UNIVERSITATEA DE ȘTIINȚE AGRONOMICE
ȘI MEDICINĂ VETERINARĂ – BUCUREȘTI
FACULTATEA DE ZOOTEHNIE

LUCRĂRI ŞTIINȚIFICE
SCIENTIFIC PAPERS

SERIA D

VOL. LIII

ZOOTEHNIE
ANIMAL SCIENCE

THE 39TH INTERNATIONAL SESSION OF SCIENTIFIC COMMUNICATIONS OF THE FACULTY OF ANIMAL SCIENCE

BUCUREŞTI
2010

Responsabilitatea pentru conținutul științific al lucrărilor prezentate în acest volum revine în întregime **autorilor**

The autors of each papers holds responsability for the content

ISSN 1843-6048

EDITURA GRANADA
Editură acreditată de CNCSIS nr. 332/2009
Bucureşti, str. Eremia Grigorescu nr. 22
Tel.: 0212.114.786.; 0728.478.918.
http://www.editura-granada.com

SUMMARY

1. GENETICS AND BREEDING

2. NUTRITION, ECOLOGY

3. REPRODUCTION, PHYSIOLOGY, ANATOMY

4. TECHNOLOGIES OF ANIMAL HUSBANDRY, MARKETING

5. TECHNOLOGIES OF THE AGRO FOOD PRODUCTS PROCESSING

6. WILF LIFE MANAGEMENT, FISHERY AND AQUACULTURE

The 39th International Session of Scientific Communications of the Faculty of Animal Science, Bucharest, Romania
Scientific papers (seria D; vol. LIII) – Animal Science

RABBITS' IMPROVEMENT

MACARI ANGELA
Institute of Scientific and Applied Biotechnology in
Animal Husbandry and Veterinary Medicine

Key words: improvement, appreciation, rabbits, slaughter yield.

SUMMARY

Characters included in object of improvement must show great economic importance. Work to improve the breeds in rabbit husbandry comprises a complex of livestock processes, aimed at improving the quality of race, animal production and high productivity in order to increase meat production.. A highly significant improvement in activity has animal breeds' **appreciation. Appreciation** aims at determining the quality of the rabbits in the assessment as productive and reproductive characters. The data presented shows that live weight before slaughter and after slaughter varies depending on race, the New Zealand-White until slaughter was - 4.09 kg after slaughter - 2.50 kg, and respectively Californian kg 4.38 kg and 2.76 kg. Ahigher slaughter yield had New Zealand breed recorded - 61.07%. Rabbit population under study is characterized by good breeding and production indices, which calls for growth in households.

INTRODUCTION

Rabbits rearing has the aim to improve the growth of pure-bred rabbits of various breeds, especially those of meat and meat- fur, as New Zeeland -White and Californian.

Characters included in objective improvement must show great economic importance. Established selection criteria is to be followed, should be easily measurable, provide a sufficiently high heritability and have a positive correlation with the other selection criteria. Guidelines on component aims of improving, rabbits selection can be made for reproduction and maternal, for body development, for meat production, down or fur.

Work to improve the breeds in rabbits rearing comprises a complex of livestock, aimed at improving the quality of breed and animal production of high productivity animals in order to increase meat production.

A highly significant improvement in activity has appreciation of animal breeds. Appreciation's aims is determining the quality of the rabbits in the assessment as productive and reproductive characters.

Productive characters can be assessed by testing New Zeeland - White and Californian breeds raised under intensive mining: towards growth and development as measured by individual weighing of rabbits (10 to 20 head.) Since birth and after every 7-14 days of growth; development by the racing of age of sexual precocity (V. Efros, 1995).

Prolificacy is determined after each birth and on average each year of service, resulting in born progeny and viable at the weaning. Meat production can be assessed by sacrificing animals from each race (V. Cofas, 1989).

Milk production is calculated by the indirect method (I. Bud, A. Mako, 1998).

Reproductive qualities are assessed by examining the percentage of female fecundity (number of pregnant females and not pregnant), the viability of babies from 1-

45 days of life, rabbits kept for breeding (46-135 days of life), after method Pomîtco V. (1982).

Purpose of research was to determine productive and reproductive qualities of the rabbits after appreciation at the rabbits farm of Technical Experimental Station from Maximovca, IŞPBZMV.

MATERIAL AND METHOD

Biological material of research served rabbits of meat production as White New Zeeland - bred and Californian raced at Technical Experimental Station from Maximovca in the extensive growth and operating system of the Institute of Scientific Practice Biotechnology in Animal Husbandry and Veterinary Medicine.

Were considered productive and reproductive qualities of the rabbits at the rabbit farm at Technical Experimental Station from Maximovca (30 head.), including: 15 females of White New Zeeland breed and 15 head of California breed.

Productive characters were determined by weighing of females before and after calving, of cups at birth, at 7 - days, 14 days, 21 - days and weighing from 35 days, 45 days, 2 months, 3 months. Indices of meat production were determined by sacrificing animals what was performed at age of 3 months.

RESULTS AND DISCUSSIONS

Assessment results, analysis and examination of the main indices were compared with standard requirements reflected in Table 1. Like any other animal species, rabbit is required to increase the selection and matching pairs in each generation. Otherwise it will reduce the quality of progeny, number of progeny, size and fur qualities, etc. Aim of selection is to choose and match the best individuals, as the next generation to be more productive to compare with previous ones.

Table 1

Standard requirements for rabbit breeds specialized for meat production

Groups	Animals body weight ,kg	Fecundity, %	Annual prolificacy, heads	Maintenance, %	Body weight at the end of youth, kg
Female	4,5	94	35-40	-	-
Male	5,0	96	-	99	-
Rabbits: 0-45 days	-	-	-	93	1,5
46-100 days	-	-	-	95	2,8
101-120 days	-	-	-	96	3,2
121-150 days	-	-	-	98	3,8

Compared with other species of domestic animals rabbits are very receptive to consangvinization, which requires strict record. So keeping the numbers of parents and offspring provide a basis for selecting work.

Rabbits improving is made, essentially, through males, since they are obtained from a much larger number of offspring compared to females. Therefore, proper selection of males is of particular importance. Males are valued and their progeny quality, as not all have the same genetic value.

Best results are obtained when the generations will choose the most valuable animals avoiding related matings. Females fall into two categories: the breeding and production. Breeding females produce young which at the age of 2-3 months is marketed to the production farm or to its visitors.

Following the data from experiments performed and presented below, we make the following assessment.

Rabbits evaluation was performed at the age of 3-8 months according to the instructions of evaluation of the rabbits and wild animals for fur (Chisinau, 2008), White New Zealand and Californian breeds with principled of rabbits improvement in Republic of Moldova.

Following to the evaluation of White new Zeeland breed was determined that from the total group of 15 males at the age of 6-18 months, 53% are upper class elite and 47% for class I. The group of females that breed and same age and was evaluated constituted a total of 32 head, of which 81% have achieved the elite class and 19% Class I (tab 2).

Table 2

Rating rabbits at evaluation

Gender	White New Zealand breed							Californian breed						
	Nr. of heads.	Elita		I		II		Nr.of heads	Elita		I		II	
		heads.	%	heads	%	heads	%		heads	%	heads	%	heads	%
Breeding male from 6 to 18 months	15	8	53	7	47	-	-	6	3	50	3	50	-	-
Breeding females from 6-18 months	32	26	81	6	19	-	-	21	17	81	4	19	-	-
Breeding male from 1.5 months - 4 months	29	18	62	5	17	6	21	14	11	79	2	14	1	7
Breeding females at 1.5 months - 4months	20	13	65	3	15	4	20	7	4	57	2	29	1	14

Young males (n = 29 heads) breeding from 1.5 to 4 months of age ranked elite 62%, 17% class I, class II 21%.

Youth breeding females of the same age from a group of 20 head., 65% are elite , 15% class I and class II 20%.

The Californian breed after evaluation ranked: males in a group of six head., 6 - 18 months of age elite class - 50% and 50% class I

At the evaluation of female of same the age and breed on a group of 21 head., ranked elite 81% and 19% class I. Breeding youth males of Californian breed aged 1.5 to 4 months from a group of 14 head. - 79% are elite class, 14% Class I and Class II 7%. Youth breeding females of the same age from a group of seven head. 57% are elite, 29% Class I and Class II 14%.

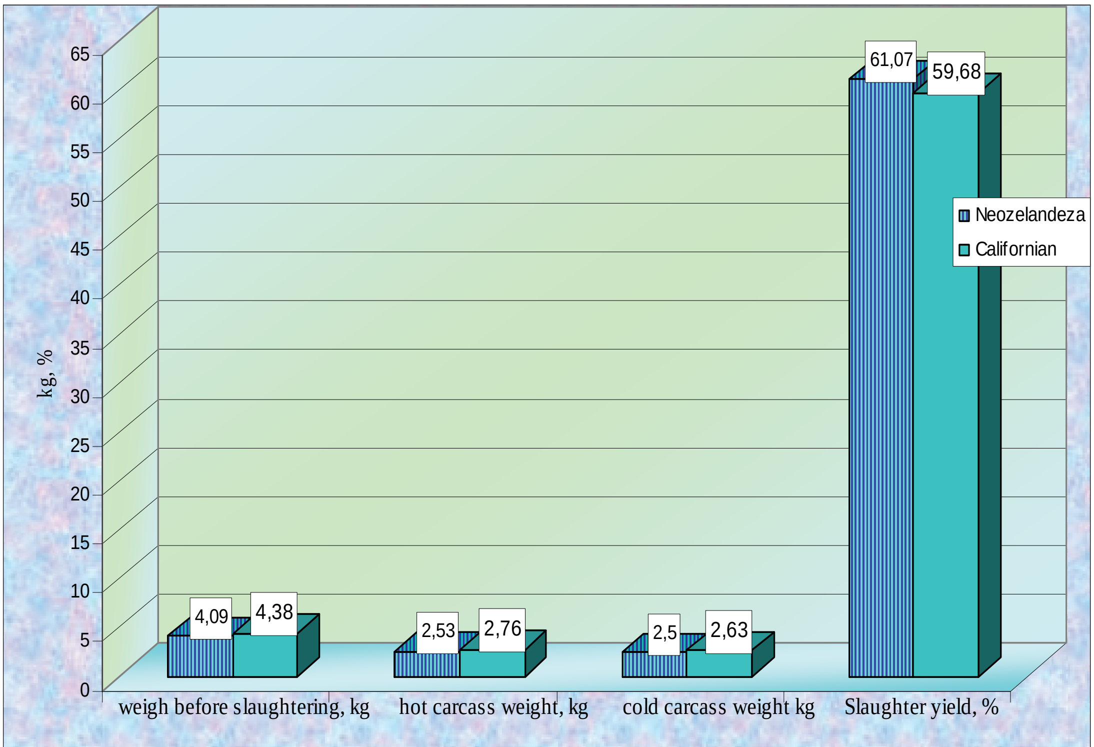


Figura 1. Meat indices of rabbits

In units specialized in the production of rabbits meat seek indices in evaluation of the production of raw and after slaughter quality and quantity indices of carcass.

The data presented (Figure 1) shows that live weight before slaughter and after slaughter vary depending on race, the White New Zealand until slaughter was - 4.09 kg after slaughter - 2.50 kg and respectively Californian 4.38 kg and 2.76 kg.

Higher slaughter yield return to White New Zealand breed recorded 61.07%. Under study females is ARE characterized by signs of good breeding and production, which is recommended for growth in households.

CONCLUSIONS

Higher yield at slaughter occurred in White New Zeeland breed-61.07%.

Rabbit population under study is characterized by good breeding and production indices, which calls for growth in households.

Study of qualities of reproductive and productive breeds of rabbits revealed an increase in indices at White New Zealand breed. It is proposed to use more active in meat producing the breed of rabbits - White New Zeeland.

REFERENCES

1. *Bud I., Mako A.* Aprecierea producției de lapte și a prolificității la iepuroace în funcție de rasa exploatată. „Creşterea şi valorificarea iepurilor, animalelor de blană şi vânatului”. Lucrări științifice. Mirton. Timişoara, 1998.- p. 9
2. *Cofas V., Stănescu V.* Organizarea procesului de producție. R. Fermierul (1989).
3. *Efros V., Bejenaru M.* Principiile de bază de creştere a iepurilor domestici. Chişinău, 1995, p. 10 – 15;
4. Instrucțiune de bonitare a iepurilor de casă şi animalelor sălbatice de blană.Chişinău 2008
5. *Помытко В.И., Александров В.Н.* Учебная книга кроликовода. Колос. Москва, 1982.

The 39th International Session of Scientific Communications of the Faculty of Animal Science, Bucharest, Romania
Scientific papers (seria D; vol. LIII) – Animal Science

BIBLICAL BIOETHICS ESSAY CONCERNING GENETICALLY MODIFIED ORGANISMS

GH. SANDU

Key words: genetically modified organisms, Codex Alimentarius

SUMMARY

Biblical text has indicated as general rule, that the creation object was the systematic category scientifically called “good species”, namely reproductively isolated. But, there were also created “semi-species” which exceptionally resulted in natural hybrids, like the ass etc. As The Old Law discouraged any kind of mixture (Numbers, Deuteronomy), it means that some mixtures, artificially induced by human beings could be unblessed by GOD. Basically, it could be blessed scientifically, the overcome of natural obstacles, if it is preserved as object of the mixture what God Himself allowed to exist in nature. From this perspective, God can’t bless genetically modified organisms, such as clones and chimers, which don’t follow the natural mechanism given at the creation.

What follows isn’t a scientific approach but a philosophical one. But philosophy is a science too, thus better saying, this means that you don’t face a technical approach of genetically modified organisms issue. What I called philosophy is a meditation concerning the human’s intervention norms over the surrounding emptiness, from the perspective of biblical ethics.

In the Creation Book , at the 11-12 verses from the first Chapter, we are told that God said :’’Shall the EARTH give birth to verdure ; grass with seed in it, according to its kind and resemblance, and fruitful trees , which shall be fruit –bearing according to their kind, on the earth!

And it was so. The earth gave birth to verdure: grass which makes seeds, according to its size and resemblance, and fruitful trees, with seeds according to their kind, on the earth. And God saw it was well.”

In front of an audience, interested in theology, I would insist on the fact that, at the beginning, vegetation appeared not from seeds, but it produced the first seeds out of which , they were about to multiply, without God’s miracle to be necessary any longer.

In front of some scientists in biology field, interested in systematic science, I insist on the fact that within a quotation of only two sentences, it is said four times that the ones which appeared by miracle, were about to produce seeds, out of which each of them to be reproduced **’’according to its kind’’.** We see, statuted here, in God’s speech **,** the good species. Saint Grigorie of Nyssa comments that the seed produced by the plants appeared by miracle, this way: “After this one fell inside the ground, out of it, the same kind of plant, as it was at the beginning , grew”.

One day, after making the plants, still using only His word, God made the animals, saying: “Shall the earth give birth to living beings, according to their kind, animals, crawlers and wild beasts, according to their kind, and all the earth crawlers according to their kind. And God saw it was well”.

As in the case of plants, in the Bible , it is insisted on the syntagm "according to their kind", proof that, generally the creation object were good species. I mean, that as rule, because, among the created ones , there were some, which are called presently semi-species, namely species apparently different, according to their resemblance degree, but which lack the mechanism of reproductive isolation. Thus, mixtures were possible to appear, in an extremely limited manner, which we could call natural hybrids, like the ass, the mule, etc.

Even if they weren't the creation object, these hybrids birth is certainly blessed by God, because they can emerge, even without human's intervention, by a natural mating act, arranged by God, only by partners change. Otherwise, the proof of their existence is given by the fact that The Saviour Himself, in his earthly life used such animals categories, coming in Jerusalem, on the back of a Jenny-ass colt.

Besides these novelties in the creation, emerged even due to the mechanisms arranged by God, it isn't expected to be blessed by the Creator, any other forms appeared on ways which force these limits. Otherwise, any mixture was discouraged by the laws established between God and human beings, at the beginning.

In this respect (what I consider to be important, you might find funny), in the Deuteronomy Book , it is clearly said "Don't you sow your vine with two kinds of seeds, and don't you curse the seeds picking up, as you sow together with the fruit of your vine. Don't you plough with an ox and an ass. Don' you wear clothes made of two kinds of threads: wool and flax threads" (chap.22, 9-11). In another part, the Scripture writes down "don't you drink mixed beverage". In the Numbers Book, chapter 19, verse 19, it is written: "You shall guard my law'; don't you make your cattle mate with another breed; don't you sow your plough land with two kinds of seeds at once; don't you wear clothes made of two kinds of threads, wool and flax". In this context, by "breed" we must understand "the variety" mentioned at the creation, not any breed of the same "kind" or species, and the restraint "don't you make them mate together" means not to force the mating of the ones which were meant to remain of the same "kind".

The specification concerning the animals, "don't you make your cattle mate with another kind", is naturally valid for plants too, as there weren't allowed even mixed crops.

To what extent, can we extend this rigid approach, without respecting God's blessing? Personally, I think we can seek to obtain in an artificial way too, what already exists, naturally. There are natural hybrids, this means that we can produce artificially some other ones, overcoming natural obstacles by a scientific approach, if the mixture mechanism stays the same with the one arranged by God in nature. Thus, without any doubt, it isn't allowed to form, within species, genetic lines meant to hybrids production.

Natural hybridization means the mixture by partners genomes mating. We could force this mixture, when mating is possible, putting the genomes together, on another way discovered by science, but mixing what God allowed to mix naturally. If one can mix whole genomes, we can dare to do it partially and why wouldn't we borrow from a species to another, just one gene?!

We could say that it is allowed to us, to overcome the limits in nature , when we speak of the manipulation of some pre-zygotal material elements drawn in the living process, but things can't stay the same when it is about life itself. Thus, for a zygote, which was called to live in a certain way by God, we aren't allowed to do with it whatever we want, and when it is about humans, anyhow, we aren't allowed to anything which might destroy him. Genetic engineering which aim at the multiple ovulation and "in vitro" fecundation, namely obtaining more zygotes, among which , only some will be used for the implant, must be considered with bio-ethical –religious caution, at least with humans.

Even when our life is endangered, we can't adopt a solution which isn't put by God in nature. For example, with the organisms endowed by God with sexual mating, we can't force the unisexual multiplication in the somatic cells. This action puts cloning among the procedures which aren't blessed by God. It is true that natural hybridizations lead to new forms, but not reuniting some somatic parts, taken the way they were in the original forms, as a simple reassembling, so chimers production, by mixing blastoderms from different species, can't be blessed by God.

In addition to this biblical bioethics, we may put the scientific bioethics, the way that even if the scientist is able from a technical point of view , and even if he is allowed from a theological perspective, he must refrain from producing genetically modified living forms which might harm, in a certain way ,the beneficiaries.

The norms application from the dread Codex Alimentarius, foreseen for the future of humankind will mostly cope with this aspect. In a normal world, these risky complications won't be necessary. God has given on earth, everything man needs, in the shape he needs, proof being the species longevity and prosperity until now. Barely, these recent additions will endanger life preserving and quality. With the wisdom God endowed human beings and with good intentions, we can produce on Earth enough food for a more numerous population than the existent one.

We could continue and it would be convenient for us to keep on eating potatoes which are just potatoes, carrots which are only carrots, without producing by genetic modification a variety of potatoes which shall contain not only starch but carotene too. And the examples may go on till presenting real strange things.

Tastes perverting will corrupt the joy of taste , and then other changes of the ones around will corrupt something else inside of us, and gradually, we won't be the beings God created.

And trust me, God didn't make a mistake, no matter how much we'll strive or boast , trying to transform ourselves in creators, we can't arrange things better than the way He did.

The 39th International Session of Scientific Communications of the Faculty of Animal Science, Bucharest, Romania
Scientific papers (seria D; vol. LIII) – Animal Science

GENETIC STRUCTURE AT THE SERUM TRANSFERRIN LOCUS IN THE CARPATHIAN GOAT

GH. HRINCĂ
Station of Research and Development for Sheep and Goat Breeding, Popauti-Botosani

Key words: protein polymorphism, transferrin, goat

SUMMARY

The biochemical polymorphism of the serum transferrin in the Carpathian goats was studied by horizontal electrophoresis method in starch gel. The genetic polymorphism at the Tf locus in this goat breed is of middle level, being determined by two co-dominant alleles (Tf^A and Tf^B) which control phenotypic expression of three genotypes: the homozygotes Tf^ATf^A and Tf^BTf^B,and the heterozygotes Tf^ATf^B. Aspects about the allelic and genotypic structures, the ratio between Tf homozygotness and Tf heterozygotness and the genetic equilibrium from the Tf locus of this goat breed were discussed.

INTRODUCTION

The polymorphism of transferrin in human, animal farm (cow, sheep, pig etc.) and poultry has been demonstrated by many investigators. In various species of animals, their serum transferrins have been studied, being demonstrated that these polymorph proteins have been controlled by multiple autosomal alleles (2, 4, 8). But, the biochemical polymorphism of transferrins in goats was not sufficiently characterized. The fractions of serum β–globulins proved to be transferrins, but it was not clarified from the beginning whether the transferrin of goats had the same properties as the serumal proteins which bond and transported the iron ions from cattle, swine and sheep. In the end, marking the serum β–globulins that present genetic variability with the ^{59}Fe isotopes, there was demonstrated that these protein fractions are bearer transferrins of the ionic iron (8).

The purpose of this report is to describe the existence of the transferrin polymorphism in the Carpathian goat breed which is bred in Romania. This documentation will be useful to provide the objective basis for future programmes of planning selection towards genetic improvement of this species which is framed in the global strategy for genetic improvement of livestock (3, 5, 7).

1. MATERIAL AND METHOD

The biological material for this study consisted of goats belonging to the Carpathian breed from the *Station of Research and Development for Sheep and Goat Breeding, Popauti-Botosan*i. The samples of blood without anticoagulant were collected from animals by jugular veinpuncture.

The genetic variants of transferrin in goats were determined by the horizontal electrophoresis method, having the starch gel, as substrate, and using a solution of lithium-borate, as electrolyte. The gel solution included Tris(hidroxymethyl)aminomethane, and electrolyte.

Preparing the solutions.

a) *the Tris-citrate solution*, stabilized at *p*H=8.2:

- tris(hidroxymethyl)aminomethane ………..6.2 g
- citric acid ………………………………….3.0 g
- distilled water ………………………..……ad 1000 ml.

b) *the lithium-borate solution (electrolyte)* in discontinuous system, stabilized at *p*H=8.6:

- boric acid …………………………………11.8 g
- lithium hydroxide …………………………0.25 g
- distilled water ………………………..……ad 1000 ml.

b) *the gel solution*, stabilized at *p*H=8.2:

- tris-citrate solution……………………… 9 parts
- lithium-borate solution ………………….… 1 part.

c) *the blood serum*. The serum resulted from the blood samples after coagulum retraction was centrifuged at 3000 r/min. and the supernatant thus obtained represented the clear serum which was stored at -30°C being susceptible for electrophoretic analysis.

Preparing the electrophoretic substrate. The starch gel was prepared of 100 ml gel solution and 12.5ml hydrolysed starch. This mixture was boiled untill liquefaction and all air bubbles were eliminated by means of a vacuum tube. Then, the liquefied mixture was moulded on rectangular glass plates (260 mm x 160 mm). When the starch became solid, incises were made in it, representing the places where the filter paper strips (Whatman insertions) imbued with serum drops will be located.

Electrophoretic migrating. The gel plates were arranged in the apparatus in a perfectly horizontal position. The Whatman insertions loaded with serum samples were inserted 4 cm from the cathode end of the gel. The electrophoresis lasted 10-12 hours until the electrophoretic bands migrated to 11 cm by the start line. The power parameters for electrophoretic migrating were 50 mA (intensity) and 400 V (tension).

Development of the transferrin electro-phoregrams.

The colouring of the starch gels was made in an alcoholic-acid solution of amidoschwartz 10B, 2%, for 15 min.:

- amidoschwartz 10B ………………………….. 20 g
- methylic acid ……………………………….. 455 ml
- icy acetic acid ……………………………….. 90 ml
- distilled water ………………………………. 455 ml

The discolouring of the starch gels was made in 2-3 successive baths of decolourizing solution, for more hours, until the gel got clarity:

- methylic alcohol …………………………… 2275 ml
- icy acetic acid ……………………………….. 250 ml
- distilled water ……………………….……... 2275 ml

The identification of the transferrin phenotypes was achieved depending on the migrating speed of the electrophoretic bands. The transferrin with the fastest migrating speed was named TfA and the one whose band is nearest of the application points of samples was considered TfB. The serum which presents electropforetic bands with intermediate moving was designed TfAB.

The distributions of genotype and allele frequencies at the Tf locus were estimated. The chi-square homogeneity test (χ^2) was performed to check distribution of genotypes and alleles in goat population.

2. RESULTS AND DISCUSSIONS

Three transferinn phenotypes were observed in the electropoetic field in the Carpathian breed: the fast type (named phenotype A), the slow types (labelled phenotype B) and the intermediate type (designed phenotype AB). Each of transferrin phenotypes A and B was identified by a single dark band, while at the transferrin phenotype AB the migrating spots were manifested by one or two dark bands, each of them being accompanied by a sickly pigmented anodal additional strip (fig. 1).

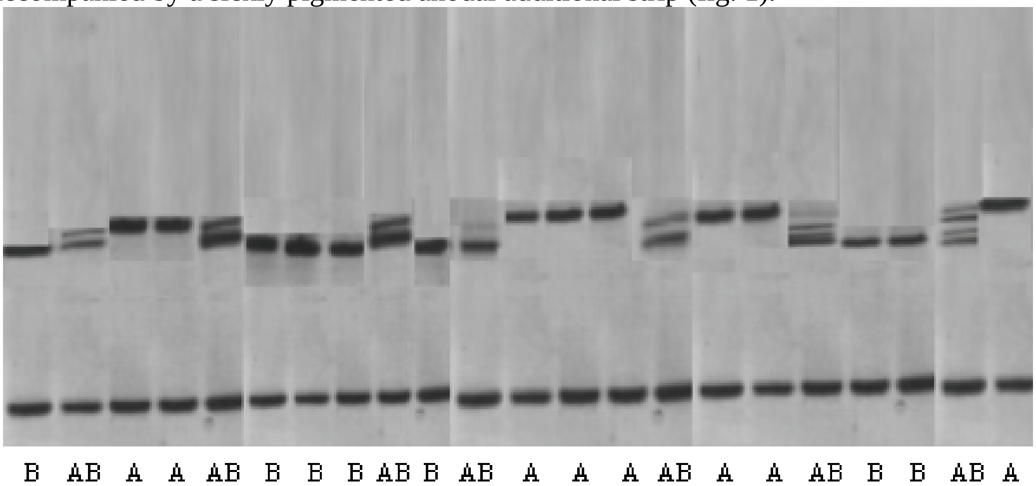


Figure 1. Transferrin electrophoregram in Carpathian goats

The electrophoretic configuration of the three transferrin phenotypes is determined by the existence of two autosomal alleles: Tf^A and Tf^B. The two transferrin alleles are in a relative equilibrium in the Carpathian breed, although the allele Tf^A (43.30%) has a lower incidence (with almost 13%) against the allele Tf^B (56.80%) (fig. 2).

The two transferrin allelomorphs are co-dominant to each other. As such, the two alleles genetically control three transferrin genotypes, being expressed as terminology Tf^ATf^A (homozygous for the allele Tf^A), Tf^ATf^B (heterozygous for both alleles) and Tf^BTf^B (homozygous for the allele Tf^B). Because of the relative equilibrium between the two alleles, the genotypic structure from the Tf locus is relatively uniform too. The incidence of heterozygotes is considerable (53.64%) and the two homozygote types have a good representation (46.36% of individuals being homozygous of both types); however, the homozygotes for the allele Tf^B are two times more frequent (31.09%) than the homozygous Tf^ATf^A (15.27%) (fig. 3). Also, in general respect, the two status of transferrin zygotness are uniformly distributed, the transferrin heterozygotness (53.64%)

being though lightly higher than the transferrin homozygotness (46.36%) (fig. 4).

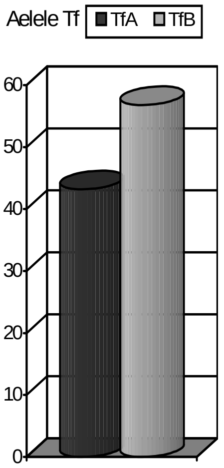


Figure 2. Allelic structure at Tf locus in the Carpathian goat

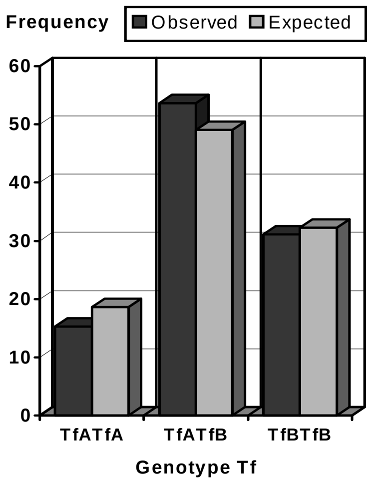


Figure 3. Genotypic structure at Tf locus in the Carpathian goat

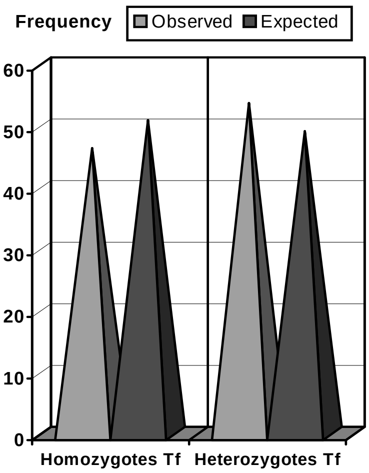


Figure 4. Zygotness status at Tf locus in the Carpathian goat

Most breeds of tame goats have a binary transferrin polymorphism determined by the two alleles (Tf^A and Tf^B) either in the European breeds (2, 4), or in the Asian breeds (5, 8) or in the American ones (7). Other breeds are more polymorph at the Tf locus; for example, four alleles (Tf^A, Tf^B, Tf^C and Tf^D) and nine phenotypes were found in the Damascus goat (3). On the contrary, in the native goats, there is a tendency towards monomorphism at the Tf locus, the expressed type being the slow one (TfA) (1, 2, 6).

Due to the fact that the observed genotypic distributions deviate too little from the expected frequencies, the values of the test χ^2 are very small and unsignificant; therefore, the Carpathian breed comply with the Hardy-Weinberg genetic equilibrium low, both concerning the individual repartition of the transferrin genotypes and in the whole aspect of the transferrin zygotness (fig. 3, 4).

3. CONCLUSIONS

1. The biochemical polymorphism of the Carpathian goats reaches a middle level and it is shown by phenotypic typifying of three transferrin genotypes: Tf^ATf^A (homozygote for the allele Tf^A), Tf^BTf^B (homozygote for the allele Tf^B) and Tf^ATf^B (heterozygote for both alleles), whose expression is controlled by two co-dominant alleles, Tf^A and Tf^B.

2. The two transferrin alleles from goats are found in a relative equilibrium with some surplus for the allele Tf^B. Therefore, the genotypic repartition from the Tf locus is relatively uniform too. More than half of individuals are heterozygous at this locus and the two types of homozygotes have a good representation, the homozygotes for the allele

Tf^B being two times more frequent than the homozygotes T^ATf^A.

3. The uniform distributions of the transferrin genotypes favour achievement of the genetic equilibrium at the locus Tf of the Carpathian goats.

REFERENCES

1. *Deza C., Petres G.T., Gardenal C.N., Varela M., Rubiales S., Barrioblio C.* – Protein polymorphism in native goats from central Argentina. . Small Ruminants Res, vol. 35, nr. 3: 195-201, 2000.
2. *Fesüs L, Varkonyhi J, Ats A.* – Biochemical polymorphism in goat in special reference to the Hungarian native breeds. Anim. Blood Grps and Biochem. Genet. vol. 14: 1-6, 1983.
3. *Güney O., Özuyanik O., Torun O., Görgülü, Darca N.* – Relationship between some polymorphic parameters and performances in Damascus goats. Pakistan J. of Biol. Sci., vol. 6, nr. 8: 738-740, 2003.
4. *Menrad M, Muller E., Stier C. H., Gelderman H., Gall C.* – Protein polymorphism in the German improved Fawn and Boer goats. Small Ruminants Res, vol. 14: 49-54, 1994.
5. *Menrad M, Stier C. H., Gelderman H., Gall C.* – A study on the Changthangi pashmina and the Bakerwali goat breeds in Kashmir: I. Analysis of blood protein polymorphisms and genetic variability within and between the populations. Small Ruminant Research, vol. 43, issue 1: 3-14, 2002.
6. *Tucker Elizabeth M., Clarke S. W.* - Comparative aspects of biochemical polymorphism in the blood of Caprinae species and their hybrids. Anim. Blood Grps and biochem. Genet., vol. 11 163-183, 1980.
7. *Wang Sh.. Foote W. C, Bunch t. D.* - Transferrin and haemoglobin polymorphism in domesticated goats in the USA. International Society for Animal Genetics (Web), 1991.
8. *Watanabe S., Suzuki Sh.* - Studies on the Transferrin of Coat. II Inheritance Mode of Serum Transferrin Types. Proceedings of the Japan Academy, vol. 42 , nr. 2(1966)pp.:178-183, 1966.

The 39th International Session of Scientific Communications of the Faculty of Animal Science, Bucharest, Romania
Scientific papers (seria D; vol. LIII) – Animal Science

RECENT CONTRIBUTIONS TO THE GENE THEORY OF SEXUALITY IN GALINACEAE

FLORIN PRICOP
Avicola Bucuresti, Jandarmeriei Street, no 2, sect. 1, Bucharest, 013893, Romania,
pricopflorinro@yahoo.com; www.florinpricop.com

Keywords: genetic recombination; feather colour; day-old chicks sex screening.

SUMMARY

The gene theory of sexuality in Galinaceae.

The genetic determinism of sex and the equal male to female ratio in chicken was explained in literature by the existence of the male sex, homogametic ZZ, and of the female sex, heterogametic ZW, as well as by the existence of genes in chromosome Z, however, with no corresponding genes of it in chromosome W. This paper presents experiments of genetic recombination which allows the identification in generation F1 of the dominant sex gene linked to the gene that determines the monitored colour phenotype. In the same generation the recessive sex allele was identified in chromosome Z. In generation F2, males and females are in equal ratio in every category of genotypes. Three categories of feather colour genotypes were produced: dominant homozygous, heterozygous and recessive homozygous. The experimental results show the presence of two genes in chromosome W, the dominant sex gene and the gene transmitting the colour of the feathers, contrary to the hemizygotic theory of Morgan. The new theory is supported by the following practical applications: Thesis and antithesis of creation of new poultry breeds; Explanation of hermaphroditism in gallinaceae; Solutions to the litigious disputes between customers and suppliers of hybrid chickens, when the genetic formula for commercial layer production was not followed; Method to stop plumage discoloration and improvement of this trait in the commercial layer hybrids obtained by crossing red Rhode-Island males with white Rhode-Island females; Hybridization design for sexing day-old hybrid chicks by the down colour using heterozygous barred females and heterozygous silver females

The 39th International Session of Scientific Communications of the Faculty of Animal Science, Bucharest, Romania
Scientific papers (seria D; vol. LIII) – Animal Science

PHENOTYPIC CHARACTERIZATION OF SILKMOTH RACES FROM THE GENETIC STOCK OF BOMBYX MORI L. SP. IN ROMANIA

ALEXANDRA MATEI[1], GEORGETA DINITA[2], GABRIELA CHIOVEANU[3], MARIETA CIULU[4], LENGHEL G.[1], MARILENA CONSTANTINESCU[1]
[1]CS SERICAROM SA-Research Department, Bucharest, Romania
[2]Faculty of Animal Science - University of Agricultural Science and Veterinary Medicine Bucharest, Romania
[3]Institute for Diagnosis and Animal Health, Bucharest, Romania
[4]National Agency for Amelioration and Reproduction in Animal Science

Key words: Bombyx mori L, Romanian genetic stock, raw cocoon weight, cocoon shell weight, fiber length

SUMMARY

The importance of gene bank existence as an essential condition for breeding programs elaboration is unanimously known for every plant and animal species, from which the permanent preoccupation for its diversification and maintaining by appropriate proceedings of preservation “in situ” or “ex situ”. This way, there is being avoided the loss of biological material, especially of the local races resistant to diseases and adapted to environmental conditions. This study aims the analysis of phenotypic characters variability within the genetic stock of Bombyx mori sp., in accordance with its biological development stages (egg, larva and pupa). Native genetic stock of silk moth Bombyx mori L. sp. resulted by: identification of local populations’ gene sources, bilateral exchange of biologic material with similar foreign institutes, creation of new genotypes using specific breeding methods. Within its structure, the genetic stock of silk moth includes 72 races.

The surveillance of health for this genetic stock represent a permanent concern for the veterinary services in Romania and it has realized every year by the National Reference Laboratory for Honey-Bee and other Useful Insects. The health status it is monitored by clinical and laboratory exams, at every insect development stages, for: polyhedrosis, flacheria, infectious anemia, nosemosis, muscardine and aspergillosis.
The silkworm specific experimental technique for new genotypes has been applied, differentiated by technological and biological development stages. The sample sizes that were the base for phenotypic parameters determination as well as the working methods correspond to sericulture technical standards. The main phenotypical and quantitative parameters of the races that represent the gene stock of Bombyx mori sp., have the following values: number of eggs/laying (230-710 eggs/laying), hatchability (80.6-100%), larval stage duration (26-32 days), larvae weight (4.2-5.7 g), larvae pupation rate (80.8-96.6%), raw cocoon weight (1.445-2.361 g), cocoon shell weight (0.240-0.520 g), fiber length (746-1356 m), metric number of fiber (2917-3764 m/g). Depending on the quantitative parameters value, the silkworm races are being used differently, entire genetic stock being destined for various technological levels, as follows: 4 active races (parents of hybrids), 4 candidate races for parents of hybrids, 64 races in preservation.

INTRODUCTION

The heredity, variability and selection represent the main factors of the animal and vegetable organisms evolution. If heredity provides the resemblance of the individuals from successive generations, the variability represents the inconsistent side of heredity, determining the differences between individuals that exist more or less to all the living beings groups. The presence of variability makes the application of selection possible, action that leads to improving animal populations.

The necessity of studying the conservation of genetic stock, has been taken into consideration by many authors (Hebean V., 1986; Brasla A. and coll., 1989; Thangavelu K., 1997; Tzenov P., 2002; Petkov N., 2004; Matei A., 2004, 2007), existing two reasons for which the animal populations need to be preserved:

a) the statute of being in menace of disappearance;

b) their genetic value.

Taking into consideration the structure and functions of the organisms to whom the variability operates to, there are being distinguished: morphological variations including shape and size changes of the body regions or organs; physiological variations which refers to physiological processes, especially to the ones with implications upon some economical characters like production, food conversion, fecundity; structural variations regarding the structure of organs and tissues and the health status.

The variability of individuals which form a population, it refers both on quantitative and qualitative features, on this aspect being distinguished: quantitative variations that can be measured, which refers to differences between metric characters and mostly with economical implications; qualitative variations that can’t be measured, they only can be described.

1. MATHERIAL AND METHOD

The biological material has been represented by 72 races consisting of the gene stock of Bombyx mori sp., grouped by their origin.

The silkworm specific experimental technique has been applied, differentiated by technological and biological development stages (Grekov D., 2005). The samples size that were the base for phenotypic parameters determination as well as the working methods correspond to sericulture technical standards. The health status was periodically confirmed by clinical and laboratory exams for: polyhedrosis, flacheria, infectious anemia, nosemosis, muscardine and aspergillosis. Polyhedrosis and nosemosis exams were done by direct microscopy method and Pohil stain; flacheria and infectious anemia were monitored by conventional bacteriological techniques and finaly muscardine and aspergillosis by micological techniques.

2. RESULTS AND DISCUSSIONS

1. The variability of egg phenotypic characters

The variability of egg morphological characters

Egg size. The egg size at Bombyx mori L. sp. races is presented as follows: length 1.4 mm (native races), 1.3 mm (Chinese races), 1.5 mm (Japanese races) and 1.1 mm (tropical races), and the egg width varies between 0.89 and 1.02 mm.

The egg weight is 0.50 mg (native races), 0.49 mg (Chinese races), 0.54 mg (Japanese races) and 0.39 mg (tropical races).

Number of eggs/laying (Table 1). Concerning Bombyx mori sp., the number of eggs/laying ratio varies between 200 and 800.

This character is being influenced by race, food quality provided to larvae, temperature and humidity conditions during laying depose.

In case of the races existing within the genetic sericultural stock, the number of eggs/laying by race group registered values between 490 and 710 eggs/laying (native races), 276-562 eggs/laying (Japanese races), 276-616 eggs/laying (Chinese races) and 230-450 eggs/laying (tropical races).

Table 1

Egg biological parameters

Race groups	Number of eggs/laying		Hatchability (%)	
	Min	Max	Min	Max
Native races	490±10	710±12	90.0±0.47	99.0±0.47
Japanese races	276±11	562±6	81.3±1.70	99.6±0.47
Chinese races	276±2	616±15	80.6±1.89	100.0±0.21
Tropical races	230±16	450±29	83.6±2.49	97.6±1.25
Races average	318±9	584±15	83.9±1.64	99.1±0.60

Egg colour. During laying depose the egg color is gradually yellow and in the next 3-4 days its color becomes violet-pink and in the end the final color is grey with different shades: dark grey, light grey, greenish grey but also orange, pink etc. All of these refer to embryonated egg color.

The chorion color, visible after larvae hatching, presents a series of mutants: white, light yellow or dark yellow, green, grey. Being a race character, both the embryonated egg color and chorion colour represent a silkworm selection character.

The races existing in sericultural native genetic stock present the egg colour in different shades: dark grey (Japanese races), greenish-grey (Chinese races), meanwhile the chorion is white at the first races group and yellow at the second one.

The variability of egg physiological characters

The voltinism (generations/year) represent a physiological character determined by environmental and genetical factors. Between environmental factors, the temperature and light plays an essential part. Incubating eggs from bivoltine races at the temperature 15-18^{o}C and short photoperiod (less than 12 hours), silk moth appear and depose non-hibernated eggs, that is 2 generations/year, in case of incubating eggs at high temperature (25-26^{o}C) for a longer photoperiod (more than 12-14 hours), silk moth appear and depose hibernated eggs (one generation/year).

The genetical determinism of voltinism is being attributed to a number of 3 multiple sex alleles (Hs, Hs^2, h_S) modified by a number of autosomal genes (H1, h_1, H_2, h_2, H_3, h_3).

The structure of sericultural native genetic stock includes bivoltine races (tropical type).

The hatchability, by race group, varies between 90.0 and 99.0% (native races), 8.06-100.0% (chinese races), 81.3-99.6% (japanese races) and 83.6-97.6% (tropical races).

2. The variability of larva phenotypic characters

The variability of larva morphological characters

The larvae length is influenced by external factors, such as the rearing conditions, feeding but it also represents a race character specific to breeding races. By race group, the larvae average length is presented in Table 2.

Larvae weight is influenced by the factors that determined the previous character and their variability by race group is presented in Table 2.

Table 2

The variability of adult larvae length and weight by races groups

Race groups	Larvae length (cm) X±Sx	Larvae weight (g) X±Sx
Native races	7.6±0.02	5.7±0.12
Chinese races	6.2±0.06	5.1±0.10
Japanese races	7.0±0.03	5.6±0.08
Tropical races	5.8±0.06	4.2±0.11
Races average	6.7±0.04	5.2±0.10

Larvae color represents a complex and variable character and refers to the tegument cephalic capsule and eyes.

In the breeding works, tegument color and larval marks are selection criteria taken into consideration, as being race characters.

Body color is normally white with a shade of light blue in Chinese races and pink in Japanese races, visible to the union place of the larva body segments.

The variability of larva physiological characters

The **moulting**, respectively the moults number, represent one of the most important physiological character of the larva. The primitive races are characterized by 3 moults, while developed races have 4 moults.

The geneticists appreciate that the presence of 3 moults represent the dominant character and the responsibles for hereditary transmition of the moults number are 3 multiple alleles: M^3 and M^5, the dominant relationships being tri>tetra>penta (Tazima Y., 1964).

At the same time, the moulting is controlled by the combined action of the juvenile hormone secreted by corpora allata and the moulting hormone-ecdysone-secreted by the prothoracic gland, both being under the control of activator hormone secreted by neuro-secrethoris cells of the cerebroid ganglions.

The races existing within the sericultural native genetic stock are characterized by the presence of 4 moults, excepting “Three Molter” race with 3 moults.

The duration of **larval stage** characterizes every race group, being shorter in tropical races (26-28 days), followed by native races (28-29 days) and longer in Japanese ones (30-32 days) (Table 3).

Table 3

The variability of larval stage duration and pupation rate

Race groups	Larval stage (days)			Pupation rate (%)		
	Min	Max	Average	Min	Max	Average
Native races	28	29	28.5	90.2	96.6	92.50
Chinese races	28	30	28.6	80.8	93.8	89.14
Japanese races	30	32	30.0	85.6	96.4	92.30
Tropical races	26	28	27.0	90.0	92.6	91.3

Chrysalis transformation percentage (**pupation rate**) - character which reflects the viability state and their capacity of metamorphosis, have been high at the native race group (90.2-96.6%) and inferior at the other groups, as follows: 85.6-96.4% at the Japanese races, 80.8-93.8% at the Chinese races and 90.0-92.6% at the tropical races.

3. The variability of cocoon phenotypic characters

The variability of cocoon morphological characters

The **cocoon shape**, depending on the race group which belongs to, can be:

- elongated with constriction that characterize the Japanese races;
- oval elongated with rounded extremities specific to Chinese races;
- spherical, elongated without constriction, characterizing also some Chinese races;
- spindle, elongated without constriction and with sharp extremities is the specific cocoon shape to the tropical races.

The **cocoon size**, expressed by the longitudinal and transversal axle length, presents a high variability within the sericultural genetic stock.

By group races, the cocoon size varies between the limits presented in Table 4.

Table 4

The variability of cocoon size

Races group	Longitudinal axle (cm)		Transversal axle (cm)		Cocoons/l	
	Max	Min	Max	Min	Max	Min
Native races	4.20±0.131	3.20±0.171	2.26±0.105	1.95±0.031	69±3	65±1
Chinese races	3.60±0.134	3.50±0.135	2.50±0.116	2.08±0.078	42±2	48±2
Japanese races	4.25±0.152	3.77±0.125	2.49±0.135	1.83±0.104	59±5	67±3
Tropical races	3.30±0.141	2.98±0.111	1.90±0.113	1.66±0.107	100±7	85±6
Races average	3.84±0.140	3.36±0.136	2.29±0.117	1.88±0.080	67±4	66±3

The variability of cocoon technological characters

Cocoon weight (Table 5) present, by race group, the following average values: the minimum value is between 1.445 (Chinese races) and 1.632 g (Japanese races), maximum value being between 1.709 (tropical races) and 2.361 g (Chinese races).

Cocoon shell weight, corresponding to Table 5, has minimum values at tropical races (0.240 g) and maximum value at Japanese races (0.520 g).

Silk content (Table 5) represent one of the most important selection's objective. Generally, the Japanese races have maximum values (25.06%) on this parameter.

Table 5

The technological parameters of raw cocoon (g)

Races group	Raw cocoon weight (g)		Cocoon shell weight (g)		Silk content (%)	
	Min	Max	Min	Max	Min	Max
Native races	1.604±0.045	2.273±0.066	0.315±0.011	0.504±0.008	18.045±0.712	22.371±0.575
Japanese races	1.632±0.042	2.233±0.092	0.328±0.013	0.520±0.005	19.040±0.518	25.060±0.295
Chinese races	1.445±0.019	2.361±0.092	0.340±0.003	0.482±0.011	16.530±0.602	24.151±0.643
Tropical races	1.469±0.060	1.709±0.050	0.240±0.007	0.369±0.013	16.789±0.622	22.760±0.546
Races average	1.538±0.042	2.144±0.075	0.306±0.009	0.469±0.009	17.601±0.614	23.586±0.515

The **dry cocoon weight** (Table 6) registers maximum values at Japanese races (1.250 g) and minimum values at tropical races (0.676 g). The **fiber length** (Table 6), same as dry cocoon weight, has the maximum value at the Japanese races (1356 m).

Table 6

The technological parameters of dry cocoon

Races group	Dry cocoon weight X±Sx		Fiber length X±Sx	
	Min	Max	Min	Max
Native races	0.843±0.028	1.163±0.033	1119±22	1324±38
Japanese races	0.870±0.036	1.250±0.035	1037±16	1356±33
Chinese races	0.724±0.028	1.184±0.031	908±15	1236±24
Tropical races	0.676±0.018	0.823±0.026	746±10	950±27
Races average	0.778±0.028	1.105±0.031	952±15	1216±30

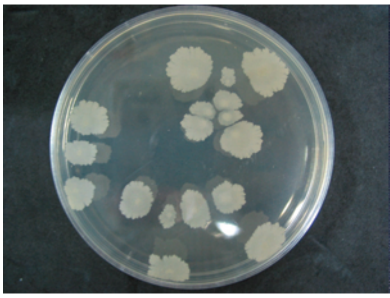
Reeling silk registers also maximum values at native races (44.8%) and minimum values at tropical races (38.6%).

Fiber fineness, expressed by meters/g, has maximum values at native races (3241-3764 m/g). Lower performances, but still notables, have the Japanese races (3041-3460 m/g).

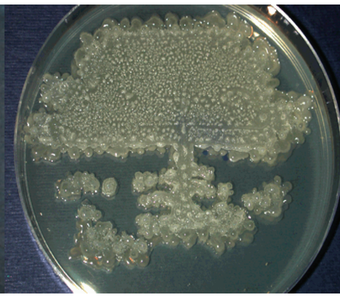
Notable performances of fiber fineness have the Chinese races (3016-3762 m/g). At the tropical races, the fiber fineness is between 2917 and 3090 m/g, being lower to the previous groups.

4. The health status for all development stages.

The health status was periodically confirmed by clinical and laboratory exams for: polyhedrosis, flacheria, infectious anemia, nosemosis, muscardine and aspergillosis.



Bacillus subtilis
specific colony on nutritive agar



Bacillus licheniformis
specific colony on BHI agar

Staphylococcus xylosus
specific colony on BHI agar

On this period, at whole genetical stock preserved it was isolated and identified only nonpathogenic species. After we have processed samples from silk worms (at V larval stage) and silk moth, we have isolated by bacteriological exams, species like: *Bacillus subtilis*, *Bacillus licheniformis and Staphylococcus xylosus.* We also have performed parasitical, virusological and micological exams, but we haven't identifier any kind of pathogens. We can affirm that the new genotypes are free for all type of specific pathogens.

3. CONCLUSIONS

Depending on the quantitative parameters value, the silkworm races are being used differently, entire genetic stock being destined for various technological levels, as follows:

- 4 active races (parents of hybrids);
- 4 candidate races for parents of hybrids;
- 64 races in preservation.

REFERENCES

1. *Brasla A., Matei A.* (1989) – Study on the variability of the main quantitative traits in some silkworm races, Archiva Zootechnica, vol. 1, p. 63-70.
2. *Ciulu M.* (2008) – Comparative study of the genetic determinism of the production characters in silkworm, Ph.D thesis, Romania.
3. *Grekov D., Kipriotis E., Tzenov P*. (2005) – Sericulture training manual, Komotini-Greece
4. *Hebean V.* (1986) – Study upon phenotipical and genotipical characters in the imposted Phylosamia ricii race and possibilities to create native biological material – Ph.D. thesis, Romania.
5. *Matei A. and coll.* (2004) – The diversification and utilization of genetical stock as source of initial material in breeding works of Bombyx mori L. – Romanian Animal Science in the EU integration perspective – Session of scientific communications, Iasi, Romania, p. 218-222
6. *Matei A., Chioveanu G.* (2007) – The structure, origin and performances of races sp. Bombyx mori L. existing in sericultural genetic stock in Romania – The XXIIIth National Symposium of history and agrarian retrology, 23-24 August, Bacau.
7. *Petkov N., Matei A., Natcheva Y., Vasileva Y., Petkov Z., Ciulu M.* (2004) – The phenotipical characters of some Romanian silkworm Bombyx mori races in relationship to the use of selection programmes-AGRAL Scientifical Symposium "Research upon chain from Romania in a European Context, Romania, p. 280-286
8. *Tazima Y.* (1964) – The genetics of the silkworm, Logos Press.
9. *Thangavelu K.* (1997) – Role of germplasm bank in sericulture – Indian Silk, 36/3,p.5-11.
10. *Tzenov P., Vasileva Y.* (2002) – Silkworm genetic resources in Bulgaria – XIXth Congress of International Sericultural Commission Proceedings, Bangkok, Thailand, p.243.

GENOTYPE-FEEDING INTERACTION IN BROILERS: EFFECTS OF REPLACING SOYBEAN MEAL BY RAPESEED MEAL IN THE DIETS FOR TWO COMMERCIAL BROILER HYBRIDS

GEORGETA CIURESCU, HORIA GROSU
Național Research - Development Institute for Animal Biology and Nutrition (IBNA) – Calea Bucuresti nr.1, 077015 Baloteşti, Ilfov, Romania, (ciurescugeorgeta@yahoo.com)

Key words: soybean meal, rapeseed meal, broilers genotype, performance, feed conversion ratio, economic efficiency, carcass quality

SUMMARY

The experiment was conducted on 1120 day-old broiler chicks, of both sexes, from two commercial hybrids: Ross 308 (genotype A) and Cobb 500 (genotype B), with the purpose to study the possibility to replace the dietary soybean meal by rapeseed meal and to compare the effects of the replacement on broiler performance, slaughtering yield and percentage of carcass parts. The broilers were housed under conditions similar to those from a commercial farm with floor-raising, on permanent litter. The broilers were assigned to two groups, control (C) and experimental (E) with 280 broilers each (2 groups × 2 genotypes × 2 replicates × 140 broilers). The broilers had free access to the feed and water. They received compound feeds corresponding to their age: starter (1- 10 days), grower (11- 24 days) and finisher (25- 42 days). The experimental results show that soybean meal can be replaced by rapeseed meal in amount of 25.00% (starter), 34.50% (grower) and 38.00% (finisher). The use of rapeseeds meal in the compound feed was also cost-efficient, yielding more profit. The slaughtering yield and the proportion of carcass parts were similar for both hybrids, irrespective of the diet. However, genotype A achieved higher weight gains (by 1.70 – 2.16%), in both variants, compared to genotype B.

Researchers are concerned lately to find new feeding solutions for poultry, which to yield high performance on low costs. Poultry feeding uses two main types of feed ingredients: cereal grains and industrial plant by-products. Corn is the most important among the cereals because of its high level of total digestible matter which gives it high energy content. Corn protein has a low biological value though, because two essential amino acids for poultry, lysine and tryptophan, are in very low levels. Hence, it is necessary to supplement poultry diets with compound feeds (CF) with high biological value protein. Soybean meal is the main source of vegetal protein (44%, whole grains, and 46-50%, dehulled grains) for poultry, while providing essential amino acids close to poultry requirement (highest lysine digestibility, 91%, of all available protein sources) (Swick and Tan, 1997). The compound feeds industry soybean meal is used both partial and full-fat. Although it is a strategic feed ingredient in many countries in Europe and Asia, the soybean meals are imported, which requires finding replacement solutions with other vegetal sources; this is the situation in Romania, too.

Rapeseed meal might be an alternative plant source for poultry feeding, giving cheaper diets, provided the compound feed formulations are correct. The rapeseed meal made of whole grains has about 40% crude proteins (on DM basis). Its protein is less digestible than soybean meal protein (72% vs. 88%), but the amino acids balance is similar, or even better than in the soybean meal for the sulphur amino acids (Summers et al., 1990 cited by Koreleski, 1993). Given the high level of insoluble polyosides and tannins (from the teguments), the metabolisable energy is rather low and is one of the problems with the rapeseeds meal, next to the presence of glucosynolates (Lessier et al., 1990 cited by Slominski et al., 1992; Charlton, 1997).

Rapeseeds meal also has more vitamins: choline, biotin and folic acid (Bell, 1984 cited by Koreleski, 1993) than the soybean meal. Khattak et al. (1996), have shown that the use of rapeseeds seeds and oil in the CF for broilers is not advisable because of the dietary glucosynolates, while Miles (2002) tested the effect of two enzymatic preparations (one with beta-glucanases, pectinase and xylanase, the other a mixture of proteases) and the presence and absence of an enzymatic pre-treatment of the rapeseed, to solve this problem. The best results were produced by the CF supplemented with both enzymatic preparations and without enzymatic pre-treatment (average daily gain 56.59 g/day, compared to 52.09 g/day). The results of the tests on broilers conducted by INCDBNA (IBNA) – Baloteşti (Vasile and Ciurescu, 2005) showed that the rapeseed meal can be used in broiler CF (replacing 25% of the soybean meal) with no adverse effect on broiler performance. The dietary treatment with „Kemzyme VP Dry" (beta-glucanase, endo-beta-glucanase, alpha-amylase, bacillolysine and endo-beta-xylanaze) didn't influence significantly broiler performance.

The purpose of the study was to determine the effects of replacing the soybean meal by rapeseed meal in broiler CF and to compare two commercial broiler hybrids.

1. MATERIAL AND METHOD

The study was conducted in the experimental farm of IBNA- Baloteşti on 1120 day-old broiler chicks, of both sexes, from two commercial hybrids: Ross 308 (genotype A) and Cobb 500 (genotype B).

The broilers were assigned to two groups: control (C) and experimental (E) with 280 broilers each (2 groups × 2 genotypes × 2 replicates × 140 broilers).

The experimental period was of 42 days, divided as follows:

- For Ross 308 hybrid: *start* (0 – 10 days), *growing* (11 – 24 days) finishing(25 – 42 days)
- For Cobb 500 hybrid: *start* (0 – 10 days), *growing* (11 – 22 days) finishing (23 – 42 days)

The test used 2 CF formulations (according to the three stages of development): a control formulation (C) and an experimental (E) formulation. The control formulation consisted mainly of corn, wheat, full-fat soy, soybean meal, oil and fish meal. In the experimental formulation, 25.00%, 34.50% and 38.00% of the soybean meal was replaced by rapeseed meal, according to the stage of development. The chemical composition of the rapeseed meal, assayed by IBNA, was: dry matter – 90%, crude protein – 34.45%, ether extractives – 2.60%, gross fibre – 11.0%, ash – 7.0%, metabolisable energy, poultry – 1794 kcal/ kg feed. All CF formulations were isoprotein, isoenergy and had similar levels of total sulphur amino acids, lysine, calcium and available phosphorus, being in agreement with the feeding requirements recommended for the intensive raising of these hybrids (Feeding manual: Cobb- Vantress, 2008 for Cobb 500 broilers and Aviagen, 2007 Ross 308 broilers).

The broilers had free access to the feed and water.

The broilers were housed in a shelter with climate conditions similar to that form a commercial farm using floor-raising on wood shavings. There were separate enclosures for each group and replicate.

The light regimen was continuous (24h) throughout the experimental period.

The broilers were vaccinated according to the specific program for this category of poultry and treated with coccidiostatics in prophylactic dose.

The following parameters were monitored: average daily feed intake (g), body weight evolution according to the stage of development (g), average daily weight gain, by stage of development (g), feed conversion ratio (g feed/g gain); liveability index (%), economic efficiency, slaughtering yield and proportion of carcass parts (%).

At the end of the experiment, 8 broilers from each replicate were starved for 2 hours, then weighed and slaughtered. The slaughtering yield was determined by the individual weighing of the resulting carcasses (including the head + neck + legs, abdominal fat + organs).

Statistic calculation

The experimental data were processed by variance analysis using the Fisher test. The Student – t test was used to determine the significant differences between the experimental groups; the differences were considered statistic for $P < 0.05$.

2. RESULTS AND DISCUSSIONS

Table 1 shows the average performance of the broilers in terms of body weight per period of growth, average daily weight gain, average daily feed intake, feed conversion ratio and liveability.

The replacement of 25-38% soybean meal by rapeseed meal, according to the developmental stage, didn’t influence significantly ($P > 0.05$) body weight and the average daily weight gain in both hybrids. The average daily feed intakes and to total feed intake were not influenced significantly ($P > 0.05$) either. Feed conversion ratio was correlated with the feed intake and was similar between the experimental groups for both genotypes.

These results support the reports of Larbier and Leclercq (1994) that the dietary rapeseed meal doesn’t affect adversely broiler performance if the dietary inclusion level doesn’t exceed 5- 6%.

Comparing hybrid performance, we notice that up to the age of 10 days (start period) the body weight and average daily weight gain were not influenced significantly ($P > 0.05$) by the level of replacement. After this age, at 28 and 542 days, the body weight was influenced significantly ($P < 0.05$); genotype A gaining 4.38% and 2.13% more, for group C and 0.11% and 1.70% more, for group E, compared to genotype B. The total average daily weight gain was 2.16 to 1.73% lower in genotype B, than in genotype A, both for group C and for group E.

Table 1

Broiler performance

Variant/ Characteristic	**Genotype A** (Ross 308)		**Genotype B** (Cobb 500)	
	C (SS)	**E** (SR)	**C** (SS)	**E** (SR)
Initial weight (g) [1)]	42.75	42.88	42,54	42,82
Weight at 10 days (g) [1)]	217.34	231.20	210,50	214,70
Weight at 28 days (g)	1291.28 [a]	1256.23 [b]	1234,84 [b]	1254,86 [b]
Final weight (g)	2328.10 [a]	2311.42 [a]	2278,67 [b]	2272,23 [b]
Total gain (g)	2285.35	2268.54	2236,13	2229,41
Average daily gain (g/day)	54.41	54.01	53,24	53,08
% compared to C	100	99.26	100	99,69
Total feed intake (g) [1)]	4288	4210	4294	4257
Average daily feed intake (g)	102.10	100.24	102,24	101,36
Feed conversion rate (kg feedj/kg gain)	1.88	1.86	1,92	1,91
Liveability (%)	98.92	98.57	100,00	99,28
Theoretic weight at 42 days	2652		2626	
Theoretic total feed intake (g)	4644		4621	

[1)]– Differences were not significant (P >0.05)
a, b – the average values on columns not having the same superscript differ significantly (P <0.05)

The total feed intake per the experimental period was not influenced significantly by the feeding regime (P >0.05), for both variants and for both hybrids. Feed conversion ratio was correlated with the feed intake.

Mortality, expressed by the liveability index (table 1) was 9 chickens per total experiment, of which 3 in the control groups and 6 in the experimental groups, and had no relation with the feed formulation.

Table 2 shows the economic-financial effects of feeding the broilers with soybean meal or its partial replacement by rapeseed meal.

Table 2

Economic and financial effects of feeding broilers with CF formulations having soybean meal or rapeseed meal

Indicator	MU	**Genotype A** (Ross 308)		**Genotype B** (Cobb 500)	
		C (SS)	**E** (SR)	**C** (SS)	**E** (SR)
Expenditure with feeding	Lei/chicken	4.288	4.120	4.294	4.170
Total production expenditure	Lei/chicken	6.597	6.338	6.606	6.415
Total income	Lei/chicken	7.790	7.740	7.630	7.610
Weight at delivery	K/ chicken	2.328	2.311	2.279	2.272
Price of delivery	Lei/kg	3.35	3.35	3.35	3.35
Profit	Le/ chicken	1.19	1.40	1.02	1.19
Margin of profit	%	18.03	22.08	15.44	18.55

The evidence shows that broiler feeding impacts strongly of broiler performance (average daily gain, total gain, feed conversion ratio, etc.) and on the cost of feeding and on the total cost of production. Taking into consideration the average broiler weight at delivery and the price per kg, both variants made profit. The use of rapeseed meal produced higher profits for both hybrids, which shows that in economic terms, the CF formulations with rapeseed meal produced the best outcomes. Of the total cost of production, 65-75% is the cost of feeding. The unit cost for the purchase of day-old chicks was 1.65 lei/chick.

Table 3 shows the slaughtering yield and the proportion of carcass parts.

Table 3

Slaughtering yield and the proportion of carcass parts

Live weight (g)	**Experimental variant**	**Slaughter yield**	**Breast**	**Thigh**	**Drums**
Genotype A (as % of live weight)					
2370	C	71.82	18.91	12.79	10.17
2330	E	71.71	18.75	12.93	10.28
Genotype B ((as % of live weight)					
2350	C	71.59	17.70	10.12	10.13
2390	E	71.61	17.92	10.22	10.26

The average values are similar for both hybrids irrespective of the feed formulation; however, genotype B had lower values than genotype A.

3. CONCLUSIONS

The experimental results show that:

- The rapeseed meal can be used in broiler CF replacing 25- 38% of the soybean meal, according to the developmental stage, without affecting significantly broiler performance.
- The CF formulations with rapeseed meal were more cost-efficient and produced more profit for both hybrids.
- The economic efficiency was better because the rapeseed meal was cheaper.
- The slaughter yield and the proportion of carcass parts was similar for both hybrids, irrespective of the feed formulation.
- Comparing hybrid performance, we notice that up to the age of 10 days (start period) the body weight and average daily weight gain were not influenced significantly (P >0.05) by the type of CF formulation. Significant differences appeared after this age, when genotype A gained 1.70%-2.16% more, than genotype B; these differences persisted until slaughter (42 days).

REFERENCES

1. *Charlton P.* (1997) – Expanding enzyme applications: Higher amino acid and energy values for vegetable proteins. Rev. Zootecnica International, ianuarie, 33- 35.
2. *Cobb (2008)*: Cobb 500 Management Manual, revised may 2008 from http://www.cobb-vantress.com.
3. *Cowan W.D., Korsbak A., Hastrup T., Rasmussen P.B.* (1994) – Influence of the added microbial enzymes on energy and protein availability of selected feed ingredients. Animal Feed Science and Technology 60, 311- 319.

4. *Korelesky Jerzy* (1993) – Improved rapeseed meal or oilseed as a feed for poultry. 9th Eupopean Symposium on Poultry Nutrition, Jelenia Gora, Poland, 35- 53.
5. *Khattak F. M., Acamovic T., Seaife J.R., Taylor A. G.* (1996) – Effects of enzyme supplementation of fullfat rapeseed and rapeseed meal diets on the performance of broiler chicks. British Poultry Science, 37.
6. *Larbier M., B. Leclercq* (1994) – Nutriția şi alimentația păsărilor. Ed. Alutus, Bucureşti.
7. *Miles R.D.* (2002) – Utilizarea enzimelor furajere în nutriția şi alimentația păsărilor. Ghid practic de nutriția păsărilor. Ed. Ceres, Bucureşti.
8. *Ross (2007)* – Ross 308 Management Manual, revised jun. 2007 from http://www.aviagen.com.
9. *Slominski B.A., Campbell L.D., Guenter W.* (1992) – Enhancement of the feeding value of low-glucosinolate rapeseed by the supplementation of poultry diets with exogenous enzymes. Proceedings XIX World's Poultry Congress, vol. 2, Amsterdam, Olanda, 241- 245.
10. *Swick R.A., Tan P.H.* (1997) – Characteristics of protein meal: Considerations in using common Asian proteins meal. Rev. Zootecnica International, ianuarie, 14-25.
11. *Vasile A., Ciurescu G.* (2005) – Productive effect of replacing the dietary soybean meal by various levels of rapeseed meal in broiler diets supplemented with enzyme preparations. Archiva Zootechnica, Ed. Cartea Universitară, vol.VIII, 111- 116.

The 39th International Session of Scientific Communications of the Faculty of Animal Science, Bucharest, Romania
Scientific papers (seria D; vol. LIII) – Animal Science

STUDY CONCERNING THE COMPARATIVE EFFICIENCY OF SOME SELECTION METHODS IN A POULTRY LINE

GROSU H., POPA R. AL., POPA DANA, CORBESCU CARMEN

Key words: breeding value, Osborne index, individual animal model, selection

SUMMARY

Animal breeding imply to promote the most valuable individuals, choose on breeding value. The breeding value must be always acompained byits precision. The level of breeding value precision is an categorized criteria between selection candidates which have similar breeding values; between two equal breeding values will be prefered that with big precision. On the other hand, the breeding value precision is one on the factors which influence annual genetic gain; a big precision imply big genetic gain (selection effect). Also, precision can be used for selection methods choosing.

The aim of this paper work is to realise a comparative study concerning the use a two biometric methods for breeding value prediction in a Plymouth-Rock line, for four traits: average weight at 7 weeks, the number of eggs, the egg average weight, and the percent of hatching. The breeding value for each individual, for all traits, is estimated using Osborne index and individual animal model. The ranking differences between evaluated individuals using those methods were quantified by rank correlation. The results showed that the individual animal model was superior to Osborne index, at significant level, especially for traits with low heritability.

1. MATERIAL AND METHOD

The biological material is represent by a Rock line, constitute by 1937 female descendents which appertain to 54 fathers and 424 mothers. The average size of father family is 35.9 female descendents, and of the mother family size is 4.57 female descendents. The average sex ratio was 7.85. It was analyzed 4 traits: the live weight at 7 weeks, the number of eggs, the egg average weight, and the percent of hatching.

For genetic parameters estimation REML method was used, elaborate by Patterson and Thompson (1971), using canonical transformation. For comparison of the two selection criteria: Osborne index (Osborne, 1957a) and individual animal model (Henderson 1973, 1975, 1984; Quaas and Pollak, 1980) two mathematical instruments was used: rank correlation method and selection accuracy (the square root of determination coefficient). The inverse of A matrix was calculated using Quaas method (1976). The fixed effect was considerate hatching serial (i=1…4). In case of Osborne index, the breeding value was predicted just for 1937 female descendents and in case of individual animal model for all individuals (1937+424+54=2415).

2. RESULTS AND DISCUSSIONS

The values of heritability for considerate traits are show in table 1.

The values of phenotypic, genotypic and environmental correlations are presented in table 2.

Table 1

The values of heritability for considerate traits

Trait	$h^2 \pm S_{h^2}$
Live weight at 7 weeks	0.17 ± 0.054
Number of eggs	0.19 ± 0.058
Egg average weight	0.46 ± 0.109
Percent of hatching	0.05 ± 0.031

It can be observed that in analyzed population, the traits have a small genetic determinism, except the egg average weight. The values of heritability are related with those find by other authors (Gheorghe S., 1979, 1983).

Table 2

The values of phenotypic, genotypic and environmental correlations

Couple of traits	r_P	r_G	r_e
Live weight at 7 weeks x			
Egg average weight	0.052	-0.152	0.112
Percent of hatching	-0.185	-0.085	-0.195
Number of eggs	-0.230	-0.360	-0.210
Egg average weight x			
Percent of hatching	-0.090	-0.012	-0.111
Number of eggs	-0.031	-0.050	-0.027
Percent of hatching x			
Number of eggs	-0.098	-0.037	-0.105

It can be observed that is difficult the simultaneous genetic improvement of live weight and number of eggs (-0.36). This fact will be more difficult to realize in case of introduction in selection objective of egg average weight, because both traits are negative correlated with this (-0.152 and -0.05 respectively). This difficult in simultaneous genetic improvement of these two traits, dictate a different consideration of those according to relative economical importance.

The egg average weight is important just in situation in which it conditions a good percent of hatching. It can be observed that between egg weight and percent of hatching, both phenotypic and genotypic correlations are very low and negative. So, these traits can be considerate independent. In these conditions, the artificial selection has the objective to maintain the value of trait, not increase it.

Concerning percent of hatching, it can be observed that it is negative correlated with al traits. So, the present of this in selection objective can create some problems.

For identify the genotypes which have capacity to transmit superior peculiarities related to live weight at 7 weeks, egg average weight, percent of hatching, and number of eggs, it was made a comparative ranking of individuals, based on two selection criteria: Osborne index and individual animal model. The results are presented in tables 3, 4, 5 and 6.

Table 3

Ranking of the first 15 hens according to breeding value and rank, based on individual animal model and Osborne index, for live weight at 7 weeks

No	Mark	BV Animal model	Rank Animal model	BV Osborne index	Rank Osborne index
1	59-536	5.3	1	1.0	1205
2	49-420	5.2	2	7.2	36
3	49-599	4.7	3	0.5	863
4	41-495	4.7	4	-5.7	1852
5	21-559	4.7	5	-1.7	1356
6	49-522	4.6	6	2.1	532
7	41-507	4.4	7	1.2	705
8	33-471	4.4	8	-2.6	1509
9	23-603	4.4	9	-7.9	1924
10	59-425	4.3	10	2.2	498
11	59-482	4.2	11	2.4	470
12	49-435	4.0	12	5.7	1050
13	49-638	4.0	13	-0.5	1077
14	59-660	3.9	14	-3.8	1686
15	41-475	3.9	15	-1.7	1351

Table 4

Ranking of the first 15 hens according to breeding value and rank, based on individual animal model and Osborne index, for live egg average weight

No	Mark	BV Animal model	Rank Animal model	BV Osborne index	Rank Osborne index
1	50-458	6.5	1	2.1	292
2	40-605	6.3	2	-1.5	1482
3	08-422	6.1	3	1.0	599
4	08-442	6.0	4	-0.2	1042
5	08-430	5.8	5	2.7	177
6	08-578	5.7	6	-0.3	1087
7	11-593	5.6	7	1.3	491
8	08-600	5.6	8	1.6	413
9	08-444	5.5	9	0.3	826
10	08-525	5.5	10	4.3	38
11	11-681	5.2	11	1.6	415
12	07-546	5.2	12	1.2	521
13	11-505	5.1	13	4.7	27
14	07-563	5.0	14	0.1	922
15	08-591	5.0	15	-0.1	1013

Table 5

Ranking of the first 15 hens according to breeding value and rank, based on individual animal model and Osborne index, for live percent of hatching (%)

No	Mark	BV Animal model	Rank Animal model	BV Osborne index	Rank Osborne index
1	17-464	3.0545	1	2.9898	8
2	17-458	3.0545	2	2.3633	71
3	17-535	2.9861	3	2.8514	17
4	19-426	2.9531	4	1.3603	346
5	19-418	2.9531	5	0.7558	610
6	17-474	2.8806	6	1.2537	399
7	17-554	2.8122	7	1.9917	140
8	17-551	2.8122	8	2.8514	16
9	29-540	2.8042	9	2.5001	52
10	30-403	2.7869	10	0.1251	935
11	29-644	2.7869	11	0.9101	531
12	29-642	2.7869	12	3.1485	5
13	17-424	2.7428	13	2.8514	20
14	30-407	2.7380	14	0.6196	688
15	30-405	2.7380	15	0.6720	664

Table 6

Ranking of the first 15 hens according to breeding value and rank, based on individual animal model and Osborne index, for live number of eggs

No	Mark	BV Animal model	Rank Animal model	BV Osborne index	Rank Osborne index
1	44-426	8.3	1	5.3	100
2	29-517	7.7	2	4.3	199
3	29-485	7.7	3	8.9	2
4	29-480	7.6	4	8.4	5
5	55-556	7.6	5	1.3	730
6	29-475	7.4	6	3.5	291
7	29-591	7.3	7	3.1	348
8	29-508	7.2	8	3.3	328
9	44-534	7.1	9	-1.2	1284
10	44-648	7.1	10	4.3	204
11	53-428	7.1	11	3.6	277
12	44-682	6.9	12	-0.2	1081
13	44-635	6.9	13	0.9	798
14	44-614	6.8	14	6.7	30
15	44-611	6.8	15	4.5	171

It can be observed a big variability concerning the places occupied by same individual, ranking by different criteria. These big differences in different criteria ranking of individuals determinate to obtain low values of rank correlations – table 7.

Table 7

The values of rank correlations in different criteria ranking of individuals

Trait	Rank correlation
Live weight at 7 weeks	0.27
Egg average weight	0.32
Percent of hatching	0.63
Number of eggs	0.44

The lowest value of rank correlation was for live weight (0.27) and the biggest for percent of hatching (0.63). All these correlations are distinct significant (critical value 0.081 for $\alpha=0.01$ and $n=1937$).

The second comparison criteria of these selection methods was accuracy of genetic evaluation – table 8.

Table 8

The selection efficiency for individual animal model an Osborne index

Trait	Selection accuracy Animal model	Selection accuracy Osborne index	Relative efficiency Animal model / Osborne index (%)	Relative efficiency Animal model / individual performance (%)	Relative efficiency Osborne index / individual performance (%)
Live weight at 7 weeks	0.57	0.53	7.5	38.2	28.54
Egg average weight	0.75	0.72	4.2	10.58	6.15
Percent of hatching	0.39	0.35	11.4	74.41	56.52
Number of eggs	0.59	0.55	7.2	35.35	26.17

It can be observed that the individual animal model have a biggest precision of selection in comparison with Osborne index, but in relation with value of trait heritability. The increase is big in case of trait with low heritability (11.4%) and lowest in case of trait with high genetic determinism (4.2%).

In comparison with individual performance selection, the animal model claims an extra precision between 10.58 and 74.41%. The same discussion for Osborne index, but the values are between 6.15 and 56.52% (related with trait heritability).

3. CONCLUSIONS

These results justify the introduction of BLUP-animal model methodology in breeding program of studied population. The animal model take into account in a optimal way all information sources (ascendants, individual performances, collateral relatives, and descendents), increasing the accuracy of selection.

REFERENCES

1. *Drăgănescu, C.* – Ameliorarea animalelor. Editura Ceres, Bucureşti, 1979.
2. *Grosu, H., Lungu, S., Kremer, V.* – Modele liniare utilizate în ameliorarea genetică a animalelor. Editura Coral Sanivet, Bucureşti, 1997.
3. *Grosu, H., Oltenacu, P. (coord.)* – Programe de ameliorare genetică în zootehnie. Editura Ceres, 2005.
4. *Sandu, Gh.* – Genetica şi ameliorarea păsărilor. Editura Ceres, Bucureşti, 1983.
5. *Sandu, Gh.* – Modele experimentale în zootehnie. Editura Coral Sanivet, Bucureşti, 1995.

PARTIAL RESULTS ABOUT GENETIC ANALYSIS OF LIPIZZAN HORSES FROM BECLEAN STUDFARM: REPRODUCTIVE ISOLATION AND AGE STRUCTURE

MAFTEI M., POPA R., POPA DANA, GÎRLEA MARIANA,
POGURSCHI ELENA, MARIN MONICA

Key words: Lipizzan, genetic analysis, reproductive isolation, age structure, Beclean studfarm

SUMMARY

This study is a part of an ample research concerning the genetic analysis (history) of Lipizzan horses from Beclean studfarm. The genetic analysis studies are a part of Animal Genetic Resources Management because just start of them we elaborate the strategies for inbreeding management. This study has as purpose to present two important aspects of genetic analysis: reproductive isolation level and age structure. This parameters has a capital importance in animal breeding because there has a directly influence in animal population evolution.

The population acceptance criteria are four: reproductive isolation, morphological and physiological differences, environmental requirements and genetic size. The reproductive isolation level is the most important criteria for population acceptance, the other three being in according to them. This parameter is very important because only reproductive isolated populations have an own evolution, in contrary they are influenced by evolving of immigrants populations.

The age structure have a double importance: for exploitation because influenced directly average age, and on the other hand, for animal breeding because is influenced the generation interval and population variability.

1. MATERIAL AND METHOD

The biologic material are represented by five sire stallions and twenty three mares Lipizzan breed representing the entire reproductive nucleus from Beclean stud farm at this time (06.10.2010).

The reproductive isolation level was quantified using the follow relation (Drăgănescu, 1979):

$$C.I.R. = \frac{AA-(AI+II)}{AA+AI+II},$$

where: AA – number of individuals accepted for reproduction in analysed interval with both autohtones parents; AI – number of individuals accepted for reproduction in analysed interval with one autohtone and one immigrant parents; II – number of individuals accepted for reproduction in analysed interval with both immigrants parents.

The age structure can be described by weight of different age categories from entire population. The age structure is expressed in years.

2. RESULTS AND DISCUSSIONS

The results regarding reproductive isolation coefficient (RIC) are showed in table 1.

Table 1

The reproductive isolation coefficient values

Specifications		No.	Immigrants (I)	Parents			RIC
				AA	AI	II	
Reproductive nucleus (RN)	M	5	5	-	-	5	-1
	F	23	23	-	-	23	-1
	Total	28	28	-	-	28	-1
Parents of RN	M	15	15	-	-	15	-1
	F	22	22	-	-	22	-1
	Total	37	37	-	-	37	-1
Grandparents of RN	M	26	26	-	-	26	-1
	F	36	36	-	-	36	-1
	Total	62	62	-	-	62	-1

Analyzing the values presented in table 1, we can conclude that the Lipizzan horses from Beclean stud farm are not a population with own evolution. The RIC – 1 value miens that the reproductive isolation does not exist.

From 5 sire stallions 4 of them (80%) have both parents born in Sâmbăta stud farm, and the other one have the mother born in Sâmbăta and father in Dalnic.

From 23 mares 19 of them (82,7%) have both parents born in Sâmbăta stud farm, 2 of them (8,7%) have mother born in Sâmbăta and father born in Brebeni, 1 of them (4,3%) have mother born in Brebeni and father in Dalnic, and another one (4,3%) have mother born in Brebeni and father in Sâmbăta.

At the parent of RN level, situation is almost the same: 79,99% from sire stallions have both parents born in Sâmbăta, and 86,38% from mares have the same origins.

We can say that the Lipizzan horses from Beclean stud farm are situated in the Sâmbăta stud farm genetically irradiation area.

The age structure situation in Lipizzan horses from Beclean stud farm is presented in table 2 and figure 1 and figure 2.

Analyzing table 2 and figure 1 and 2 we can see that the age structure is not equilibrate for both sexes. This situation could be explained by chaotic admitting in reproduction nucleus of individuals, as a consequence of: incapability to produce sire stallions and mares for replacing, small size of reproduction nucleus and impossibility to realize a reproductive isolation.

Table 2

The age structure situation in Lipizzan horses

Sex	Total	Birth year																								Average age
		1990		1991		1993		1994		1995		1996		1998		2000		2002		2003		2004		2005		
		N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	years
M	5	/	/	/	/	/	/	/	/	2	40	1	20	/	/	2	40	/	/	/	/	/	/	/	/	12.50
F	23	2	8.7	1	4.35	1	4.35	2	8.7	2	8.7	/	/	3	13.03	1	4.35	3	13.03	4	17.39	2	8.7	2	8.7	11.22

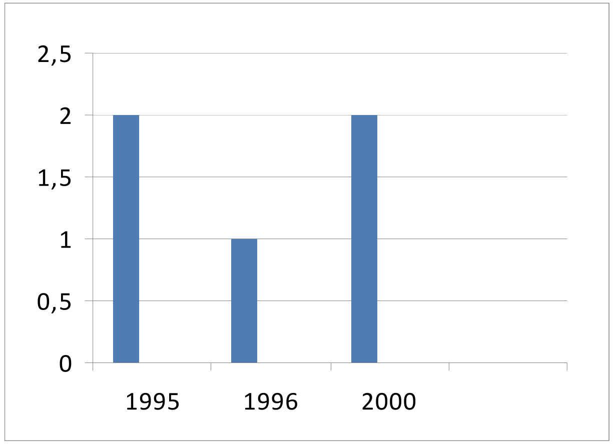


Figure 1 = stallion age structure

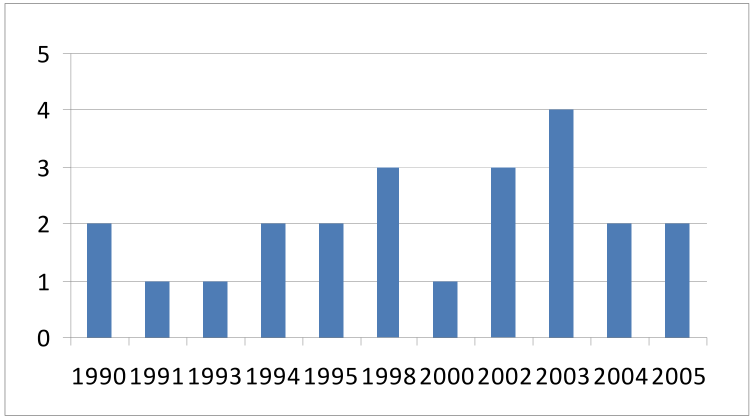


Figure 2 – mares age structure

3. CONCLUSSIONS

1. The Lipizzan horses from Beclean are not a population.
2. Beclean stud farm can be considered an appendix of Sâmbăta stud farm.
3. The age structure is unbalanced at both sexes, with major negative consequences regarding the generation interval.
4. A good solution for Beclean stud farm for being a real stud farm is to increase the reproductive nucleus evolutive direction, distinctly by Sâmbăta Lipiyyan population.
5. A viable long term solution, from genetically and commercial reasons, is to maintain the selection activities in direction of obtaining colored Lipizzan (black, bay, chestnut).

REFERENCES

1. *Drăgănescu C.* – Ameliorarea animalelor, Ed. Ceres, București, 1979.
2. *Mărginean Gh.* – Tratat de hipologie, Ed. Orion, 1997.
3. *Popescu Vifor Şt.* – Genetica populațiilor de animale domestice, Ed. Ceres, București, 1990.

The 39th International Session of Scientific Communications of the Faculty of Animal Science, Bucharest, Romania
Scientific papers (seria D; vol. LIII) – Animal Science

THE POLYMORPHISM OF SOME KEY GENES INVOLVED IN SOME LACTATION TRAITS

TEODORA CRINA CARSAI[1], VALENTIN ADRIAN BALTEANU[1]
[1] Faculty of Animal Husbandry and Biotechnology, Regional Laboratory of Farm Animals Genotyping, University of Agricultural Sciences and Veterinary Medicine, 3-5 Calea Manastur Street, 400372, Cluj-Napoca, Romania; lzga.usamvcj@yahoo.com

Key words: genes, polymorphisms, lactogenesis

SUMMARY

In the last years the number of researchers interested in genetic determinism of mammary gland development and function in different species and humans and the implication of genetic polymorphisms from some loci (coding for hormones, transcription factors or enzymes) in lactation, very much increased. The development of some new technologies in the fields like genomics, transcriptomics, proteomics, leaded to identification of some mechanisms controlling the proliferation of epithelial secretor cells in mammary gland and their secretion capacity. Understanding more profoundly of these genetic mechanisms has today a bigger importance, because the improvement of milk quantity and quality in farm species doesn't have to compromise the animal health reproduction and its longevity.

ACTIVATION OF GENES EXPRESSION IN MAMMARY GLAND UNDER THE INFLUENCE OF LACTOGENIC HORMONES

The data avalanche from the last years is linked to the mechanisms trough which some protein factors (hypothalamic factors of hormones releasing, hormones, transcription factors, enzymes), cooperates to induce mammary epithelial cells differentiation and starting of the mammary gland secretor activity.

In milk ruminants milk there are 6 major milk proteins codified by 6 non-allelic genes, which are specifically expressed in mammary epithelial secretor cells during lactation (Balteanu et al., 2010). The whole casein is composed of : α_{S1}-casein (α_{S1}-CN), β-casein (α_{S1}-CN), α_{S2}-casein (α_{S2}-CN) and K-casein (K-CN). It is representing: 80% in cattle, 85% in buffalo, 82% in sheep, 77% and goat, from whole protein. The proportion of casein fraction has a significant influence of milk manufacturing properties, the texture and taste of different cheeses or other dairy products. The whey proteins are represented by β-lactoglobulin (β-LG) and α-lactoalbumin (α-LA) and represents: 20% in cattle, 15% in buffalo, 18% in sheep, 23% in goat.

Lactogenesis can be divided in two phases: Phase I - which begins in the last stage of gestation, in which are taking place cellular structural and functional differentiation processes of the secretor epithelium; Phase II - which begins immediately after birth and involves the finalisation of cellular differentiation, which coincides with milk secretion and synthesis in significant quantities. These two phases are essential having as final effect starting of lactation. We can deduce that any mutation in the structure of some genes (coding for hormones, growing/ transcription factors or enzymes) responsible for mammary gland development and function, can cause modifications in any of these two stages, with immediately impact (negative or positive) on milk production parameters (Carsai et al., 2010).

The endocrine system, mainly pituitary gland, plays a central role in all aspects involving mammary gland development, lactation and maintaining of its secretion and then its activity ending. The secretor activity of pituitary gland is coordinated by the brain trough some protein factors for synthesis and releasing of hypothalamic factors. The pituitary factor 1 (PIT1) is a key factor synthesised in hypothalamic nuclei, which has a direct influence in synthesis and releasing from anterior pituitary gland of the 2 major hormones involved in growth and development of mammary gland (mamogenesis), lactation starting and milk synthesis (lactogenesis), maintaining of milk synthesis (galactopoesis): growth hormone or somatotroph (GH or STH) and prolactin (PRL).

The growth hormone (GH) is acting on mammary gland by two mechanisms: 1) indirectly, trough the stimulation in liver of another key hormone synthesis called insulin like growth factor 1 (IGF 1); 2) directly trough the binding of his receptor (called GHR).

In mammary gland these two hormones are binding by their receptors located on the target mammary gland secretor epithelial cells membrane: prolactin receptor (PRLR) and growth hormone receptor (GHR). These binding cause the receptors dimerization and activation by phosphorylation of a protein transcription factor named signal transducer and activator of transcription factor 5 (STAT 5). He is arriving in nucleus where binds to specific regions from milk protein genes promoters, causing their transcriptional activation and milk protein synthesis, influencing the milk fat and lactose synthesis too (Carsai et al., 2010)

AcylCoA: diacylglycerol acetyltransferase (DGAT) is a key enzyme involved in triacylglycerol synthesis, using as a substrate diacylglycerolul and acetyl-CoA. In milk the fats are organized as little spherical and elliptical globules, being composed of triglycerides which are representing 98-99% from all fats. In mammary gland DGAT is involved in triglycerides synthesis, which is taking place in smooth endoplasmatic reticulum.

Lactose is the main carbohydrate found in all mammals milk, being composed of galactose and glucose covalently bound ß1,4 glycosidic by a one way reaction. It is synthesised in mammary gland by lactose synthase, a complex enzyme composed of 2 proteins: ß1,4 galactosyltransferase (GALT), which is its active part and α-lactoalbumin (α-LA), which is a milk protein without a catalytic function.

GALT is an enzyme found in all tissues, being located in cell only on the inner surface of the Golgi apparatus. In the absence of α-LA (a milk protein synthesised only in mammary gland) GALT participates in glycoprotein synthesis by adding of galactose to the oligosaccharides complex from glycosylated proteins. In secretor epithelial cells from lactating mammary gland, GALT modify its substrate specificity by association with α-LA, being the active subunit of lactose synthase enzyme.

After synthesis in Golgi apparatus lactose cannot diffuse out from the forming secretor vesicles and as a consequence the water is absorbed and retained inside for osmotic pressure equilibration. The quantity of water absorbed is directly linked with the quantity of lactose, having as immediate effect increasing or decreasing milk production.

STUDIES CONCERNING THE ASSOCIATIONS BETWEEN THE POLYMORPHISMS OF THESE GENES AND MILK QUANTITY/ QUALITY IN FARM SPECIES

The mutations occurring in these genes structure during the years leaded to the appearance of many alleles in these loci. These variations, named generically polymorphisms, are caused by genes restructuration (substitution of a nucleotide with another, deletions, insertions etc), which can have as an effect: modification of gene expression levels, modification in aminoacid sequence of the protein codified by the gene (with consequences on protein conformation and its activity as a hormone, receptor or enzyme) or without any effect if these mutations are located in introns. The effect of these polymorphisms in the 10 loci is further discussed.

PIT 1: Mattos et al. (2004) by studies made in Holstein breed found that A allele (characterised by the absence of Hinf I restriction site from exon 6) is associated with increasing of milk and protein quantity, but with a lower fat percent. Oshima et al. (2003) studied the combined effect of two markers (PIT 1 and α_{S1}-CN) on milk production in an American Holstein population. The AA genotype in PIT 1 locus and BC in α_{S1}-CN locus had positive influence on milk quantity and quality. Huang et al. (2008) identified in American Holstein a SNP polymorphism C577A type from exon 3, associated with a proline to histidine substitution in position 76 of mature protein. This new allele was associated with a significantly increasing of milk quantity in Holstein.

PRL: Dybus et al. (2002) investigated the associations between an RsaI polymorphism from exon 3 of prolactin gene and Polish Holstein and milk production. AA genotype was associated with a higher protein percentage in comparison with BB genotype. Brym et al. (2005) studied the association between an A8398 G type polymorphism form exon 4 and milk production in Polish Holstein and Jersey breeds. The AG genotype was associated with a higher milk quantity and GG genotype was associated with a higher protein percentage. Miceikiene et al. (2006) studied the prolactin gene polymorphism in 4 Lithuanian cattle breeds. AA genotype was associated with a superior milk fat percentage in comparison with AB and BB genotypes. Ghasemi et al. (2009) studied the same polymorphism Rsa I from exon 3 in Monbeliard breed, AA genotype being associated with higher milk quantity.

GH: Dybus et al (2002) studied a polymorphism Alu I type located in exon 5 which has a consequence a substitution of a leucine (L) with a valine (V) in the position 127. The LL genotype was associated with a higher fat and protein quantity. Yardibi et al (2009) studied the same polymorphism in South Anatolian and East Anatolian Red Cattle. In both breeds LL genotype was associated with a higher milk quantity and a higher fat percentage in comparison with the other 2 genotypes.

IGF 1: Siadkowska et al (2006) studied the association between a polymorphism C472T type located in the 5'untranslated region in Polish Holstein and milk production. The CT genotype was significantly associated with milk quantity and quality and a higher fat and protein percentage in comparison with CC genotype. Mehmannavaz et al. (2010) examined the effect of the same polymorphism in Iranian Holstein. Also in this study the CT genotype was associated with a higher milk and fat quantity in comparison with the other genotypes.

PRLR: Brym et al. (2005) studied the association between a polymorphism A205C type from intron 9 in Polish Holstein and Jersey breeds and milk production. The CC genotype was associated with a higher milk quantity and a higher protein percentage in comparison with AA and AC genotypes. Viitala et al. (2006) studied the association between a polymorphism which cause a serine (S) to asparagin (N) substitution in position 18 of prolactin receptor in Finnish Ayrshire breed, this polymorphism being associated with a higher milk fat and protein quantity.

GHR: Viitala et al. (2006) respectively Sun et al. (2009), studied in Finnish Ayrshire and Chinese Holstein respectively, an A/T type polymorphism from exon 8, which has as result a fenilalanine (F) substitution with a tyrosine (Y) in the position 279 of mature protein. This protein was associated with a higher protein and fat percentage and with a higher milk quantity.

STAT 5: Brym et al (2004) studied a polymorphism G9501A type from intron 9 in Jersey breed, GG genotype being associated with a higher milk quantity and protein percentage, AA and AG genotypes being associated with a higher protein percentage. Flisikowsky et al. (2004) studied in Polish Holstein a polymorphism T12743C from exon 16. TC genotypes were associated with a higher milk quantity and a higher percentage of dry matter, protein and lactose in comparison with TT. Sadeghi et al. (2008) studied the same polymorphism in Iranian Holstein, finding that CT genotype was associated with a higher protein quantity from milk. Selvaggi et al (2009) studied in Italian Brown a polymorphism C6853T type from exon 7, CC genotypes being associated with a higher milk quantity and a higher protein percent in comparison with CT and TT.

DGAT: In the gene coding for this enzyme a double substitution in exon 8 AA/GC type was identified. It was associated with a substitution of a lysine (K) with and alanine (A) in mature protein (Grisard et al., 2004). The effect of this polymorphism AA/GC was studied in cattle populations from New Zeeland (Spelman et al., 2002), Israel (Weler et al., 2003), Holland (Grisard et al., 2002) Germany, (Sanders et al., 2006), Poland (Parek et al., 2005), France (Gautier et al., 2007; Naslund et al., 2008). After an expression study the researches concluded that the variant containing lysine has a higher enzymatic activity, in comparison with the variant containing alanine. The effects of this aminoacid substitution are associated with higher milk and protein quantity but a lowering fat quantity, fat and protein percentage.

In Romanian cattle and goat breeds there is not known, which are the genetic variants (alleles) in the 10 loci and which is their frequency? Are these identical with those identified in other world breeds? What differences of genetic nature exists between improved versus unimproved breeds which are causing so extreme phenotypes concerning milk production? These are several questions we are trying to answer in the Project TE code 224/2010-2013.

Acknowledgments: This research was supported by CNCSIS-UEFISCSU, Project TE code 224/2010

REFERENCES

1. *Balteanu, V.A., Pop F.D., Vlaic A., Carsai T.C., Creanga S.*- Characterization of the αS1-casein I^{SM} allele provides evidence for phylogeny of the ancient Romanian Grey Steppe cattle, Moldavian strain. Lucrări Ştiinţifice Seria Zootehnie Iaşi, 53: 315-320, 2010.
2. *Brym, P., Kamiñski S., Wójcik E.* - Nucleotide sequence polymorphism within exon 4 of the bovine prolactin gene and its associations with milk performance traits. J. Appl. Genet. 45: 179-185, 2005 ;
3. *Carsai, C. T., Balteanu V. A.* - Key genes involved in development and lactation capacity of mammary gland in cattle and goats. Bulletin UASVM Animal Husbandry and Biotechnology, 67(1), 2010;
4. *Dybus, A.*- Associations of growth hormone GH and prolactin PRL genes polymorphism with milk production traits in Polish Black and White cattle. Anim. Sci. Pap. Rep., 20: 203-212, 2002 ;
5. *Flisikowski, K., Oprzadek J., Dymnicki E., Zwierzchowski L.*- New polymorphism in the bovine stat5a gene and its association with meat producttion traits in beef cattle, Anim. Sci. Papers Rep., 21: 147–157, 2003;
6. *Ghasemi, N., Zadehrahmani M., Rahimi G., Hafezian SH.*-Associations between prolactin gene polymorphism and milk production in Montebeliard cows. Int. J. Genet. Mol. Biol., 1: 48-51, 2009 ;
7. *Gautier, M., Capitan A., Fritz S., Eggen A., Boichard D., Druet T.* - Characterization of the DGAT1 K232A and variable number of tandem repeat polymorphisms in French dairy cattle. J. Dairy Sci. 90:2980–2988, 2007;
8. *Huang, W., Maltecca C., Khatib H.* - A proline-to-histidine mutation in POU1F1 is associated with production traits in dairy cattle. Animal Genetics**,** 39: 554 – 557, 2008;
9. *Mattos, K.K., Del Lama S.N., Martinez A.F.*- Association of bGH and Pit-1 gene variants with milk production traits in dairy Gyr bulls. Pesq. Agropec. Bras., Brasilia, 39:147-150, 2004;
10. *Selvaggi, M., Cataldo D., Normanno G., Celano G., Dario M.*- Genetic polymorphism of STAT5A protein: relationships with production traits and milk composition in Italian Brown cattle. J. Dairy Res., 76 441- 445, 2009;
11. *Siadkowska, E., Zwierzchowski L., Oprzadek. J, Strzałkowska N., Bagnicka E., Krzyaewski J.* - Effect of polymorphism in IGF-1 gene on production traits in Polish Holstein-Friesian cattle. Anim. Sci.Pap. Rep., 24: 225-237, 2006.

The 39th International Session of Scientific Communications of the Faculty of Animal Science, Bucharest, Romania
Scientific papers (seria D; vol. LIII) – Animal Science

IDENTIFICATION OF THREE POSSIBLE NEW CASEIN ALLELES IN CARPATHIAN GOAT

VALENTIN ADRIAN BALTEANU[1], TEODORA CRINA CARSAI[1]
[1] Faculty of Animal Husbandry and Biotechnology, Regional Laboratory of Farm Animals Genotyping, University of Agricultural Sciences and Veterinary Medicine, 3-5 Calea Manastur Street, 400372, Cluj-Napoca, Romania; lzga.usamvcj@yahoo.com

Key words: Carpathian goat, α_{S1}-casein, β-casein, polymorphism, allele

SUMMARY

In goat αS1-casein (α_{S1}-CN) locus, at least 18 alleles with four different expression levels have been identified so far, having a significant influence on milk protein, casein, fat contents, manufacturing properties and cheese yield. In Romania, unimproved Carpathian goat breed exhibits a high heterogeneity concerning milk quality. In our previous work we described a high degree of polymorphism of major milk proteins in Carpathian goat. We describe here the detection of three possible new casein variants in α_{S1}-CN casein and β-casein (β-CN) loci. Potential benefit of selection for null allele individuals is discussed.

1. MATERIAL AND METHOD

1.1. MILK SAMPLES COLLECTION

A total of 283 milk samples from three goat populations were collected, in order to identify the frequency of these previously observed alleles (Balteanu, 2005; Balteanu, 2010a). Milk samples collection was done individually directly from udder and no preservatives were added. Samples were stored during transportation at 4^0C and then frozen at -20^0C.

1.2. GENOTYPING

Isoelectric focusing (IEF) of milk samples was done as described in our previous studies (Balteanu, 2005; Balteanu et al., 2007). IEF was carried out in 4 % ultrathin (0,5mm) polyacrylamide gels containing urea and a mixture of three ampholytes with a pH ranging between 2.5-7.0, in an Multiphor II Electrophoresis System (GE Healthcare, Sweden). After the run, the gels were stained in PhastGel Blue R (GE Healthcare, Sweden). The gels were then analyzed with a Molecular Imager Gel Doc XR System (BioRad Laboratories, Hercules, CA, USA).

1.3. RNA EXTRACTION FROM MILK SOMATIC CELLS

Milk samples collection was done from several Carpathian goat individuals, identified by IEF as carriers of the new α_{S1}-CN null and β-CN alleles in the homozygous condition. Samples were also collected from two individuals identified as carriers of the other unknown α_{S1}-CN variant in heterozygous condition with B allele, just these kinds of individuals being identified in this case.

Somatic cells from the collected milk samples (10 ml) were pelleted by centrifugation at 2,000 g for 15 min at 4^0C. The cell pellet was resuspended in 1 ml

PureZOL reagent (BioRad Laboratories, Hercules, CA, USA) and the following extraction steps were performed according to the protocol recommended by the producer.

1.4. cDNA OBTAINING AND SEQUENCING

These were done as described before (Balteanu, 2010a). The restriction products were analyzed in 2.5% agarose gel, containing 1X Sybr Safe (Invitrogen, Eugene, OR, USA).

2. RESULTS AND DISCUSSIONS

The analysis of IEF profiles of individual milk samples revealed, in the six loci coding for the six major milk proteins, the presence of some common genetic variants in the six loci, but also the presence of some rare alleles.

A null α_{S1}-CN genetic variant (named α_{S1}-CN 0^{Ch} allele, 0-null, Ch-Carpathian), characterised by the absence of this protein in milk of homozygous animals, was identified with 0,021 frequency. It was observed always in linkage with a possible new genetic variant in β-CN locus (named β-CN X^{Ch} allele, X-uncharacterised, Ch-Carpathian), proving the linkage inheritance of both alleles located on the same chromosome, namely 6. Only homozygous individuals could be identified by IEF (Figure 1, left).

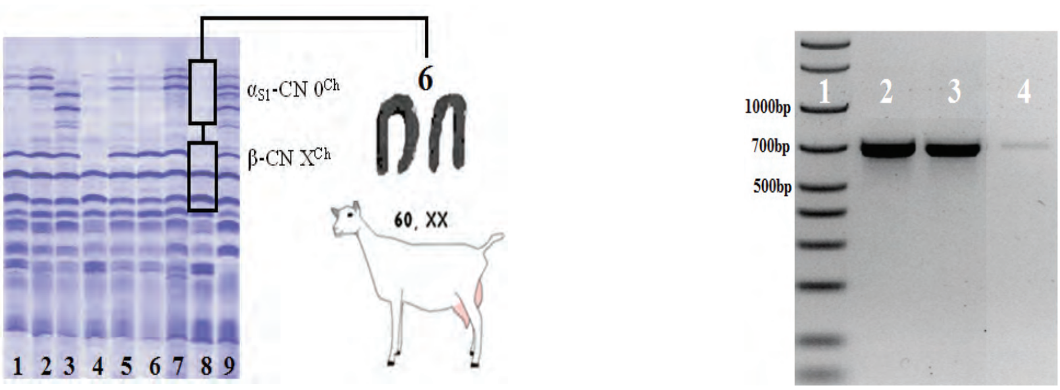


Fig. 1. Evidencing of α_{S1}-CN 0^{Ch} allele by IEF of milk samples (samples 4 and 8 respectively, left picture), and their corresponding transcripts by PCR: (sample 4, right picture). The β-CN X^{Ch} is also evidenced by IEF (samples 4 and 8 respectively, left picture)

The reverse transcription of α_{S1}-CN mARN, followed by PCR amplification performed on reference samples α_{S1}-CN BB, AA and the new null genotype, revealed a high quantity of α_{S1}-CN cDNA from BB and AA genotypes and just cDNA traces belonging to null allele (Figure 1, right). These results confirmed the IEF observations, according to which the milk of these individuals is lacking in α_{S1}-CN.

Also in α_{S1}-CN locus a possible new genetic variant was observed with an IEF electrophoresis profile pretty similar with that of F variant. The major IEF band of this α_{S1}-CN is running below the second band of β-CN A and the second band close above de first electrophoresis band of β-CN A (Figure 2, left).

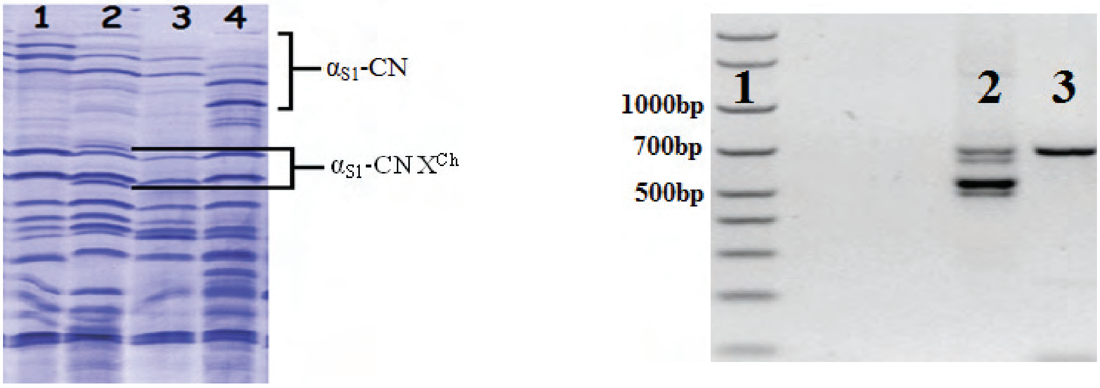


Fig. 2. Evidencing of α_{S1}-CN X^{Ch} allele by IEF of milk samples (sample 2, left picture), and their corresponding transcripts by PCR: (sample 2, right picture).

This genetic variant was observed only in heterozygous condition with α_{S1}-CN B allele, it both identified individuals. What is interesting for this genetic variant is the major change in its isoelectric point (Figure 2, left). The majority of known genetic variants found in this locus in goat, have an isoelectric point very close to the anodic end of IEF gels, above β-CN (Figure 2, left). The exception is F genetic variant, which has the highest isoelectric among all known caprine α_{S1}-CN genetic variants (Balteanu et al., 2007). This is due to the lack of several peptides from its structure caused by gene restructuration, which causes an exon skipping phenomenon (deletion of 3 exons) in messenger RNA of F allele (Leroux et al., 1992).

This possible new allele was named until its characterisation α_{S1}-CN X^{Ch} (X-uncharacterised, Ch-Carpathian) and, as it is suggested by protein electrophoresis profile, probably presents in its sequence a major restructuration caused probably by several mutations or/and exon skipping phenomenon (found in F allele too). It cannot be mistaken for F allele because of two reasons: the isoelectric point is lower in comparison with F genetic variant and its level of expression is significantly higher (evidenced by the higher intensity of the quantitative dye PhastGel Blue R). This suggests that this allele belongs probably to high expression alleles group.

The reverse transcription of α_{S1}-CN mARN followed by PCR amplification, performed form reference samples BB and heterozygous BX^{Ch} samples, revealed one transcript belonging to α_{S1}-CN cDNA BB sample and several transcripts in the case of BX^{Ch} sample, one belonging to B allele and the others to X^{Ch} allele. These results confirmed the IEF observations according to which this major change in its isoelectric point is do to an exon skipping phenomenon.

Some of these observations were confirmed by DNA sequencing (Balteanu V.A., personal communication, unpublished data 2010).

3. CONCLUSIONS

The present study was performed on 283 Carpathian goat individuals belonging to 3 populations.

Three possible new genetic variants were identified. A null allele was identified in α_{s1}-CN locus, namely α_{S1}-CN 0^{Ch}, being characterised by the absence of this protein in milk of homozygous individuals. It was observed always in linkage with a possible new genetic variant in β-CN locus, namely β-CN X^{Ch}. Another allele, namely α_{S1}-CN X^{Ch}, has in its sequence a major restructuration caused probably by several mutations and/or an exon skipping phenomenon.

PCR tests will be developed in our laboratory, in order to rapidly and early identify these casein alleles, even in heterozygous condition. A particular interest is focused on the α_{S1}-CN 0^{Ch} allele because its potential use in creating hypoallergenic milk, α_{S1}-CN being the main milk allergen. The influence of this new α_{S1}-CN null allele on milk composition is also under evaluation as compared with the common AA, EE and FF genotypes in this locus.

Acknowledgments: This research was supported by National Centre for Programs Management (CNMP), Project No. 52104/2008-2011 and Code 1086.

REFERENCES

1. *Balteanu, V.A.*- Studiul polimorfismelor genetice ale proteinelor majore din lapte la principalele rase de taurine, bubaline, ovine şi caprine din România în scopul utilizării lor ca markeri genetici în ameliorare şi trasabilitate. Teza de doctorat. USAMV Cluj-Napoca, Facultatea de Zootehnie şi Biotehnologii, 2010a;
2. *Balteanu, V. A., Vlaic A., Pop F.D., Carşai T.C., Pascal C., Creangă Şt., Zaharia N., Pădeanu I., Voia O.S., Sauer M., Sauer I.W.*- The study of αS1-casein genetic marker polymorphism in Carpathian goat breed: synthesis of 2009 research (Project PN II 52104/2008). Lucrări Ştiinţifice Seria Zootehnie Iaşi, 53: 321-325, 2010b;
3. *Balteanu, V.A., Vlaic A., Pop F.D., Odagiu A., Cighi V., Creanga S.*- αS1-casein alleles frequency in Carpathian goat. Bulletin of USAMV-CN, Anim. Sci. and Biotech., 63-64/2007: 527, 2007;
4. *Balteanu, V.A.*- Milk proteins polymorphism in Romanian cattle, buffalo and goat breeds studied by isoelectric focusing technique. Identification of 2 new casein allele: αS1-casein I^{SM} in Romanian Grey Steppe Cattle and αS1-cazeina B^{BT} in Romanian Buffalo, MSc thesis, USAMV, Faculty of Animal Husbandry and Biotechnology, Animal Genetics Department, Cluj-Napoca, Romania, 2005;
5. *Grosclaude, F., Mahé M.F., Brignon G., Stasio L. Di, Juenet R.*- A Mendelian polymorphism underlying quantitative variation of goat αS1-casein. Genet. Sel.Evol., 19: 399-412, 1987 ;
6. *Mahé, M. F., Grosclaude F.*- Polymorphism of *β*-casein in the Creole goat of Guadeloupe, evidence for a null allele. Genet. Sel. Evol. 25:403–408, 1993;
7. *Leroux C., Mazure N., Martin P.*- Mutations away from splice site recognition sequences might cis-modulate alternative splicing of goat alpha s1-casein transcripts. Structural organization of the relevant gene. J. Biol. Chem., 267:6147-6157, 1992;
8. *Pascal, C. Confederat M.*- Researchers with reference at the quantitative and qualitative milk production at indigenous local goats growled and exploited in the North-Estern area of Romania. In: International Symposium on Goat Farming in Central and Eastern European Countries: Present and Future - IGA Regional Conference, Constanta, Romania, June 27-30., http://www.iga-goatworld.org/, 2006.

MEASURING PLASMA GOSSYPOL IN COWS WERE FED DIFFERENT LEVELS WHOLE COTTONSEED

MORTEZA SALEHPOUR *, MOHSEN HAJIPOUR**
*Islamic Azad Univ. of Rudehen, Tehran, email: salehpour@znu.ac.ir
** Islamic Azad Univ. of Ghaemshar, Ghamshar. Iran

Key word: early lactation, Holstein cows, whole cottonseed, plasma gossypol, animal performance

SUMMARY

A study was carried out to determine the effects of varying levels of whole cottonseed on gossypol plasma and production parameters in early lactating Holstein cows. Sixteen early lactating Holstein cows (DIM=39±5) were used in Latin Square design with 4 block and 4 repeats. Animals in each group fed 1 of 4 experimental ration containing (0, 7, 14 and 21 % Whole cottonseed on dry matter base).The diets were similar as crude protein and NE_L on dry basis. Cows were fed with total mixed ration individually. Plasma Gossypol measurement was shown that diets were significant different ($P<0.05$), so that Plasma gossypol was higher for cows fed high whole cottonseed (14 and 20 % whole cottonseed) diets. Plasma gossypol of cows fed whole cottonseed were shown negative effects on milk fat and protein percentage and yields, but no effects on Dry matter intake and Milk production .

INTRODUCTION

Whole cottonseed is a multinutrients feed that is extensively used as an energy and protein source in dairy cattle diets. It provides a unique blend of protein, energy and fiber compared with other feedstuffs(6,7,16,22). It is very importance in early lactation period that we have challenge with limit appetite and DMI and increasing energy demand for cows. However whole cottonseed contains gossypol , a polyphenolic yellow pigment present in cotton plants, as a natural defense mechanism against in seed pets(2,3,6,22). The predominant, naturally occurring pigment ($C_{30}H_{30}O_8$) is a yellow highly reactive compound the exhibits acidic, phenolic and aldehydic properties (2,25).

In the intact whole cottonseed, gossypol is mostly found as free gossypol(25) .However, when cottonseed is processed, gossypol binds to proteins, possibly to lysine (2,5). In addition to the free and bond forms, 2 distinct stero- isomers of gossypol occur in whole cotton seed, the plus (+) and minus (-) isomer (16,20). These isomers appear to have different bioactivities and retained in body for longer period of time (14,15). The minus (-) isomer appears to have higher biological activity (18). Generally in whole cottonseed , there is higher concentration of (-) isomer. Non- ruminants and young ruminant are risk to gossypol toxity. Mature ruminants, which process a functioning rumen, can detoxify gossypol and ability to metabolically tolerate gossypol coincides with the development of rumen function (18,25).

It was long believed that the mechanism of gossypol detoxification by ruminant was by its binding to soluble protein and that the bond was resistant to enzymatic digestion (16,18). However, reports of toxicity in mature cow, suggests that the capacity of rumen to detoxify gossypol can be exceeded (20,25). It is possiible that feeding excessive amount of the toxin in the free form may overcome this protective mechanism and impair animal performance (15). Feeding recommendations for cottonseed products have been based on nutrient content feeding levels of free and total gossypol in diets for lactating dairy cows. The objective of this study was to determine the effect of feeding varying amount of whole cottonseed on plasma gossypol concentration and production performance in early lactating Holstein cows.

1. MATERIAL AND METHOD

Animals and Feeding: A sixteen multiparous Holstein cows in early lactation (DIM=39±5) were selected from Rezaei`s farm house in Karaj, Iran for 84-d experiment in which varying amounts of wcs were fed. Cows were assigned to 4 treatment diets (4 cows per diets). Periods were 21-d, the first 14-d were used an adaptation, and last 7-d were used for sampling. Composition of experimental diets is shown in table 1 and 2. Diets were fed as TMR and varied in amount of whole cottonseed (gossypol fed). Cows were fed TMR in two separate feeding at 0800 and 1600 prepared daily by hand mixing in manger and milked 3th daily (0400, 1200 and 1700) with milk yield measured and recorded at each milking. Milk samples were taken during 15-d and 17-d.

Table 1

Ingredient composition of diets fed to cows during experimental periods diets

Ingredient	Diet[1]			
	control	B	C	D
Alfalfa hay	22.50	22.50	22	20.5
Corn silage	13.70	13.50	13.70	13.50
Corn gluten	4.50	4.50	4.10	3.70
Barley	27.50	27.50	22	20.50
Wheat bran	19.50	15.80	13.7	13.50
Whole cottonseed	-	7	14	21
Soybean meal	10.50	9	6.80	4.50
Calcium carbonate	0.9	0.9	1	1.5
Sodium bicarbonate	0.5	0.5	0.5	0.5
Vitamins A, D and E[2]	0.25	0.25	0.25	0.25
Salt	0.25	0.25	0.25	0.25

[1] *control = diet without WCS, B = diet containing 7 % WCS, C = diet containing 14 % WCS, D = diet containing 21 % WCS.*
[2] *contained 20,000 IU of vitamin A/kg, 6,235 IU of vitamin D/kg, and 98 IU of vitamin E/kg.*

Laboratory Analysis: Weekly samples of feed offered were dried in a forced air oven at 100°C to determine DMI. Samples were ground through a 2-mm screen indweller Mill (TOSHIBA, IRAN). Air dried samples were analyzed for DM, crude protein and ether extract according to methods of AOAC (1), NDF was determined according to the procedure Van soest (24). Blood samples were drawn from coccygeal vein of each animals into 10 ML vein inject tubes containing sodium Heparin (pars Darrow, Iran). Samples were obtained between 3h after morning feeding with vein inject tubes.

Blood samples were placed in ice immediately after collection, kept out of light, and transported to the laboratory within 5 min where samples were centrifuged at 3000 × g for 10 min. Plasma was recovered into a 5-ml screw cap mailer tube and stored at −20°C for subsequent gossypol analysis. Samples of cottonseed were analyzed for TG and gossypol isomers by HPLC (13) and for free and TG by AOCS official methods (12,13).

Whole cottonseeds were analyzed for FG and TG content. The Official Methods of the American Oil Chemists Society were used to determine FG (12) and TG (13) in WCS. Cottonseeds were decorticated before analysis, and the actual analyses were conducted on decorticated seed. High performance liquid chromatography was used to quantify the isomers of gossypol in WCS and plasma samples (4,12). The HPLC procedure involved extraction of gossypol from WCS, or lyophilized plasma and formation of the 2-amino-1-propanol derivatives of (+) and (−) gossypol (4 ml). This was accomplished by heating the sample (98°C,30min) in a complexing reagent consisting of 10% glacial acetic acid and 2% (R)-(−)-2-amino-1-propanol in N,Ndimethyl fornamide. The 2-amino-1-propanol derivatives were separated on a 4- × 100-mm Inertsil C18reverse-phase column operated isocratically with a mobile phase (87% methanol, 20% 10 mM KH2PO4 adjusted to pH 3.0 with H3PO4) with electronic detector (LKB,2143SWEDEN) a flow rate of 1.0 ml/ min. Retention times were 2.3 and 3.8 min for the 2-amino-1-propanol derivatives of (+) and (−) gossypol isomers, respectively. Gossypol acetic acid containing 50% (+) and 50% (−) gossypol isomers was used as a standard. HPLC model is 1200Serirs, Ajilent Technology.

Table 2

Chemical composition of diets fed to cows during experimental periods

	Diet			
	control	B	C	D
Ash	6.1	6.4	5.9	5.5
NE_L, Mcal/kg of D	1.65	1.64	1.66	1.66
CP	16	16	16	16
By pass protein(% c	30.9	30.2	31.8	32.9
NDF	35	34	36.5	38.3
ADF	18.5	19.9	24.4	25
NFC[1]	38.9	40.8	36.5	33
FAT	3.7	2.6	4.9	6.2
Ca	0.91	0.87	0.85	0.98
P	0.45	0.47	0.49	0.51
Mg	0.28	0.30	0.31	0.33

[1] *Nonfiber carbohydrate calculated by difference 100 – (%NDF + %CP + %Ash +%EE).*

Statistical Analysis

Data were analyzed by covariance analysis. Data were analyzed by ANOVA including period, treatment, square and cow with in square using the general linear model procedures of SAS. Type III sums of squares were used and the residual served as error term for all tests. The experimental design was a Latin Square design. Within treatment, cows were blocked according to DIM and milk production.

The following model was used:

$$Y_{ijkl} = \mu + T_i + P_j + B_k + B(k)_L + E_{ijkl}$$

Where Yijkl = observation, μ = overall mean, Ti = treatment effect, Pj = period effect, Bk = square effect ,B(k)l = cow with in square and Eijkl = residual effect

All means are least square means and differences were reported as significant when P<0.05. Differences among treatment mean for significant Effects were determined using the Duncan multiple range test.

2. RESULTS AND DISCUSSIONS

The mean of different traits compartment are shown table 3. As expected, TG and FG intakes differed among dietary treatments, reflecting. The different concentrations of FG and TG in the diets. The amount of TG consumed by cows increased as the Amount of TG from WCS in the diet increased. Intakes of DM did not differ among diets for cows (Table 3), and Yields of milk and 4% FCM did not differ among treatments (Table 3), and efficiency of utilization of NEL intake for milk production was similar across treatments. Feeding cottonseed in dairy rations do not alter DM intake of lactating cows. Coppock et al. (9) concluded that whole cottonseed can be added up to 25% of the Diet DM with no effects on intake. When the fiber content of the diet is maintained constant, adding whole cottonseed to the diet of lactating cows at 10 to 20% has usually no effect on DM intake. This is extremely important since nutrient intake is the driving force for yields of milk and milk components. In present study , similar Forage among diets was caused DMI hasn’t difference. Main factor is determined rumen capacity is milk production (29). In results, diets have similar Milk production therefore another reason for similar DMI result among diets was it. Milk production was not different (*P* > 0.10) for cows fed treatment diets.

Similar milk production with increase WCS would be related similar DMI and NE_L density in diets. The results of study were different with previous studies (7,8,23).

In most studies (6,11), WCS was used as nonforage fiber source, while in current study forage percentage was constants in all diets. Therefore it can be concluded effect of WCS on production performance is function of forage percentage in rations.

Milk fat concentration was highest for second diet and was different significantly (P < 0.05) among the diets and periods. Increasing TG and FG in diets 3 and 4 ,have negative effect on rumen fermentation and in result diets 3 and 4 indicated decreasing milk fat synthesis.

Table 3

Least square mean of performances of cows which were fed experimental diets

Item	Diet				SEM	Effect	
	control	B	C	D		Diets	Period
DMI, kg/d	21.87	21.81	22.15	21.91	0.13	ns	0.422
Milk, kg/d	33.47	33.40	33.84	33.08	0.32	ns	0.237
Milk [1],kg/d	30.73	30.72	29.98	29.54	0.31	ns	0.44
Milk fat,%	3.44[a]	3.47[a]	3.21[b]	3.23[b]	0.026	0.0001	0.0001
Milk fat yield, kg/d	1.15	1.15	1.09	1.08	0.013	0.069	0.468
Milk protein,%	3.10[a]	3.07[a]	3.01[b]	2.93[b]	0.019	0.021	0.492
Milk protein yield, kg/d	1.04	0.99	1.02	0.98	0.011	ns	0.55

a,b,c Means in row with different superscripts differ (p< 0.05).n.s. = non significant

[1] Fat corrected milk for 4% fat(FCM) [2] Milk productions per kg DMI [3]

A comprehensive review of the effects of whole cottonseed on lactation of dairy cows showed that including 10 to 30% of the diet as whole cottonseed increased milk fat content in 4 out of 13 trials (8). In general, adding whole cottonseed to the diet of lactating cows has minimal effect on milk fat content. Some have suggested that addition of whole cottonseed to diets high in corn silage can be 100 detrimental to milk fat content (22). This negative effect may be related to the fat content of the diet, as well as the availability of physically effective fiber in high corn silage diets.

Milk protein concentration was highest for Control diet and was different significantly (P < 0.05) among the diets. When cottonseed is added to the diet of lactating cows and the fat content of the ration increases, usually a milk protein content depression is observed (8). However, yields of milk protein and fat change with addition of cottonseed to the ration. The effect of whole cottonseed on milk protein is usually negative when corn silage is the main forage. In early lactation cows, most factors that limited milk protein synthesis is lysine. Also in gossypol detoxification process, lysine is used(2,25) ,therefore decreasing milk protein was predicted. Results of this experiment agreement with studies of Coppeck (8) Clark and Armentano (6).

Prieto et al. (18) observed no negative effect of increasing dietary gossypol by adding cracked Pima cottonseed to the diet on yields of milk and milk components.

Table 4

Least square mean of Plasma Gossypol of cows which were fed experimental diets

Item	Diet				SEM	effect	
	control	B	C	D		Diets	Period
Total Gossypol,mg/ml	0.08^{a}	2.65^{b}	3.01^{c}	4.31^{d}	0.23	0.0001	0.0018
(+) Isomer, mg/ml	0.03^{a}	1.39^{b}	1.23^{c}	2.52^{d}	0.29	0.0094	0.099
(-) Isomer, mg/ml	0.06^{a}	1.71^{b}	1.78^{c}	2.81^{d}	0.06	0.0001	0.0001

a,b,c Means in row with different superscripts differ ($p< 0.05$). n.s. = non significant

Plasma gossypol concentrations differed according to treatments, and gossypol intake increased mean PG concentrations during the 84-d study. Plasma gossypol concentrations directly reflect gossypol absorption in the gut and metabolism by the liver(22). When cottonseed is fed, gossypol in the free form that escapes detoxification within the fore stomachs is available for absorption in the small intestine. It is assumed that binding of gossypol to amino acids of dietary and bacterial 96 origins reduces gossypol availability. When cottonseed escapes rumen digestion, plasma gossypol concentrations increase dramatically. Mena et al. (15) fed lactating Holstein cows varying amounts of gossypol from whole lined Upland cottonseed or cottonseed meal. Gossypol in cottonseed is mostly in the free form and gossypol in cottonseed meal is mostly in the bound form. Plasma gossypol concentrations were directly related to intake of FG. Most plasma TG concentrations were well below the proposed safe upper limit of 5 μg/ml (4). no symptoms of gossypol toxicity such as decreased feed intake or milk production were observed. The lack of symptoms of gossypol toxicity suggests that plasma TG concentration alone may be a nice indicator to determine safe levels of cotton seed in diets. Another point to measure and compare plasma gossypol this study is that gossypol concentration of the fourth period noticeably decreased in some treatments. In other hand, the period effect is significant. The finding of these results concluded rumen micro flora gradually adapted and find more ability for detoxification (21,22).

3. CONCLUSIONS

Results of the present research indicate that using whole cottonseed in early lactating cow has benefit results in Body weight and Body condition score without affecting cow health, milk production and DMI. Most plasma TG concentrations were well below the proposed safe upper limit. No symptoms of gossypol toxicity such as decreased feed intake or milk production were observed. There is a linear relation between gossypol intake and plasma gossypol in short period. With previous researches, current Results indicate Amount of forage in diets affects on whole cottonseed efficiency. Intake total gossypol in diets is decreasing milk protein percentage.

REFERENCES

1. *A.O.A.C.*1990.Official methods of analysis.15th ed. assoc. office. Anal. Chem., Arlington, v. a.
2. *Blauwiekel, R., S. Xu, J. H. Harrison, K. A. Loney, R. E. Riley, and M. C. Calhoun*. 1997. Effect of whole cottonseed, gossypol, and ruminally protected lysine supplementation on milk yield and composition. J. Dairy Sci. 80:1358–1365.
3. *Cai, J., H. Zhang, Y. Zeng*, et al., 2004. An optimized gossypol high-performance liquid chromatography assay and its application in evaluation of different gland genotypes of cotton. J. Biosci.29:1:67-71
4. *Calhoun, M. C., S. W. Kuhlmann, and B. C. Baldwin*, 1995. Assessing the gossypol status of cattle fed cotton products. Proc. Pacific Northwest. Anim. Nutr. Conf. Portland, DR. Washington, state univ. pulman.
5. *Calhoun, M. S., and C. Holmberg*, 2001. Availability of gossypol in soap stock fed to lambs. J. Am. oil. Chem. Soc. (abstr).
6. *Clark, P.W., E. Armentano*, 1993.Effectivness of Neutral Detergent Fiber in whole cottonseed and dry distiller grain J. Dairy Sci. 76:2651.
7. *Coppock, C. E., and D. L. Wilks*, 1993. Feeding whole cottonseed and cottonseed meal to dairy and beef cattle, Texas. A&M univer. Public.
8. *Coppock, C.E., West, J., Moya, J.R., Nave, D.H., LaBore, J.M.,Thompson, K.G., Rowe Jr., L.D., Gates, C.E.*, 1985b. Effects of amount of whole cottonseed on intake, digestibility, and physiological responses of dairy cows. J. Dairy Sci. 68, 2248–2258.
9. *Depeters, E. J., S. J. Taylor, A. A. Frank and A. Agairre*, 1985. Effect of feeding whole cottonseed on composition of milk. J. Dairy Sci. 68:897.
10. *Harrison, J. H., P. Kincail, et al*, 1995. Effect of whole cottonseed and calcium of long chain fatty acids on performance of lactating dairy cows. J. Dairy Sci.78:181.
11. *Harvatine, D. I., J. L. Winkler, J. L. Firkins*, 2001. Quantification of effectiveness of whole linted cottonseed as a forage substitution when fed with corn differing in ruminal starch availability, J. Dairy Sci. 82:213(abstr).
12. *Hron R J, Kuk M S and Abraham G* 1990 Determination of gossypol by high performance liquid chromatography; J. Am. Oil Chem. Soc. 67 182–187
13. *Hron Sr R J, Kim H L, Calhoun M C et al* 1999 Determination of (+)–, (–)–, and total gossypol in cottonseed by high performance liquid chromatography; J. Am. Oil Chem. Soc.76 1351–1355
14. *Kenar, J.A.*, 2006. Review Reaction Chemistry of Gossypol and Its Derivatives. JAOCS, Vol. 83, no. 4 (2006)
15. *Mena, H., J.E.P. Santos, J.T. Huber, J.M. Simas, M. Tarazon, and M.C. Calhoun*. 2001. The effects of feeding varying amounts of gossypol from whole cottonseed and cottonseed meal in lactating dairy cows. J. Dairy Sci. 84: 2231-2239.
16. *Mena, H., Santos, J.E.P., Huber, J.T., Tarazon, M., Calhoun, M.C.*, 2004. The effects of varying gossypol intake from whole cottonseed and cottonseed meal on lactation and blood parameters in lactating dairy cows. J. Dairy Sci. 87, 2506–2518.
17. *NRC*.2001.Nutrient Requirements of Dairy Cattle.7th Rev,Ed.,Natl.Acad. Sci. Washington, DC. Pp.269-302.
18. *Prieto, J.G., E.J. DePeters, P.H. Robinson, J.E.P. Santos, et al*. 2003. Increasing dietary levels of processed Pima cottonseed increase plasma gossypol but do not influence productive performance of lactating Holstein cows. J. Dairy Sci. 86: 254-267.
19. *Robinson, J.J., C.J. Ashworth, J.A. Rooke, et al*.2006. Nutrition and fertility in ruminant livestock. Animal Feed Science and Technology 126 (2006) 259–276
20. *Rochfort, S., A.J. Parker, F.R.Dunshea*.2008. Review Plant bioactive for ruminant health and productivity. Phytochemistry 69 (2008) 299–322
21. *Santos, J.E.P., M. Villasenor, E.J. DePeters, P.H. Robinson, and B.C. Baldwin*. 2002. Type of cottonseed and gossypol in diets of lactating dairy cows: Lactation performance and plasma gossypol. J. Dairy Sci. 85:1491-1501.
22. *Santos, J.E.P., M. Villasenor, E.J. DePeters, P.H. Robinson, and C.H. Holmberg*. 2003. Type of cottonseed and gossypol in diets of lactating dairy cows: Plasma gossypol, reproduction, and health. J. Dairy Sci. 86:892-905.

23. *Smith, W.A., Vosloo, L.P.,* 1994b. Effect of whole cottonseed, heat treated whole cottonseed and whole cottonseed plus lanolin on milk production and composition. S. Afr. J. Anim. Sci. 24, 45–48.
24. *Vansoest, P.J. J.B.Robertson and B.A.Lewis*. 1991. Method, for dietary fiber, neutral detergent fiber, and non Starch polysaccharides in relation to animal nutrition. J. Dairy sci.74:3583.
25. *Zhang W., Z. Xu, X. Pan et al* .2007.A review Article Advances in gossypol toxicity and processing effects of whole cottonseed in dairy cows feeding. Livestock Science 111 (2007) 1–9

SUPERCRITICAL FLUID EXTRACTION OF VOLATILES OILS EXPERIMENTAL MODEL

MARIA ICHIM, RAMONA ENACHE, ADRIANA VISAN
Institute of Biotechnology and Environmental Protection - S.C. BIOING S.A., Bucharest, Romania

Key words: volatiles oils, extraction, supercritical fluids.

SUMMARY

In this study is presented an experimental model of extraction with supercritical fluids. The vegetable material is represented by medicinal and aromatic plants with a high content of volatiles oils, material anterior selected.

From the experiments was been dignified the chemical composition of volatiles oils; Carum carvi L. - 50-65% carvone, 30-45 % limonene; Achillea millefolium L. - 30% thymol and para-cymene, 30-40% carvacrol; Thymus vulgaris L. 36 - 55% thymol; Salvia officinalis L. 18-43% A-thujone, 3 - 9% β-thujone, 6 - 13% 18-cineole, 3-9% camphor; Fooeniculum vulgare Mill. 55-75% (E) - anethole, 12-26% fenchone, 1-5% limonene.

Essential oils are aromatic components obtained from different plant parts such as flower, buds, seed, leaves and fruits, and they have been employed for a long time in different industries, mainly in perfumes (fragrances and aftershaves), in food (as flavoring and preservatives) and in pharmaceuticals (therapeutic action).

To global level EOs are used in next percentages of 55-60% in food industry, 15-21% in cosmetics/perfumes industry, 10-20% like raw material for several compounds extraction, 5-10% like active substances in pharmaceuticals prepared and 2-5% for natural products.

Nowadays in European Union like in Romania too manifest a great interest for explotation of officinal and aromatics plants.

The major producers of EOs are developing or emerging countries (Brazil, China, Egypt, India, Mexico, Guatemala and Indonesia), while the major consumers are the industrialized countries (USA, western Europe and Japan). The forecasted annual growth of EO markets of around 4% is thus generating new commercial opportunities for the developing world.

Romania has a large diversify of plant on his habitat. In spontaneous flora dormant 3700 species recognized that have herbal action. Officinal flora from Romania include over 800 species, from them 283 are checked for therapeutic properties.

Supercritical fluids were used as solvents for a wide variety of applications, such as volatile oil extraction, metal cation extraction, polymer synthesis and nuclear particles. In practice, more than 90% of all analytical supercritical fluid extraction is performed with carbon dioxide for several practical reasons. Apart from having relatively low critical pressure (74 bars) and temperature (32°C), CO_2 is relatively non-toxic, non-flammable, available in high purity at relatively low cost, and is easily removed from the extract.

The extraction of essential oil using solvent at high pressure or supercritical fluid, has received much attention in the past several years, especially in food, pharmaceutical and cosmetic industries, because it presents an alternative to conventional processes such as organic extraction and steam distillation.

Regarding of traditional methods of extraction witch is using organic solvents or with steam distillation, extraction with supercritical fluids don't involve additional operations to remove the solvent, operation which can affect the final quality of the product.

The large consumption of product witch are using vegetable extract, like food, cosmetics and pharmaceutics industry make like technology of essential oil extract using supercritical CO2 to become more attractive compared with conventional process, and in same time respecting the product quality. The knowledge of mass-transfer mechanism, the kinetics parameters and the thermodynamics restrictions of the extraction conducted in a bed of vegetable material can be used to economically evaluate the extraction process.

1. MATERIAL AND METHOD

For experiments previously made in laboratory was take it in study next plants: *Carum carvi L., Achillea millefolium L., Thymus vulgaris L, Salvia officinalis L., Fooeniculum vulgare Mill.*.

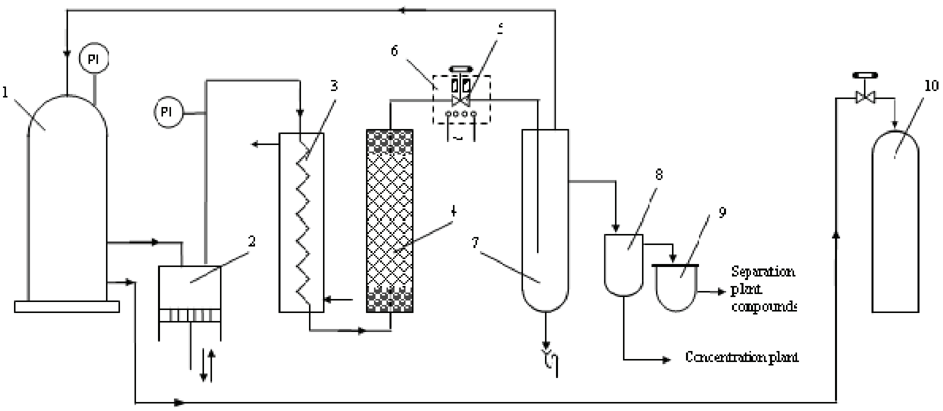
For obtaining EOs from mentioned above plants we present in this study an experimental model of extraction with supercritical fluid in closed circuit.

In this model we mean to a technological process in what supercritical fluid is circulated in close circuit, the model that apply to supercritical fluid with low pressure.

Supercritical model from the tampon vessel in no.1 is compressed with the help of the compressor no.2 and cooled with condenser no.3, from where is passing in ejector no.4 over the plant that will be exposed to extraction operation. After this faze the supercritical model with the extract is slacked with the help of the valve no.5 with heating in the room position. No. 6

The resulted material is collected in the vessel pos. no .7, and the oil is separated in florentine vessel pos. no.8 and collected in vessel no.9, from where is send to be separated of EOs components obtained.

Supercritical fluid is separated from the obtain extract and collected in the no.1 tampon vessel and after this is bottled in bottles no.10.



Technological scheme of supercritical fluid extraction with closed circuit

2. RESULTS AND DISCUSSIONS

In case of supercritical fluid extraction and not only, the characteristic properties of the obtain extract from vegetable materials will be different, depending, of working conditions chosen the extraction and separation for the experimental installation; in this way, in the same time with the increase of pressure is increasing CO_2 supercritical density, which leads to components grow of solubility less volatile from the material prepared. Accordingly, by chosen of the adequate combinations of the extraction temperature and pressure, like to the conditions of separations too, is possible to can be optimized the extraction selectivity and speed.

In extraction, the solvent, CO_2, is pressurized to at least 73 bars (critique pressure), to higher temperatures then 31°C (critique temperature). Above this critiques values, CO_2 get to “supercritical rank”. In this form, viscosity is similar with the one of a gas, letting his penetration in the solid matrix, and his capacity of dissolution is similar with a liquid. After extraction the solvent is separated from the extract by lowering its pressure, causing the carbon dioxide to convert to the gaseous phase and to lose its high dissolution capacity. The product can be completely separated from the solvent, which is again compressed and recycled into process.

Solvent extraction from the solids typically consists of two major stages: extraction and separation. In the extraction stage, the supercritical solvent flows through a fixed bed can be upward or downward. At high solvent ratios (ratio of supercritical solvent flow to the amount of solid), the influence of gravity is negligible. The temperature and the pressure inside the extraction unit define the relevant physical properties of the carbon dioxide (namely density, viscosity, and mass diffusivity) that change significantly with small changes in temperature and pressure near the critical point. The behavior causes change in the solvent dissolving capacity, which makes it possible to define a specific set of compounds to be extracted. On the other hand, it makes it difficult to control the extraction unit operationally. The typical values of these operational parameters are 1.01 to 1.10 for reduced temperature (ratio between operational and critical temperature) and 1.01 to 1.50 for reduced pressure (ratio between operational and critical pressure.

Very low viscosity of processed material structure make like CO_2 to penetrate very easy the material structure; in the same time the low latent heat used in vaporization and the high average of volatility, make that him to be separate very easy from the extract without significant losses.

In table no.1 are presented some of the CO_2 properties.

Table 1

Properties of pure CO_2 to pressures and temperatures different

Pressure (MPa)	Temperature (K)	Density (kg/m^2)	Viscosity (kg/ms)x10^5
24,5	313 328 343	879,5 806,2 730,0	8,15 6,85 5,67
17,6	313 328 343	814,6 712,5 599,1	6,99 5,39 4,09
10,8	313 328 343	676,1 397,4 283,6	4,69 2,74 2,40

Such as supercritical fluid can be used gas like propane, and butane, whit high concentration and purity, as well the mixture propane-butane. All this supercritical fluid have one advantage, namely, the working pressure is more lower then the CO_2 characteristics, but are hazardous gas, because of the high inflammability, this characteristic make like this kind of gas to have a limited utility.

3. CONCLUSIONS

For elaboration of the experimental model with regard to obtaining EOs was chosen the extraction with supercritical fluid because of the advantages that this method shows, and like:

1. SCFs have solvating powers similar to liquid organic solvents, but with higher diffusivity, lower viscosity, and lower surface tension.

2. Since the solvating power can be adjusted by changing the pressure or temperature separation of analyses from solvent is fast and easy.

3. By adding modifiers to a SCF (like methanol to CO2) its polarity can be changed for having more selective separation power.

4. In industrial processes involving food or pharmaceuticals, one does not have to worry about solvent residuals as you would if a "typical" organic solvent were used.

5. Candidate SCFs are generally cheap, simple and many are safe. Disposal costs are much less and in industrial processes, the fluids can be simple to recycle.

6. SCF technology requires sensitive process control, which is a challenge. In addition, the phase transitions of the mixture of solutes and solvents have to be measured or predicted quite accurately. Generally the phase transitions in the critical region are rather complex and difficult to measure and predict. Our research has provided much insight into these phenomena.

REFERENCES

1. *Danisco P. P.* (2001) - Comparing extraction by traditional solvent with supercritical extraction from an economic and environmental standpoint, ISAFS - CD- Rom.
2. *Seied Mahdi Pourmortazavi, Seiedeh Somayyeh Hajimirsadeghi* (2007) - Supercritical fluid extraction in plant essential and volatile oil analysis, ScienceDirect.
3. *M. H. Eikani, I. Goodarznia, M. Mirza* (1999) - Flavour, Fragm. J.14
4. *V. M. Rodrigues, E.M.B.D. Sousa, A.R. Monteiro, O. ChiavoneFilho, M.O.M.A.M. Marques* (2002) - Supercritical Fluids, ScienceDirect.
5. *Brunner* (1994) - Gas Extraction - An introduction to fundamentals of supercritical fluids and the application to separation process, Steinkopff Darmsta, New York: Springer.
6. *Hortono R., Mansoori G.A., Suwono A.* (1999) - Prediction of Molar Volumes, Vapor Pressures and Supercritical Solubilities of Alkanes by Equations of State, Chemical Engineering Communications Vol.173.

STUDIES ON TRANSLOCATION OF LEAD CONTAMINANTS AND THEIR ACCUMULATION IN MORUS PLANTS

MARIA ICHIM, ADRIANA VISAN, RAMONA ENACHE

Institute of Biotechnology and Environmental Protection –S.C. BIOING S.A., Bucharest, Romania

Key words: translocation, lead, fitoremediation, Morus sp.

SUMMARY

Research conducted on the pollution / soil contamination with heavy metals showed several possibilities to remedy it is part and extraction of these metals in the soil by cultivating plants with high capacity to absorb pollutants including Morus sp.

Intensity of the negative effect of heavy metals depends on their size and concentration of a number of defining physical and chemical properties of soil such as texture, organic matter content, redox potential, pH, etc.

Plant species that are more efficient in the translocation of lead, should have rapid growth and produce large amounts of biomass while accumulating high concentrations of metal pollutants. It should also be tolerant enough to grow in contaminated soils and be resistant to the action of chelating agents..

This study presents a model for obtaining biological material, namely morus seedlings required assessing the degree of translocation of lead contaminants and their accumulation in plants of the Morus sp.

Soil contamination with heavy metals occurs when the soil can not support normal growth and development of plants, with the consequence that lower production of biomass or its total destruction. Soil contamination with heavy metals is largely due to industrial activity or excessive use of fertilizers, bio-solids or waste.

In the last decade, several researches have shown that in soils contaminated with heavy metals may reduce the content of chemical elements through phyto-remediation. Basic and applied research has demonstrated unequivocally that certain plant species have genetic potential to remove, degrade, metabolize, or immobilize a wide range of contaminants. Hyper-accumulatory plants have ability to extract high concentrations of metals from soil into their tissues, while retaining metabolic functions, are considered primary candidates for phyto-remediation process.

Lead in soil comes from air, water and sludge, and the surface is ground down into the processes of diffusion, adsorption, dissolution and stripping with water or microorganisms. In soil, microorganisms form soluble lead or suspended in water, thus reaching the plant roots.

As a result of pollution and high load of soil with heavy metals and increase awareness of their mobility in soil, plants absorb large quantities of these elements, plus deposit amount with existing polluted air particles on leaves, shoots, etc.

Studies done on plants have shown that roots have the ability to take significant amounts of Pb and its translocation to other parts of plants occurs through root. Other authors such as Miller and Koeppe (1971) demonstrated that the translocated plants can accumulate large amounts of Pb in the leaves in a concentration dependent manner. How lead enters the plant through the leaves depends on their ability to absorb lead from air sources, capacity that in turn depends on leaf morphology. Fluff on the leaves absorb heavy metals from the atmosphere. However, most of the lead, taken by plant roots remains.

1. MATERIAL AND METHOD

To establish the elements of the experimental device were driven these steps:

a) Obtaining biological material, namely morus seedlings needed to achieve the experiment.

For this has been used 100 grams of morus seeds of which were obtained over 3500 hybrid Morus seedlings that were used in testing modules.

Morus seeds were planted in plastic boxes on solid substrate made of celery: mranita: sand, in the ratio 1:1:1. Seeding was conducted in the greenhouse where they were kept under control and care to achieve the experimental module.

Experimental module presented in this article has used 500 morus seeds.

b) Establishing and working protocols on:

- experimental growth-substrate -liquid
- for lead-contaminated substances, including determination of test dose

Experimental module includes experience in fenofaza morus seeds germination - appearance embryonic leaves and rootlets - until fenofaza intensive, in terms of air contamination with Pb, similar to that caused by road traffic. This was counted, weighed and divided into growing vessels, a total of 500 morus seeds. Such vessels are germinating type glass Petri dishes on filter paper and liquid medium of origin groundwater.

c) Pb contamination

Working hypotheses were the following grounds:

Lead is found widely in nature as the mineral compounds (galena, Pb sulphide), white lead, lead carbonate and lead chromate. Lead is resistant to sulfuric acid because it forms lead sulfate that is insoluble and prevents further corrosion. Heavy metals, including lead, are on list of Priority Hazardous Substances, for which some lead-based substances are used in special conditions or are restricted. Among the substances used in industry that contain lead, the most important are :

- Lead trihidratacetat, soluble in water (<0.01% insoluble), unlike other lead salts which are insoluble in water and highly corrosive, it is used in textile industry.

- Lead tetraethyl (MET) is a derivative of liquid lead and is highly toxic; it is used as an additive in gasoline and diesel up to 0.05% with a role to increase octane knock. MET is insoluble in water, soluble in organic solvents and gasoline, it easily volatilize, eleasing lead into combustion exhaust gases.

- Lead nitrate is a salt of lead used in industry, soluble in water. For contamination was determined using the experimental module next versions of substances: - lead volumetric standard, solution of nitrate in water containing 0.1 mg lead/ 1 ml.

Experimental variations of doses of contamination will meet the following concentrations:
-1 blank - no Pb contamination, administration water management
- 2 blank – no Pb contamination, administration groundwater management
- Version 1.1 - standard volume concentration of lead contamination at LMA
- Version 1.2 - standard volume concentration of lead contamination at 0.1 LMA
- Version 1.3 - standard volume concentration of lead contamination at 0.5 LMA
- Version 1.4 - standard volume concentration of lead contamination at 2.0 LMA
- Version 1.5 - standard volume concentration of lead contamination at 5.0 LMA
- Version 1.6 - standard volume concentration of lead contamination at 10.0 LMA.

2. RESULTS AND DISCUSSIONS

These items were made of the experimental device:
-Morus seedlings and seeds placed in germination conditions
-Somatometric-determinations in morus seedlings root system.

Data were recorded:
Maximum length rootlet, morus seedlings, registering maximum of 19 cm and 6 cm minimum.
Weighing vessel growth of solid substrate, registrations - the maximum 678.9g and minimum 585.7 g

Somatometric determinations in morus seedlings were made from 10 to 10 days in fenofaza of germination, to determine:
-viability of morus seedlings
-dynamic development of plants in vegetation
-the chemical analysis of water content, dry substance, chlorophyll, protein and biomass in leaves radicular

To highlight the influence of Pb contamination, biochemical determinations will be made on both growth substrates used, and the morus tree biomass, represented by the leaves and roots of morus.

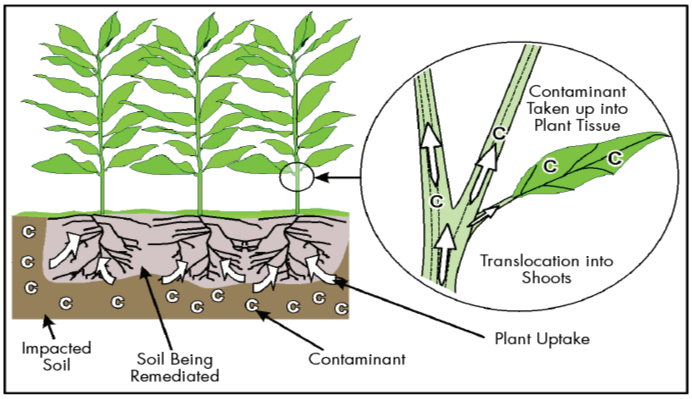


Fig 1. Translocation of contaminants

Fig 2.Morus seedlings grown from seed

3. CONCLUSIONS

• Lead is available for soil's plants from sources of aerosols. Studies done on plants have shown that roots are the ability to take significant amounts of Pb and its translocation to other parts of plants occurs through root.
• An important characteristic of ecosystems is the morus tree biomass production and longevity than their considerable (50-100 years), in comparison with annual or biennial plant ecosystems vegetation or cultivated, present the same biotype.
• We presented the experimental model, obtaining the necessary testing of all biological material contaminated with Pb (morus seedling development and morus seeds in the germination fenofaza).

REFERENCES

1. *M. M. Lasat* (2001) - Phytoextraction of metals from contaminated soil: a review of plant/ soil/ metal interaction and assessment of pertinent agronomic issues, Technology Innovation Office, N. W. Washington.
2. *McGrath SP, Zhao F-J*. (2003) -. Phytoextraction of Metals and Metalloids from Contaminated Soils. Current Opinion in Biotechnology 14: 277-282.
3. *Anne Maureen* (2007) – Phytoextraction of lead from contaminated soil by Panicum Virgatum L. (Switchgrass) and associated growth responses,University Kingston, Ontario, Canada.
4. *Lane SD, Martin ES* (1977) - A histochemical investigation of lead uptake in Raphanus sativus. New Phytol. 79:281-286.
5. *Godzik B* (1993) - Heavy metal contents in plants from zinc dumps and reference area. Pol. Bot. Stud. 5:113-132.
6. *Kumar NPBA, DushenkovV, Motto H, Raskin I* (1995) - Phytoextraction: the use of plants to remove heavy metals from soils. Environ. Sci. Technol. 29:1232-1238.

The 39th International Session of Scientific Communications of the Faculty of Animal Science, Bucharest, Romania
Scientific papers (seria D; vol. LIII) – Animal Science

SOME ASPECTS OF FARM ANIMAL BIODIVERSITY FORMATION ON ROMANIA'S ACTUAL TERITORY

M.TH. PARASCHIVESCU, A.T.BOGDAN, M.PARASCHIVESCU, G.F.TOBA, SIMIONA STAN

Key words: biodiversity, farm animal, Romanian breeds.

SUMMARY

Farm animal patrimony of Romania has been formed along the time altogether with the social evolution of the people speaking the Romanian language or living on the territory of Romanian states. From ancient times people living on Carpathian Mountain Chain were known as transhumant shepherds moving their flocks to South an East or some time even to West. That meant that shepherds' families were established in mountains where they could be protected since young and stronger man led the flocks. The main species were sheep together with some goats, dogs and the donkeys to carry closes and tools. Still now there are in Romania the Tzurcana sheep, a breed on gross wool, resisting long runs, rains and snow and the small donkeys able to carry weights on wooden saddle fixed on their backs. The short interval of time between the two World Wars didn't give opportunity to many changes in the livestock of Romania. Never the less during this time The National Institute for Animal Science has been created, under the leadership of the grate professor Gh. K. Constantinescu of the Veterinary Medicine Faculty in Bucharest. The first action of the research stuff of the Institute was to now the genetic patrimony of the livestock. They have produced remarkable monographs concerning horse, cattle and sheep breeds. I After the Second World War in Romania socialization of economy has been imposed. The land property of gross landowners was transferred to the State, all the land prêt abele to was included in collective husbandries of "artel" type and the private property of facilities, of tools and of animals was abolished. The farm animal biodiversity was due to the same populations as before, but each of them altered by uncontrolled crosses. After 1990 the transition to the market economy based on the private property of the land of animals and of the tools were lead more politically than economically.

Farm animal patrimony of Romania has been formed along the time altogether with the social evolution of the people speaking the Romanian language or living on the territory of Romanian states.

From ancient times people living on Carpathian Mountain Chain were known as transhumant shepherds moving their flocks to South an East or some time even to West. That meant that shepherds' families were established in mountains where they could be protected since young and stronger man led the flocks. The main species were sheep together with some goats, dogs and the donkeys to carry closes and tools (C. Draganescu). Still now there are in Romania the Tzurcana sheep, a breed on gross wool, resisting long runs, rains and snow and the small donkeys able to carry weights on wooden saddle fixed on their backs.

When the first stately organization were founded and state boundaries were traced the transhumance routes were modified and shortened. Shepherdess was practiced further but it took an extensive form moving from home to mountain or from mountain to plain and backward inside narrower territories less different from the climatic point of view. Thus it can be explained why flocks start to differ and a new breed, Tzigaia, with uniform half thick fiber wool appeared. Both Tzurcana and Tzigaia breeds are light animals able to graze walking and are milked. Because of the long distances between home and sheepfolds the sheep milk is not consumed as fresh milk but is clotted in curd milk to prepare particular sorts of cheese at sheepfolds or is fermented in different ways. There for still there is strong connection between animals and their environment and so reproduction pattern and the physiologically parameters remained unmodified along the time.

When the boundaries of the new states were accomplished the need to protect them became necessary. The need for faster displace of army troops for one place to the other increased the interest for horse breeding. The ancient history books wrote about the Moldavian saddle horses that were fast and effort lasting. Vassalage political relations with the Turkish emporium pushed local families to keep pigs, undesired by Moslems. When they started to sell cereals to neighbor countries draft cattle have been bred. Outside Carpathian Mountains, to South and East, animals were kept, for security reasons as well, mostly free, in natural conditions. There were then to types of swine the Stocli breed, lean and slowly growing, fed on fruits of oak and birch forests, along the Danube and in Danube Delta the Swamp Pig a little bit larger and fatter disposing on better feed stuffs (N. Teodoreanu 1944). The breed of cattle, the Steppe Gray, was the one kept in the neighbor countries also cereal producers. They were fed on roughage only, were strong and resistant.

Over the mountains where Austrian emporium developed a feudal society building fortresses and burgs animal farming was more developed and less natural. The area was occupied more and more with dual purpose breeds of cattle, horses became heavier and pigs were able to grow faster and be fatter, a desired trait in that time. The Simmental, the Brown and the Pintzgauer breeds of cattle have been imported from Switzerland and the Edelshwein breed of pigs was imported from Germany. Following the German model pork consummation increased. From the local pigs two native breeds were created the Mangalitza and the Basna, the first one offering good lard and the second one, a black pig with a white strip around the body in the saddle area, being fast growing and having larger farrows.

After the Grate Romanian Union the Transylvanian experience wanted to be applied in the Old Kingdom as well. In fact this tendency was already noticed immediately after 1900 when Brown and Simmental cattle and also Mangalitza and Edelstein pigs were imported from over the mountains (A.T. Bogdan – 1998).

The short interval of time between the two World Wars didn’t give opportunity to many changes in the livestock of Romania. Never the less during this time The National Institute for Zootechny has been created, under the leadership of the grate professor Gh. K. Constantinescu of the Veterinary Medicine Faculty in Bucharest. The first action of the research stuff of the Institute was to now the genetic patrimony of the livestock. They have produced remarkable monographs concerning horse, cattle and sheep breeds. In between from Basarabya province entered the karakul sheep, famous for the beautiful lamb furs they produce. In Banat region a loved white pig livestock was developed. Poultry, Silk Worms, Bees, Rabits and Fur animals were not ignored. (A.T. Bogdan – 1998). No matter how difficult was to do it the professional stuff of the Institute managed to conserve valuable nuclei of above mentioned breeds which later state as foundation for animal farm patrimony of Romania.

After the Second World War in Romania socialization of economy has been imposed. The land property of gross landowners was transferred to the State, all the land prêt abele to was included in collective husbandries of “artel” type and the private property of facilities, of tools and of animals was abolished. The farm animal biodiversity was due to the same populations as before, but each of them altered by uncontrolled crosses.

When within the Ministry of Agriculture the State Agriculture Department (SAD) was organized and most of the collective agriculture farms were founded it was noticed that the animal genetic patrimony of the country was very poor. Then the need of farm animal improvement was claimed. Two trials to organize a Selection Animal Farm Division in the Ministry of Agriculture have been unsuccessful. Only later in 1966 when in the Ministry of Agriculture Animal Reproduction and Selection Division, led by Marcel Paraschivescu PhD, was founded and the Animal Production Division of SAD was led by Ioan Moldovan, afterward state secretary for animal production in the Ministry of Agriculture, the enrichment and efficient administration of the genetic animal patrimony took frame.

Success of these time trial was obtained because the actions started with artificial implementation in cattle and sheep the target being to concentrate semen production in big artificial insemination centers. The importance of good sires became more evident. In 1976 “The State Council DECRET on Reproduction Material Prices in Farm Animals” has been published. A competition to become elite farm developed both in state and in cooperative farms. An event of this period was black and white cattle importation from Holland and Denmark. Breed improvement programs for dual purpose breeds were emitted.

In sheep the target was to produce thin wool. The solution was found in applying artificial insemination. The action started in 1959 in Dobrodja region using the young rams produced in Palas Research Station where Palas Merino was bred. The action spread in all the plain areas of the country. At the end of the year 1970 about 40% of the sheep stock in Romania produced thin wool.

In pigs 6 selection farms were formed mostly as new units working on the same selection programs under the control of the Pig Research Institute in Perish, not far away from Bucharest. A great success was the creation by the research officer in Perish Liviu Beris of the paternal breed Peris 345. This one still exists.

On independent way Stan Tsarlea developed the a very efficient net of industrial poultry production units. The net included both for egg and broiler production, grandparents farms, parents farms, incubation stations and commercial units with hybrids. The model started to be extended in turkeys.

In pork production the state enterprises developed the commercial production of industrial type disposing of huge livestocks (up to 300000 heads in one location). Many of them used artificial insemination using boars bought from the selection units mentioned above.

In this time animal production activity was successful but it did not attaint the finish of managing genetic resources to create and conserve biodiversity. Reproduction of breeds was not closed. Open genealogical registers have been used so we can’t say we dispose of a real biodiversity. Much old population disappeared (Stepp Gray Cattle, Mocanitsa, Stocli, Karnabat and others).

After 1990 the transition to the market economy based on the private property of the land of animals and of the tools were lead more politically than economically. All former successes were lost. The question of conserving biodiversity is wrong approached. There was considered that global allocation of some funds and signing international convention is enough for biodiversity conservation. Or it is necessary to create adequate institutions and to dispose of knowledge how they have to function.

At the national level some impulses to approach the conservation of rear populations have been done. In this order the conservation of the Stepp Gray Cattle in the Research Station Dancu, county of Iasi, the conservation of Mangalitsa and Bazna pigs in Agriculture Research Station Turda, county of Cluj or the conservation of Ratsca sheep breed with screwed horns in Caransebes Sheep Research Station might be mentioned. Unfortunately some of these results are already lost. There are also researches concerning biodiversity conservation that aren't applied. Also there is legislation and funds for this purpose. On these bases it is possible to organize a net of units acting in biodiversity conservation, including a bio information data base for monitoring and guiding their steps towards a sustainable management of genetic resources.

REFERENCES

1. *Bogdan, A.T.* (1998) – Concepția profesorului dr. G.K. Constantinescu despre zootehnizare agriculturii românești și rolul managerial actual al inginerilor zootehniști în realizarea acestui obiectiv strategic național", Lucrări științifice Vol. 41- U.S.A.M.V. Iași, pag. 268-278
2. *Drăgănescu, C.* (2003) – Managementul durabil al resurselor genetice la animalele domestice din țară, Raport de țară, contribuție la analiza resurselor genetice animale mondiale de către FAO - I.B.N.A.Balotești.
3.*Teodoreanu, N.* (1944) - Producția porcului - Ed. Eminescu S.A., București.

A MODERN APPROACH IN ECOLOGICAL SITE RESTORATION

CRISTINA GARLEA*, V. ANTON**, I. GARLEA**,A. PETRE ***, IOANA C.GARLEA****
* CSCBA-Romanian Academy , Bucharest,Romania,e-mail sendra@zappmobile.ro
** NHN ECOINVEST Ltd.,Bucharest Romania
*** Institute of Atomic Physics,Bucharest, Romania
**** University of Utrecht, Faculty of Physics,Utrecht, The Netherlands

Keywords: ecological restoration, radioactive pollutants, mathematics analysis

SUMMARY

The sustainable development of the world is deeply traced by the safety of the food resources. In the third Millenium, the pollution provided by the industrial facilities affected large areas cultivated for the direct use of the people as well as for the animal consume. The removal of these negative effects could be performed by the large scale interdisciplinary projects of the reconstruction, taking into account the eco-economical reasons. The paper presents physics-mathematics methods used for the radiological characterization of the large areas depreciated by nuclear activities (radioactive waste storages, nuclear reactors, radioisotope production laboratories, hot cells, uranium mining and milling). The results are used for the elaboration of the recovering strategy based on the combined system MARSSIM, created by DOE-USA.

An application was performed in Ilfov county, under the project no. PHARE 815/70, Local initiative. The returning in civil use of the land is a serious challenge accordingly by the law in force in the country, including the scientific report proving the final clean-up .

INTRODUCTION

The radiological survey must demonstrate that the residual radioactivity after the documentation procedures there is under the releasing limits (for nonrestrictive use or with some conditions imposed by authorities). The radiological parameters must be less than the Maximum Admissible Level of the Contaminants Concentration (NMAC). This level is established by rules, for different scenarios (ingestion, direct exposure, inhalation), these values being nearly the natural background level. Usually the Regulatory Body establishes the releasing criteria for the civil use of the area. The rehabilitation of the radioactive affected areas are based on the accurate surveillance methods.

1. PLANNING AND DESIGN OF SURVEILLANCE

The ecological restoration strategy must take into account the contaminants, their distribution, acceptable radiological level established by fundamentals norms of the country /1,2/, the physical characteristics of the site as well as the future use of the zone.

The planning of the rehabilitation process is conducted by the identification of the high radioactivity areas [3,4,5] as well as the number of places for data collecting. The initial hypothesis is that the level of radioactivity is more than unrestrictive release limit (null hypothesis) In the development of the research there were used two statistics tests for the evaluation of the final status:

- Wilcoxon Rank Summe (WRS) test for contaminants in background
- Sign test for other radiocontaminants [6,7].

The methodology for radiological characterization strategy following MARSSIM recommendations gathered in NUREG-1575 includes the next steps:

- the classification of the areas depending by the level of contamination
- the grouping or separation in survey units
- the determination of the data places number
- the selection of the measuring instrumentation
- the elaboration of the integrated surveillance design.

In the first class C1 could reconsidered:

- sites previously remediate
- areas known for radioactive discharging
- former radioactive waste storages
- former radioactive burial places
- areas with separate pieces having high specific activity.

The areas of second class C2 are:

- transport routes potentially contaminated
- zones of manipulation of radioactive materials having low radioactivity
- unsealed radioactive issues presented in the area
- former contaminated control zones.

In the third class C3 are enclosed:

- tampon areas between C1 and C2 classes
- very low radioactivity areas.

The calculation The conformity with criteria must be demonstrated in the final status report. The natural area for the natural background must have very likely characteristics (physical, chemical, biological, geological) with those of the surveillance unit.

In the international best practice are recommended:

- the calculations of the number of points for data collecting by the utilization of WRS test; the used formula is the following

$$N = \frac{(Z_{1-\alpha} + Z_{1-\beta})^2}{3(P_r - 0,5)^2},$$

where Pr is the probability that the results of the random measurements in the reference area to exceed those from surveillance area

- calculations by Sign test :

$$N = \frac{(Z_{1-\alpha} + Z_{1-\beta})^2}{4(Sign - 0,5)^2},$$

where $Z_{1-\alpha}$ and $Z_{1-\beta}$ are percentiles of the decisions errors versus levels α and β levels of the decision uncertainty.

2. THE RESULTS IN MAGURELE –ILFOV ECOZONE

A rehabilitation of the former nuclear site Magurele fortress – Baterry 14-15 was managed by PHARE project no.815/70-Local initiative, with the generous assistance of Romanian Government. The above mentioned mathematics methods have been used for the determination of the correct zone classification. The main nuclear facility in the area is an obsolete storage of radioactive wastes, placed in the old military building, surrounded by a reach vegetation. The investigated site is presented in Fig.no.1

Fig. 1. Former radioactive waste storage – Magurele, Ilfov

The results of the use of unit rule for the specific radioactivity determination are given in tables no. 1 and no. 2. The results are in Bq/kg' as well as in Bq/cm^2 for all classes.

Table 1

Unit rule (for specific massic radioactivity, Bq/kg)

Clasa	A_{US} (m^2)	A_{AR1} (m^2)	A_{AR2} (m^2)	A_{AR3} (m^2)	A_{AR4} (m^2)	A_{m1}	A_{m2}	A_{m3}	A_{m4}	$NMAC_C$ (Bq/kg)	C_{AR1} (Bq/kg)	C_{AR2} (Bq/kg)	C_{AR3} (Bq/kg)	C_{AR4} (Bq/kg)	s_r (Bq/kg)	s_s (Bq/kg)	d (Bq/kg)	S	S<1 (y/n)
C11	256	1,92	8	4,8	8	133	32	53,3	32	980	453	1232	902	911	5,26	382,00	382,04	0,4443	YES
C21	192	0,72	6	4,5		267	32	42,7		939	479	655	677		5,26	188,00	188,07	0,2292	YES
C31	372	0,56	4			664	93			859	149	80			5,26	28,20	28,69	0,0342	YES
C32	128									890					5,26	30,00	30,46	0,0342	YES
C33	244									858					5,26	27,80	28,29	0,0330	YES

Table 2

Unit rule (for specific surface radioactivity, Bq/cm^2)

Clasa	A_{US} (m^2)	A_{AR1} (m^2)	A_{AR2} (m^2)	A_{AR3} (m^2)	A_{AR4} (m^2)	A_{m1}	A_{m2}	A_{m3}	A_{m4}	$NMAC_C$ (Bq/cm^2)	C_{AR1} (Bq/cm^2)	C_{AR2} (Bq/cm^2)	C_{AR3} (Bq/cm^2)	C_{AR4} (Bq/cm^2)	s_r (Bq/cm^2)	s_s (Bq/cm^2)	d (Bq/cm^2)	S	S<1 (y/n)
C11	256	1,92	8	4,8	8	133	32	53,3	32	3	8,62	8,15	7,07	11,83	0,008	10,56	10,56	3,4815	NO
C21	192	0,72	6	4,5		267	32	42,7		3	6,24	8,50	8,80		0,008	5,58	5,58	1,9164	NO
C31	372	0,56	4			664	93			3	4,39	7,75			0,008	1,04	1,04	0,3724	YES
C32	128									3					0,008	0,87	0,87	0,2900	YES
C33	244									3					0,008	1,01	1,01	0,3367	YES

The results of the use of the free release criteria are given in the Tables no. 3 and no. 4.

Table 3

Free release criterion (for specific massic radioactivity, Bq/kg)

Clasa	a	b	m	n	m'	n'	D/s	s	$NMAC_C$ (Bq/kg)	MIRC	P_r	P_2	P_b=1-b	P_F	W_r	W_c	$W_r>W_c$ (y/n)
C11	0,05	0,05	24	42	33	33	1,0	382	980	598	0,76025	0,633702	0,95	0,514	1308	927	YES
C21	0,05	0,05	24	32	28	28	1,1	188	939	732	0,781662	0,662216	0,95	0,520	1068	783	YES
C31	0,05	0,05	24	24	24	24	1,2	28,2	859	825	0,801928	0,6898	0,95	0,528	876	668	YES
C32	0,05	0,05	24	7	16	16	1,6	30,0	890	842	0,87105	0,788602	0,95	0,567	500	419	YES
C33	0,05	0,05	24	12	18	18	1,5	27,8	858	816	0,855578	0,765812	0,95	0,558	588	493	YES

Table 4

Free release criterion (for specific surface radioactivity, Bq/cm^2)

Clasa	a	b	m	n	m'	n'	D/s	s	$NMAC_C$ (Bq/cm^2)	MIRC	P_r	P_2	P_b=1-b	P_F	W_r	W_c	$W_r>W_c$ (y/n)
C11	0,05	0,05	24	42	33	33	1,0	10,56	3	0	0,76025	0,633702	0,95	0,514	1308	927	YES
C21	0,05	0,05	24	32	28	28	1,1	5,58	3	0	0,781662	0,662216	0,95	0,520	1068	783	YES
C31	0,05	0,05	24	24	24	24	1,2	1,04	3	2	0,801928	0,6898	0,95	0,528	876	668	YES
C32	0,05	0,05	24	7	16	16	1,6	0,87	3	2	0,87105	0,788602	0,95	0,567	500	419	YES
C33	0,05	0,05	24	12	18	18	1,5	1,01	3	1	0,855578	0,765812	0,95	0,558	588	493	YES

In the figures *2, 3* and *4* there are presented the distribution of the surface radioactive contamination with ^{60}Co and ^{137}Cs as well as total surface contamination in front of the old military facility. In this area was stored the contaminated wood from dendrology park Scrovistea [5,6,7].

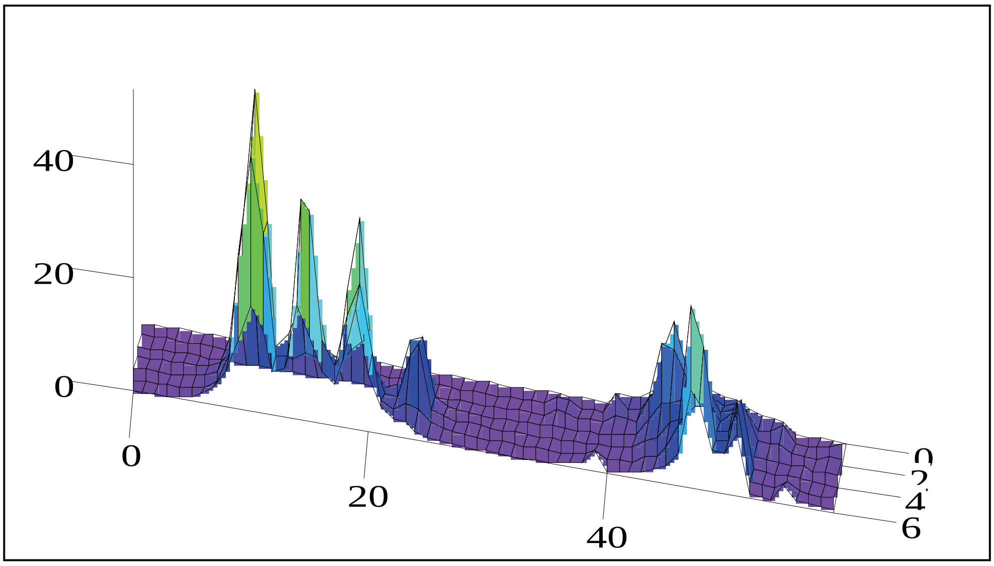


Fig. 2 The distribution of surface contamination (Bq/cm^2), ^{60}Co

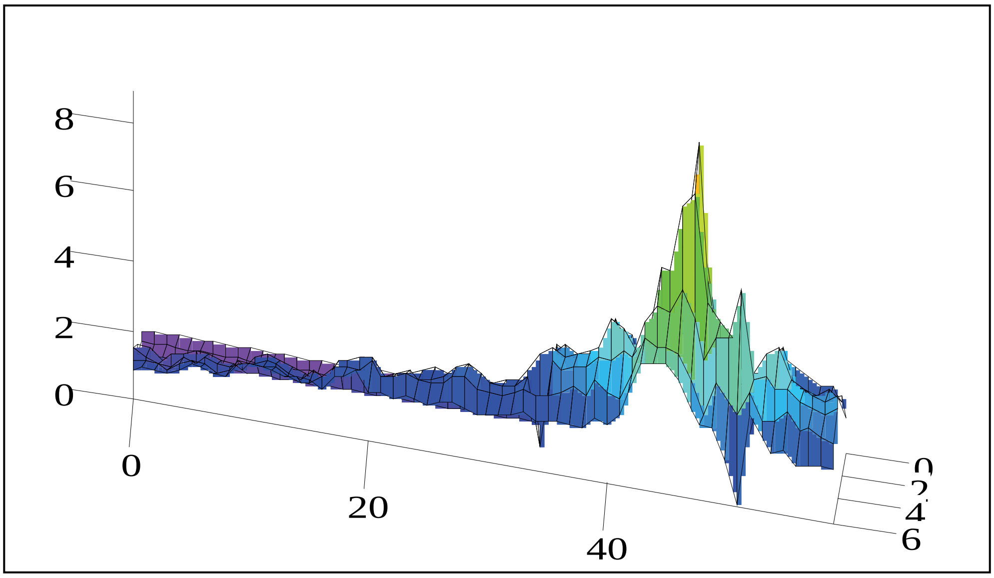


Fig. 3 The distribution of surface contamination (Bq/cm^2), ^{137}Cs

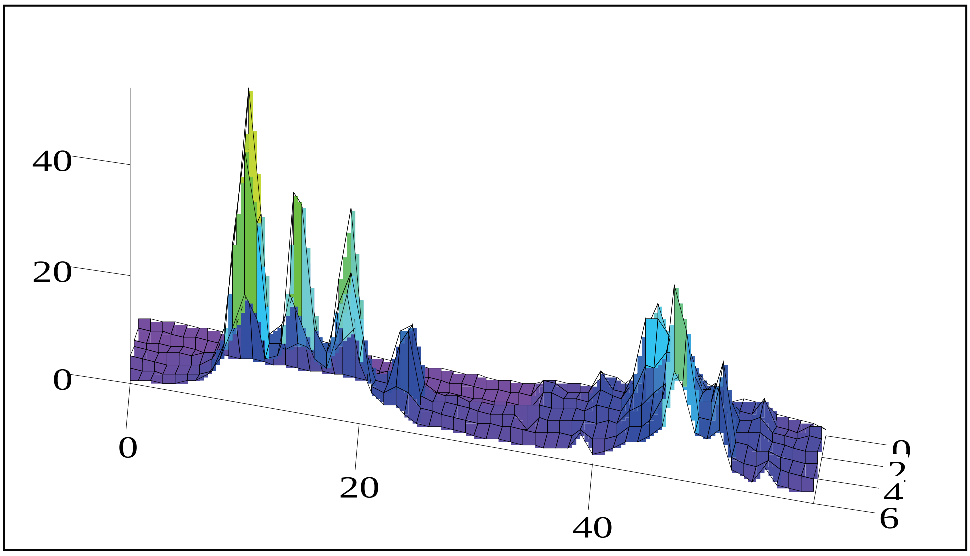


Fig. 4 The distribution of total surface contamination (Bq/cm^2)

CONCLUSIONS

The removal of the radioactive contaminants can be performed under the interdisciplinary projects, based on the radiological characterization

The cost of the pollution removal is significantly reduced by the use of the statistics tests..

The radioactivity of the ecozones must be the main task of the industrial units in the area, based on the MARSSIM methodology.

REFERENCES

1. Norme Fundamentale de Securitate Radiologică (NFSR), M. O. nr. 404 bis din 29 august 2000.

2. *C. Garlea et al* – Reabilitarea zonei fortului Magurele , Bateria 14 – 15, ed. Paralele 45, Colectia Universitaria, 2009.

3. MARSSIM (Multi-Agency Radiation Survey and Site Investigation Manual), NUREG 1575, December 1997.

4. IAEA TECDOC No. 351, Vienna, 1993.

5. *I.Garlea et al* -Definirea strategiei de reabilitare a zonei degradate, raport de stadiu NHN-001 Bucuresti, martie 2001.

6. *DOE STANDARDS 5400.5, vol. 1, 2, 1997*

7. *S. Brandt,* Statistical and Computational Methods in Data Analyses, North Holland Publishing Company, Amsterdam,1970

CURRENT ASPECTS CONCERNING THE PRODUCTIVE POTENTIAL OF FEEDS AND THEIR USE IN MONOGASTRIC ANIMALS

RADU BURLACU

Key words: forages, productive potential, energy, protein

Three major aspects of monogastric animals feeding are considered:

- The productive potential of the forages
- The requirement for energy and plastic elements
- The formulation of diets with software developed using the mathematical model for energy and protein metabolism simulation (Burlacu et al. 2002)

1. The productive potential of the forages

It was lately agreed worldwide that the nutritive value of the forages for monogastric animals (pigs, poultry and fur animals) must be expressed in corrected metabolisable energy (EMc), which aims to correct the energy spent for the dietary protein deamination, function of the ideal protein, corresponding to the animal protein synthesised either as milk, or as meat, eggs, hair, or as requirement for maintenance. On the other hand, the forage content in bacterial fermentescible matter (SFB) and their content of sugar is also of interest. The bacterial fermentescible matter represents the amount of membrane glucids that are degraded in the caecum and colon, with 40% loss of energy, corresponding to 6.8 MJ/kg DM membrane glucids (17 MJ x 0.4 = 6.8 MJ) and which is applied to the forages with a sugar content higher than 100 gr SFB/ kg DM. For the forages with a sugar content higher than 80 gr/kg DM there also is another correction which applies, 1.4 MJ/kg DM sugar, which is the difference of energy content between the starch and the sugar (17 MJ – 15.6 MJ = 1.4 MJ). Thus, the calculation formula for EMc becomes:

$$EMc = ED – (EU + Edez + 6{,}8\ (BFM – 0{,}1) + 1{,}4\ Z)$$

where ED = digestible energy, MJ and EU = urine energy, MJ.

Just to make an image on the importance of correcting the deamination energy, we compared the content if essential amino acids of the ideal protein, represented by the pig meat, broilers and eggs. These ideal proteins, compared with the protein from different forages, give the proportion in which the forage protein can synthesize animal protein. The difference of dietary amino acids will de deaminated and used by the animals as thermal matter, therefore, as energy. The higher is the deamination process, the larger is Edez correction, and vice versa, which justifies the use of differentiated EMc values for the animal categories mentioned earlier.

If we judge the differences of nutritive value evaluation according to the old system, which doesn’t take into consideration the above corrections, and if we also judge it by the current system, in pigs, for instance, one may see that if for the corn the difference is not significant, the difference is of 12% in the soybean meal, of 11% in the fish meal and feedgrade beet, and 25% in the fresh alfalfa, which shows that these differences can not be overlooked. In the basic forages for broilers and layers, the difference of evaluation for the corrected metabolisable energy is of just 0-5.2%, but for the protein available for maintenance and synthesis (PA), these differences reach 11.6% to 31.5%, which is not to be neglected. This justifies fully the necessity for differentiated feeding tables for these two categories of poultry.

2. The requirement for energy and plastic elements

2.1 The requirement for energy are expressed through EMc, by adding the energy requirement for maintenance (EMm), the energy requirement for body protein synthesis (EPr), the energy requirement for body lipid synthesis (Lr), and the energy requirement for thermoregulation (Q'), physical activity (Q'') and, when it is the case, for pregnancy (EMg), for lactation (EMl) or for egg production (EMo) and for fur growth (EMw), using the following formula:

Requirement of EMc = EMm + EPr + Lr + Q' + Q'' + EMg + EMl + EMo + EMw

EMm is evaluated from the net body weight (Gn) or, better, from the total content of body protein of the animal (Pt), related to exponential values specific to the different categories of animals, by sex and physiological state.

EPr is evaluated function of the potential daily gain of protein valid for the particular species, breeds, lines, whose size can be described with a Gompertz-type equation, which takes into consideration the net body weight or the total body protein at maturity (A or Pt), the growth coefficient B, the age in days (t) and the inflexion point (t^x), which the moment when the animal, fed normally, retains the maximal gain, after which it decreases to zero. In this way, the new system for energy and protein norms takes into account the new lines developed by the breeders, characterized primarily by a higher capacity of body protein synthesis. ELr is evaluated by relating to the production of protein, thus revealing the fatter gains, blamed by the feeding hygiene and by the higher energy costs. Knowing thus the protein and lipid gains, one may calculate the energy requirement for protein and lipid synthesis, admitting a cost valid between 50 and 56 MJ/kg. The gain of protein and lipids, in pigs, by sex, including the pregnancy gain and the net weight gain for the broilers, by sex, including the net body evolution presume a Gompertz-type evolution, with an inflexion point 20-50 days and a decrease to disappearance after a period of 70-150 days. The values of Q' and Q'', which are the requirement of corrected metabolisable energy for thermal regulation and for physical activity, are calculated taking into account animal body weight and the difference between body temperature (Tc) and environmental temperature (Ta), as well as the critical lower temperature (Tci) and the upper critical temperature (Tcs), which are the range of temperatures in which the animals find themselves in the neutral thermal area, during the physical activity and given by the extra energy spent by kg/m with moving. For pregnancy, EMg is calculated from the gross energy retained in the uterus (Eu) and in the mamma (Emam), accepting a 50%yield of EMc utilization. For lactation, are used the energy value of the milk (El) and a 70% yield of EMc utilization. For hair growth, the EMw requirement is usually calculated together with the energy requirement for maintenance, because it has insignificant values within the global energy balance. For egg production (EMo) are used the energy value of the egg proteins and lipids (Pro and Lro), calculating the same yields of EMc utlization as for Pr and Lr.

2.2. Protein requirements

Just like for the energy requirements, the protein norms for monogastric animals are measured taking into consideration the requirement of amino acids for the maintenance of th4e vital functions, expressed in net protein for maintenance (Pm), function of the total body protein (Pt) and the requirement either for weight gain (Pr), or for pregnancy (Pg), for lactation (Pl), for egg production (Po) or for hair growth (Pw). The net protein which represents the requirement for production (weight gain, pregnancy, lactation, eggs, hair) is synthesized with a yield ranging between 81.3% (pigs and fur animals) and 83/7% (poultry), so that the requirement of total available protein (PA) is calculated differentiated for these categories of monogastric animals using the following formulas:

- For pigs and fur animals:

$$PA = Pm + (Pr + Pg + Pl + Pw): 0.813$$

- For poultry:

$$PA = Pm + (Pr + Po): 0.837$$

The requirement for limiting essential amino acids is calculated function of the amount of available protein (PA) based on the ideal composition which in pigs and fur animals is considered to have for 100 g, 7 g lysine, 4 g met + cist, 1.5 g tryptophan and 4.5 g threonine and for the growing poultry: 6.6 g lysine, 5.6 g methionine + cystine, 1.2 g tryptophan and 4.6 g threonine; while for the layers: 7.7 g lysine, 6.4 g met + cist., 85 g tryptophan and 5.5 g threonine.

In this way we calculate the norms of available protein (PA) for the reproduction sows and the EMc norms function of the physiological state of the sows, during pregnancy, lactation and during the dry period, on three cycles. The mathematical model also allows calculating the evolution of the body composition of the sows along the three cycles, which must also be taken into consideration. The requirement of mineral salts and vitamins is usually calculated by 1 kg diet DM.

3. The formulation of diets.

As mentioned, the feeding value of the forages can be measured only within the context of the diet, because the deamination energy for the dietary protein (Edez), as well as the bacterial fermentescible matter (SFB) and the sugar (S), including the biological value (VB) of the dietary protein is nit the sum of the feeding values of the individual forages, which is why diet formulation must be done according to the current animal performance according to the stage of production. This can only be done correctly using mathematical models for metabolism simulation on computer. The required inputs are:

- Forage content of digestible energy (ED, MJ/kg DM);
- Forage content of digestible crude protein (PBD g/kg DM);
- Gross digestible fiber (CBD g/kg DM);
- Digestible nitrogen-free extractives (SEND g/kg DM);

- starch (A g/kg DM);
- sugar (Z g/kg DM);
- Forage content of limiting essential amino acids (AAdig /kg DM);

- Norms of corrected metabolisable energy (EMc, MJ/day), available protein (PA g/day), net protein for maintenance (Pm for lactation (Pl), for eggs (Po) and for hair (Pw).

The following equations are formulated:

a) ED, x X + ED, y, Y + …+ED, n, N = EMc + a $\left(\frac{PA}{VB} - \Pr - Pg - Pl - Po - Pw\right)$ + 4.9 $\left(\frac{PA}{VB} - \Pr - Pg - Pl - Po - Pw\right)$ + 0.0068 (((CBD, x, X + CBD, y, Y + …+CBD, n, N) + (SEND, x, X + SEND, y, Y, + …+ SEND, n, N) – (A, x, X + A, y, Y + …+A, n, N) – (Z, x, X + Z, y, Y + …+Z, n, N) : n – 100)(x + 0.0014 ((Z, x, X + Z, y, Y + …+Z, n, N) : n)(xx

b) PBD, x, X + PBD, y, Y + …+ PBD, n, N = PA/VB

c) $\frac{\left(AAd, \mathrm{x}, \mathrm{X} + \mathrm{AAd}, \mathrm{y}, \mathrm{Y} + \ldots + \mathrm{AAd}, \mathrm{n}, \mathrm{N}\right)}{\left(\mathrm{PBD}, \mathrm{x}, \mathrm{X} + \mathrm{PBD}, \mathrm{y}, \mathrm{Y} + \ldots + \mathrm{PBD}, \mathrm{n}, \mathrm{N}\right)} : AAlpc = VB$

where a = 7.2 for pigs and fur animals and 5.85 for poultry; X, Y, …N = kg DM forage, and AAlcp = the limiting amino acid of the protein produced in competition with the limiting amino acids of the forages, in kg per 1000 g produced protein.

----

x) if the dietary SFB per kg DM is higher than 100 g
x)) if the dietary Z per kg DM is higher than 80 g

This system of three equations is solved and the dietary amounts of forages: X, Y, …N are determined in kg SU.

The mathematical modelling of the metabolism processes may reveal amounts of forages, expressed in DM, which differ function of several factors. These amounts are shown graphically as rectangles, for each age, when different percentages of dietary crude protein (PB) with the biological value (VB) between 0.45 and 065 are took into consideration. For instance, in broilers, the production of daily weight gains of 13 to 57 g/day according to the aged, have a ratio of gain lipids to gain protein between 0.2 and 1.0. It results thus that at the age of 28 days of the boilers, the production of a daily weight gain of 37 g, requires 62 to 93 g compound feed/day, if the compound feed has 18 to 45 % CP with a biological value between 0.45 and 0.56 for a variation of the lipid to protein ratio between 0.2 and 1.0.

CONCLUSIONS

The efficient and economical feeding of the monogastric farm animals can only be done with diet formulations developed on computer using the mathematical models for energy and protein metabolism simulation. The limiting essential amino acids, the macro elements and the trace elements, as well as the dispensable vitamins must also be taken into account. The diets must also be proportioned to the ingestion capacity specific to the animals, which depends on their physiological state during exploitation. The extent to which these desiderates will be put into practice, will lead to a reasonable and competitive exploitation of the monogastric farm animals.

REFERENCES

1. *Burlacu Gh., Burlacu R., Columbeanu I., Alexandru G*., Rev. Agric. Sci. IV, 150 (1988)
2. *Burlacu Gh., Burlacu R., Columbeanu I., Alexandru G.,* Arhiv anim. Nutr., Berlin, 40 (1990) 5/6, 409-422
3. *Burlacu Gh., Burlacu R., Cavache A. şi Surdu I.:* Potențialul productiv al nutrețurilor şi utilizarea lor la animalele de fermă, Ed Ceres, 2002, 212-254.

RESEARCHES REGARDING THE BIOLOGIC RESERVE OF THE RODENT *MICROTUS ARVALIS* PALL (*RODENTINA: MICROTIDAE)* IDURING THE AUTUMN OF 2009 IN THE ORCHARDS IN SIBIU COUNTY

IULIANA ANTONIE *, SIMONA SPÂNU*, ADRIANA ILIU**, ANA TIMAR**
*"Lucian Blaga" University, Sibiu, The Faculty of Agricultural Sciences,
Food Industry and the Protection of the Enviroment
** The Direction for Agriculture and the Rural Development Sibiu – The Fito- Sanitary Unit
iuliana_antonie@yahoo.com

Key words: biological reserve, Microtus arvalis Pall

SUMMARY

The weather conditions during the last years were favorable to the growth of the populations of Microtus arvalis in Sibiu County. This pest rodent sheltered within all the agricultural cultures as well as in pastures, hayfields, slopes, the road sides. Its presence grew alarmingly in orchards, too.

In order to put into practice correctly the control and warning measures there was necessary to establish the density of this pest. So, in order to determine the number of colonies as well as the percentage of attacked trees there were investigated 929 hectares of orchards.

Researches upon the species Microtus arvalis were done by Săvescu, 1960; Manolache and Boguleanu, 1967; Tuţă, 1980; Teodorescu and coworkers, 2003; Paşol and coworkers, 2007, and so on.

The investigations were done during 3rd September 2009 – 15th September 2009 in 7 orchard firms in the localities Viile Sibiului, Cisnădie, Șura Mare/Slimnic, Șura Mare (Agnita), Ruja, Miercurea Sibiului (Sibiu County). There was checked the surface of 929 hectares of orchards and there were identified the trees that were attacked by the rodent on the parcel of tree species. In order to determine the number of colonies as well as the percentage of the trees attacked by the mice there done soundings in zigzag as well as on the diagonal of the parcel. In the parcels where the trees were sustained by a sustaining system the sounding was done alongside the tree rows. In the same time there was investigated the dependence of the population of Microtus arvalis on the values of environment factors during 2009.

There is considered that the results of the investigations are of a special economic importance, these being used afterwards in appreciating the best moment to put into practice the control and warning measures against this rodent. In the same time was brought to present the data regarding the orchards patrimony in Sibiu Country.

INTRODUCTION

Microtus arvalis Pall belonging to the *Microtidae* family, also named field mouse is one of the pest rodent of the young fruit tree plantations and of all young tree plantations. This rodent is spread in the entire steppe and forest steppe area till the altitude of 2000m.

In our country it can be seen in the orchards and forest plantations in the Transylvania Basin, in Banat and Moldavia. It also can be seen in Walachia and Oltenia in the under Carpathians regions alongside with the water rat (Tuța, 1980).

In the areas where it made a powerful invasion it was of a high economic significance. So during 1965 – 1966 in Batoş orchard in Mureş County it destroyed over 80,000 trees of 2-10 years old, the tree patrimony being of 120 ha intensive orchard (Tomșa, 2003).

In years with long, warm and rainless autumns the mice can cause great losses especially to the young trees in the new plantations and seed beds (Teodorescu & coworkers, 2003). The mice gnaw the roots as well as the stem round the base then climbing gnawing up to 25cm height. The gnawing can be shallow but on small areas they can be deep to the wood all around the stem. The attacked trees dry in time (Paşol & coworkers, 2007). The greatest damages are produced at the end of winter.

Among the fruit tree species, the apple and the apricot trees, the the plum tree are mostly attacked by *Microtus arvalis* (Săvescu, 1960). At the cherry and sour cherry tree as well as for the hazel tree 1-8 years old the attack rate is smaller.

This pest develops very well on a rough soil. It lives in colonies, in underground nests having a lot of galleries, deep to 30-40cm that communicate with the exterior through a variable number of holes from 1 to many more. (Manolache & Boguleanu, 1967)

The mouse breeds from spring till autumn. A pregnant mouse female can give birth 5-7 times to 5-8 young ones if there are good condition of life like food, warm time and normal humidity. The young generation can breed themselves at the age of 1month and a half. The live time for a mouse is at the average of 18-19 months.

1. MATERIAL AND METHOD

- ✓ **the interval the investigations took place:** 03.09.2010 – 15.09.2009;
- ✓ **The investigation took place in 7 orchards in the following localities**: Viile Sibiului, Cisnădie, Şura Mare/Slimnic, Şura Mare, Veseud (Agnita), Ruja, Miercurea Sibiului;
- ✓ **There was checked a surface of 929 ha of orchards** finding out the invaded surfaces and the degree of the attack (the density of the colonies/ha);
- ✓ **There were identified the trees that were attacked** by the rodent on areas and fruit trees species;
- ✓ **The investigation method:** in order to determine the number of colonies as well as the percentage of trees attacked by the mice there were done drills in zigzag and on the diagonal of the area. In the areas where the trees had sustaining systems the drills were done alongside the row of trees.

2. RESULTS AND DISCUSSIONS

1. FINDING OUT THE INVADED AREAS AND ESTABLISHING THE DEGREE OF THE ATTACK (THE DENSITY OF THE COLONIES/HA)

The weather condition during the last years was favorable for the growth of the populations of *Microtus arvalis* in Sibiu County. This pest rodent settled in all the agricultural cultures as well as in pastures, hay field, slopes, the side of the roads and its presence also grew alarmingly in the orchards, too.

In order to apply correctly the warning and control measures there was necessary to establish the density of the pest. In this respect in order to determine the number of colonies as well as the percentage of the attacked trees there were investigated 929 ha of orchards (Table 1).

Table 1

The surface and the type of orchards investigated in the Sibiu County

The number of the total Investigated ha	**The orchard type**		
	Super intensively over 3,000 trees/ha	**Intensively 500-2000 trees/ha**	**Classical 200-500 trees/ha**
929 ha	66 ha	299 ha	564 ha
% of the total of orchards	7,1%	32,2%	60,7%

During 03.09.2009 – 15.09.2009 there were investigated 929 ha of orchards in the Sibiu County from which: 66 ha of orchard super intensively (over 3,000 trees/ha), representing 7.1% of the surface; 299ha of orchard in an intensively way (500-200 trees/ha), representing 32.2% of the total and 567ha. Classical orchard (200 – 500 trees/ha) representing 60.7% of the investigated area.

Out of those 929ha of the investigated orchards in 2009 825ha (respectively 88.8%) were found out having the pest rodent (Table 2).

Table 2

The attacked areas and the density of the rodent (colonies/ha) in the Sibiu County 2009

The controlled surface From a sanitary Point of view	No attack	With attack	**Invaded surfaces and the density (the degree of the attack) of the rodent *Microtus arvalis* (colonies/ha)**				
			Weak 1-5 col. /ha	Medium 6-10 col./ha	Big 11-25 col./ha	Very big 26-100 col./ha	*General Attack* 101-200 col./ha
926 ha	104 ha	825 ha	94 ha	97 ha	205 ha	125 ha	304 ha
%	11,2 %	88,8%	11,39%	11,78%	24,84%	15,15%	36,84%

Out of the 825ha, 94ha presented a weak density of the attack (11.39% of the attacked surface), on the 97ha the density was a medium one (11.28%), on 205ha the degree of the attack of the pest was a big one (24.84%) and on 127 ha the degree of the attack was a very big one (15.15%) and on 304ha (36.84%) there was a general attack.

2. THE ANALYSIS OF THE ATTACK OF THE RODENT AGAINST THE FRUIT TREES IN THE CONTROLLED ORCHARDS

Besides the number of the colonies/ha there was also investigated the number of the fruit trees attacked by *Microtus arvalis* (Table 3).

Table 3

The number of the attacked trees from the total of the controlled orchards

Controlled Orchard Surface ha	**Without tree attack**	**With the tree attack**	**The attacked trees**				
			Weak 3%	Medium 3-10%	Strong 10-30%	Very strong 30-60%	Extremely strong over 60%
926 ha	781 ha	148 ha	46 ha	46 ha	42 ha	14 ha	-
% of the total surface	84%	16%	5%	5%	4.5%	1.5%	-
The Total of the attacked trees	-	**15,707**	**1,027**	**2,649**	**7,419**	**4,612**	-

As a result of the analysis of the table 3 we can draw the following conclusions:

- On those 148ha of orchard there were found 15,707 samples pf fruit trees that suffered an attack of *Microtus arvalis.* Out of these 1,027 samples suffered a weak attack, 2,649 suffered a medium attack, 7,419 samples a strong attack and 4,612 samples a very strong attack.
- We must draw the attention that the result of the attacked trees by the rodent was during 2007 – 2009
- The biggest damages were registered in young orchards, of intensively type having 1,100trees/ha.

Table 4 leads to the following conclusions:

- Out of those 148 ha of fruit trees attacked by *Microtus arvalis* 116 ha were cultivated intensively, 4 ha were cultivated super intensively and 28 ha classical. There were affected 12,031 trees out of 15,707. There was established that the most of the attacked trees were in young orchards, the intensively type(over 1,000trees/ha);
- On 46 ha there were attacked 1,027 trees , this being a weak attack (1-3%); on another 46 ha there were attacked 2,649 trees, this being a medium attack (3-10%); on 42 ha there were attacked 7,419 trees, this being a strong attack (10-30%); on 14 ha the pest attacked 4,612 trees, this being an extremely strong attack (30-60%);
- In Viile Sibiului there were attacked 4,597 apple trees, 2,500 cherry trees, 1,375 sour cherry and only 225 plum trees. Although in the literature of specialty there is mentioned that the cherry tree and the sour cherry tree can be attacked by *Microtus arvalis* in a smaller proportion there was established that on the investigated agricultural eco system the number of the samples of sour cherry trees and the cherry trees was much higher than those of the attacked plum trees.
- There can't be done a direct correlation of the number of the colonies/ha and the number of the attacked trees/ha due to the agricultural and technical works as well as the control measures that were applied differently on the areas by the producers.

Table 4

The Situation of the Attacks Considering the Types of Orchards in Sibiu County

Locality/ Society	Trees attacked	The total of the hectares attacked			The number of the trees attacked – the kind of attack (ha)					
		Intensively	Super Intensively	Classical	Weak 1-3%	Medium 3-10%	Strong 10-30%	Very Strong 30-60%	Extremel Strong > 60 %	The total of the attacked trees
Viile Sibiului S.C. Horticola Internaţional SRL	Apple tree	35 ha	-	-	12 ha/ 396 trees	6 ha/ 660 trees	17 ha/ 3,366 trees	-	-	4,422
	Apple tree	-	-	5 ha	-	5 ha / 175 trees	-	-	-	175
	Plum tree	-	-	5 ha	-	5 ha / 225 trees	-	-	-	225
	Cherry tree	-	-	10 ha	-	-	-	10 ha / 2,500 trees	-	2,500
	Sour cherry tree	15 ha	-	-	5 ha/ 165 trees	-	10 ha / 1,210 trees	-	-	1,375
Cisnădie S.C. Prod Fruct	Plum tree	-	-	7 ha	7 ha / 84 trees	-	-	-	-	84
Şura Mare/Slimnic Person	Apple tree	10 ha	-	-	-	2 ha / 88 trees	4 ha / 880 trees	4 ha / 2,112 trees	-	3,080
	Cherry tree	-	-	1 ha	-	-	1 ha/ 115 trees	-	-	115
Şura Mare Person	Apple tree	1 ha	-	-	1 ha / 2 pomi	-	-	-	-	2
Veseud (Agnita) S.C. Duo Comp SRL	Apple tree	37 ha	-	-	11 ha / 302 trees	25 ha / 1,237 trees	1 ha / 330 trees	-	-	1,869
Ruja S.C. Conelt SRL	Apple tree	17 ha	-	-	6 ha / 66 trees	3 ha/ 264 trees	8 ha / 1,320 trees	-	-	1,650
	Plum tree	1 ha	-	-	-	-	1 ha / 198 trees	-	-	198
Miercurea Sibiului S.C. Deko Rame SRL	Apple tree	-	4 ha	-	4 ha / 12 trees	-	-	-	-	12
Total		116 ha	4 ha	28 ha	46 ha / 2,649 trees	46 ha 7 2,649 trees	42 ha / 4,612 trees	14 ha / 4,612 trees	-	15,707

3. CONCLUSIONS

Out of those 929 ha of orchards investigated in 2009 in the Sibiu County, 825ha (respectively 88.8%) were found with pest rodent. Among these 94 ha presented a weak density of the attack, 97 ha a medium one, 205 ha a high attack degree, 127 ha in a very high attack degree and on 304 ha the attack was generalized;

There were attacked by *Microtus arvalis* a number of 15,707 fruit tress out of which 1,027 samples suffered a weak attack, 2,649 a medium one, 7,419 a strong attack and 4,612 samples a very strong attack;

Out of those 15.707 fruit trees 11,210 were apple trees, 507 were plum trees, 2,615 cherry trees and 1,375 sour cherry trees;

The attacked trees are the result of the attacks during 2007 -2009;

In Viile Sibiului there were attacked 4,597 apple trees, 2,500 cherry trees, 1,375 sour cherry trees and only 225 plum trees. Although in the literature of specialty there is mentioned that the cherry tree and the sour cherry tree can be attacked by *Microtus arvalis* in a smaller proportion there was established that on the investigated agricultural eco system the number of the samples of sour cherry trees and the cherry trees was much higher than those of the attacked plum trees;

There was established that on the areas where were done mechanical and agricultural and technical works of the soil as well as the weed killer was used on the row of trees the attack of *Microtus arvalis* was weaker.

The growth of the attack of pests in some agricultural systems is sometimes due to the lack of the mechanical, agricultural and technical works as well as to the lack of sanitary treatments.

REFERENCES

1. *Tuţă, Al.,* 1980, Rozătoare dăunătoare în plantații pomicole, silvice şi pepiniere, Metodici de prognoză şi avertizare a tratamentelor împotriva bolilor şi dăunătorilor plantelor de cultură, Centrul de material didactic și propagandă agricolă, București.
2. *Tomşa, M., Tomşa, Elena,* 2003, Protecția integrată a pomilor şi arbuștilor fructiferi, Ed. Geea, București.
3. *Săvescu, A., 1960,* Album de protecția plantelor,vol. I, Centrul de Material Didactic şi Propagandă Agricolă, Bucureşti.
4. *Manolache, C., Bogulenu, Gh.,* 1967, Entomologie agricolă, Întreprinderea poligrafică „Crişana”, Oradea.
5. *Paşol, P., Dobrin, Ionela, Frăsin, Loredana,* 2007, Tratat de entomologie specială, Editura Ceres, București.
6. *Teodorescu, Georgeta, Toman, T., Sumedrea, Mihaela*, 2003, Entomologie horticolă, Editura Ceres, Bucureşti

THE INFLUNCE OF THE WEATHER CONDITION CONCERNING THE BIOLOGIC RESERVE OF THE RODENT *MICROTUS ARVALIS* PALL (*RODENTINA: MICROTIDAE)* DURING THE AUTUMN OF 2009 IN THE ORCHARDS IN SIBIU COUNTY

IULIANA ANTONIE *, SIMONA SPÂNU*, ADRIANA ILIU**
*"Lucian Blaga" University, Sibiu, The Faculty Of Agricultural Sciences,
Food Industry and the Protection of the Enviroment
** The Direction for Agriculture and the Rural Development Sibiu – The Fito- Sanitary Unit
iuliana_antonie@yahoo.com

Key words: biological reserve, Microtus arvalis Pall

SUMMARY

The weather conditions during the last years were favorable to the growth of the populations of Microtus arvalis in Sibiu County. This pest rodent sheltered within all the agricultural cultures as well as in pastures, hayfields, slopes, the road sides. Its presence grew alarmingly in orchards, too. In order to put into practice correctly the control and warning measures there was necessary to establish the density of this pest. So, in order to determine the number of colonies as well as the percentage of attacked trees there were investigated 929 hectares of orchards. Researches upon the species Microtus arvalis were done by Săvescu, 1960; Manolache and Boguleanu, 1967; Tuță, 1980; Teodorescu and coworkers, 2003; Paşol and coworkers, 2007, and so on.

The investigations were done during 3rd September 2009 – 15th September 2009 in 7 orchard firms in the localities Viile Sibiului, Cisnădie, Șura Mare/Slimnic, Șura Mare (Agnita), Ruja, Miercurea Sibiului (Sibiu County). There was checked the surface of 929 hectares of orchards and there were identified the trees that were attacked by the rodent on the parcel of tree species. In order to determine the number of colonies as well as the percentage of the trees attacked by the mice there done soundings in zigzag as well as on the diagonal of the parcel. In the parcels where the trees were sustained by a sustaining system the sounding was done alongside the tree rows. In the same time there was investigated the dependence of the population of Microtus arvalis on the values of environment factors during 2009.

There is considered that the results of the investigations are of a special economic importance, these being used afterwards in appreciating the best moment to put into practice the control and warning measures against this rodent. In the same time was brought to present the data regarding the orchards patrimony in Sibiu County

INTRODUCTION

Microtus arvalis Pall belonging to the *Microtidae* family, also named field mouse is one of the pest rodent of the young fruit tree plantations and of all young tree plantations. This rodent is spread in the entire steppe and forest steppe area till the altitude of 2000m.

In our country it can be seen in the orchards and forest plantations in the Transylvania Basin, in Banat and Moldavia. It also can be seen in Walachia and Oltenia in the under Carpathians regions alongside with the water rat (Tuța, 1980).

In the areas where it made a powerful invasion it was of a high economic significance. So during 1965 – 1966 in Batoş orchard in Mureş County it destroyed over

80,000 trees of 2-10 years old, the tree patrimony being of 120 ha intensive orchard (Tomşa, 2003).

In years with long, warm and rainless autumns the mice can cause great losses especially to the young trees in the new plantations and seed beds (Teodorescu & coworkers, 2003). The mice gnaw the roots as well as the stem round the base then climbing gnawing up to 25cm height. The gnawing can be shallow but on small areas they can be deep to the wood all around the stem. The attacked trees dry in time (Paşol & coworkers, 2007). The greatest damages are produced at the end of winter. Among the fruit tree species, the apple and the apricot trees, the the plum tree are mostly attacked by *Microtus arvalis* (Săvescu, 1960). At the cherry and sour cherry tree as well as for the hazel tree 1-8 years old the attack rate is smaller.

This pest develops very well on a rough soil. It lives in colonies, in underground nests having a lot of galleries, deep to 30-40cm that communicate with the exterior through a variable number of holes from 1 to many more. (Manolache & Boguleanu, 1967)

The mouse breeds from spring till autumn. A pregnant mouse female can give birth 5-7 times to 5-8 young ones if there are good condition of life like food, warm time and normal humidity. The young generation can breed themselves at the age of 1month and a half. The live time for a mouse is at the average of 18-19 months.

1. MATERIAL AND METHOD

- ✓ **the interval the investigations took place:** 03.09.2010 – 15.09.2009;
- ✓ **The investigation took place in 7 orchards in the following localities**: Viile Sibiului, Cisnădie, Şura Mare/Slimnic, Şura Mare, Veseud (Agnita), Ruja, Miercurea Sibiului.
- ✓ **There was checked a surface of 929 ha of orchards** finding out the invaded surfaces and the degree of the attack (the density of the colonies/ha)
- ✓ **There were identified the trees that were attacked** by the rodent on areas and fruit trees species;
- ✓ **The investigation of the dependence of the number of the population *Microtus arvalis* to the values of the environment:** temperature, rain in 2009;
- ✓ **The investigation method:** in order to determine the number of colonies as well as the percentage of trees attacked by the mice there were done drills in zigzag and on the diagonal of the area. In the areas where the trees had sustaining systems the drills were done alongside the row of trees.

2. RESULTS AND DISCUSSIONS

The weather condition during the last years was favorable for the growth of the populations of *Microtus arvalis* in Sibiu County. This pest rodent settled in all the agricultural cultures as well as in pastures, hay field, slopes, the side of the roads and its presence also grew alarmingly in the orchards, too.

The year 2009 was from the temperature point of view over the yearly average temperature in many years. This being, for the Sibiu Depression of 8.9^0 C and in 2009 the average temperature was 10.3^0 C. During 2009 there was registered quite a growth of the average temperature of the air with 1.4^0C.

Usually July is the hottest month of the year and January the coldest one. 2009 was between the normal limits regarding the temperature. There was registered 20.9^0C in July that is a value close to that registered in many years for this month and - 2.8^0C in January, this value being also close to the normal one. December and February, generally cold months were mild in 2009, with temperature above the average ones So, the average temperature in February was of only – 0.6^0C, and in December the average temperature was even higher of 1.7^0C. During the invasions of arctic or marine polar air the researched area can be covered by masses of cold air, being mostly exposed to the severe cold the valleys and the depression zone.

During the year the number of the days when there is registered an average temperature higher than 0^0C is of 293 and the number of the days with an average temperature over 10^0C is of 179. The average data of the first frost is situated in the second decade of October. The danger of frost can last till May but it generally disappears from the third decade of April. Due to the invasions of masses of cold air yearly in autumn and late in spring the frost can be present sometimes within a period of 2 to 4 weeks comparing to the average data. The number of frost days is of 124 (Fig. 1).

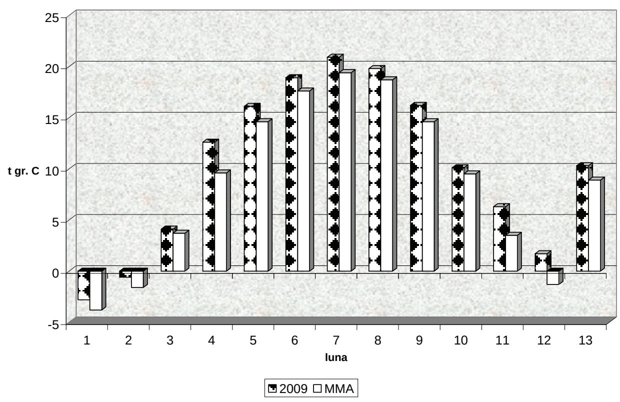


Figure 1 The Variation of the Average Monthly of the Air Temperature during 2009

Having as a background the growth of the temperature and in normal conditions of rain the number of the pests grew alarmingly.

The average relative wetness of the air registers values of 75% (average yearly value). In the depression area of Sibiu the difference registered between the warm and cold season is quite high (18%). The yearly value of the relative wetness of the air in the depression area presents a continuous diminution till the beginning of summer and than a growth till the end of the year.

As regarding the rain the smallest quantities of rain are during the cold season, when there is collected only a quarter of the quantity of water during summer. In

February the average monthly quantities of water varies from 18-30mm. In 2009 February was a wet month with a quantity of 51.2mm. Generally June is the month with the highest quantities of water out of the entire year, these quantities vary round 90mm. In 2009 was also registered quite a growth of the quantity of rain comparing to the normal one almost the entire summer time: 113.6mm in June and 154.4mm in July. May, generally a rainy month was poor in showers – only 38.6mm.

As an assembly the quantity of rain was within the normal limits (Figure 2) but with atypical values for February (more than normal 51.2mm) and April (less than normal with 4.6mm)

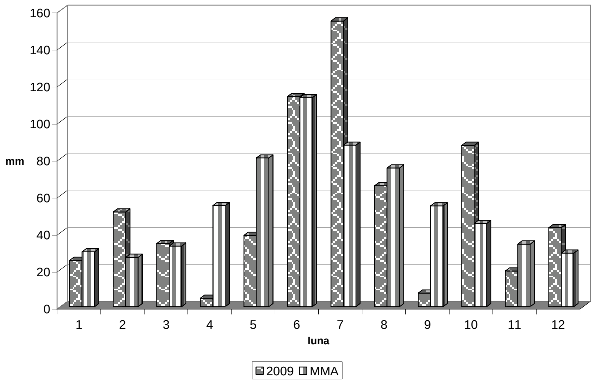


Figure 2: The Variation of the Monthly Quantity of Rain in Sibiu during 2009

In order to apply correctly the warning and control measures there was necessary to establish the density of the pest.

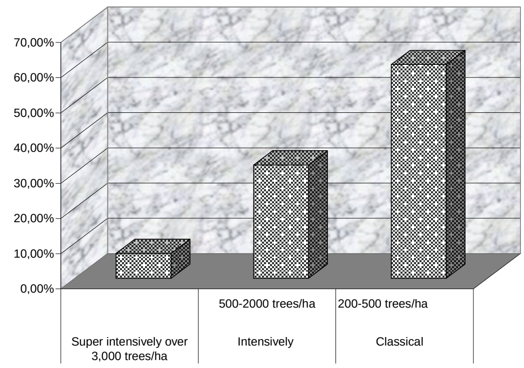


Figure 3. The surface and the type of orchards investigated in the Sibiu County

In this respect in order to determine the number of colonies as well as the percentage of the attacked trees there were investigated 929 ha of orchards (Figure 3).
During 03.09.2009 – 15.09.2009 there were investigated 929 ha of orchards in the Sibiu County from which: 66 ha of orchard super intensively (over 3,000 trees/ha), representing 7.1% of the surface; 299ha of orchard in an intensively way (500-200 trees/ha),

representing 32.2% of the total and 567ha. Classical orchard (200 – 500 trees/ha) representing 60.7% of the investigated area. Out of those 929ha of the investigated orchards in 2009 825ha (respectively 88.8%) were found out having the pest rodent. (Figure 4.)

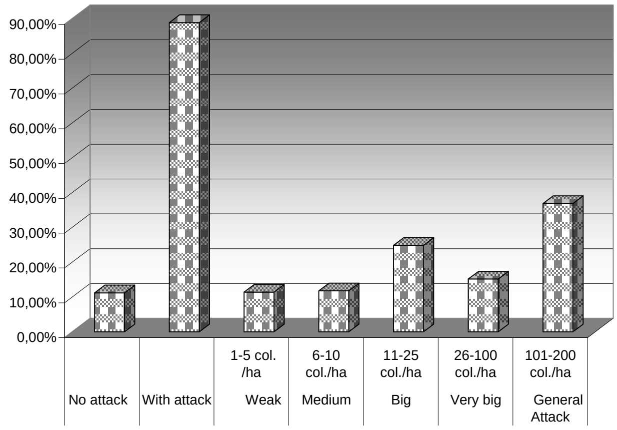


Fig. 4 The attacked areas and the density of the rodent (colonies/ha) in the Sibiu County 2009

Out of the 825ha, 94ha presented a weak density of the attack (11.39% of the attacked surface), on the 97ha the density was a medium one (11.28%), on 205ha the degree of the attack of the pest was a big one (24.84%) and on 127 ha the degree of the attack was a very big one (15.15%) and on 304ha (36.84%) there was a general attack. Besides the number of the colonies/ha there was also investigated the number of the fruit trees attacked by *Microtus arvalis* (Figure 5).

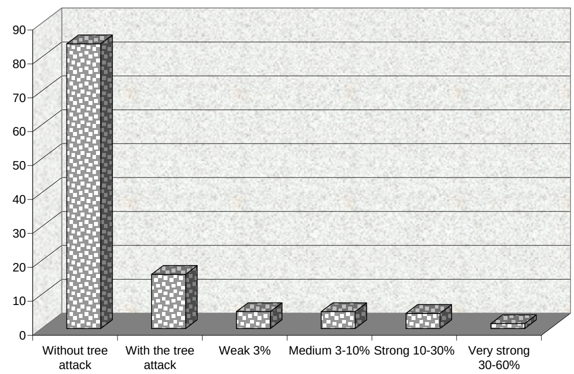


Figure 5 The number of the attacked trees from the total of the controlled orchards

Out of those 148 ha of fruit trees attacked by *Microtus arvalis* 116 ha were cultivated intensively, 4 ha were cultivated super intensively and 28 ha classical. There were affected 12,031 trees out of 15,707. There was established that the most of the attacked trees were in young orchards, the intensively type(over 1,000trees/ha). On 46 ha there were attacked 1,027 trees , this being a weak attack (1-3%); on another 46 ha there were attacked 2,649 trees, this being a medium attack (3-10%); on 42 ha there were attacked 7,419 trees, this being a strong attack (10-30%); on 14 ha the pest attacked 4,612 trees, this being an extremely strong attack (30-60%). In Viile Sibiului there were attacked 4,597 apple trees, 2,500 cherry trees, 1,375 sour cherry and only 225 plum trees. Although in the literature of specialty there is mentioned that the cherry tree and the sour cherry tree can be attacked by *Microtus arvalis* in a smaller proportion there was established that on the investigated agricultural eco system the number of the samples of sour cherry trees and the cherry trees was much higher than those of the attacked plum trees.

CONCLUSIONS

Out of those 929 ha of orchards investigated in 2009 in the Sibiu County, 825ha (respectively 88.8%) were found with pest rodent. Among these 94 ha presented a weak density of the attack, 97 ha a medium one, 205 ha a high attack degree, 127 ha in a very high attack degree and on 304 ha the attack was generalized. There were attacked by *Microtus arvalis* a number of 15,707 fruit tress out of which 1,027 samples suffered a weak attack, 2,649 a medium one, 7,419 a strong attack and 4,612 samples a very strong attack. Out of those 15.707 fruit trees 11,210 were apple trees, 507 were plum trees, 2,615 cherry trees and 1,375 sour cherry trees. The attacked trees are the result of the attacks during 2007 -2009;

In Viile Sibiului there were attacked 4,597 apple trees, 2,500 cherry trees, 1,375 sour cherry trees and only 225 plum trees. Although in the literature of specialty there is mentioned that the cherry tree and the sour cherry tree can be attacked by *Microtus arvalis* in a smaller proportion there was established that on the investigated agricultural eco system the number of the samples of sour cherry trees and the cherry trees was much higher than those of the attacked plum trees;

On the background of the growth of the temperature and in normal conditions of rain during 2009 the number of the pest rodents grew alarmingly in the Sibiu County. The growth of the attack of pests in some agricultural systems is sometimes due to the lack of the mechanical, agricultural and technical works as well as to the lack of sanitary treatments.

REFERENCES

1. *Tuţă, Al.,*1980, Rozătoare dăunătoare în plantaţii pomicole, silvice şi pepiniere, Metodici de prognoză şi avertizare a tratamentelor împotriva bolilor şi dăunătorilor plantelor de cultură, Centrul de material didactic şi propagandă agricolă, Bucureşti.
2. *Tomşa, M., Tomşa, Elena,* 2003, Protecţia integrată a pomilor şi arbuştilor fructiferi, Ed. Geea, Bucureşti.
3. *Săvescu, A.,* 1960, Album de protecţia plantelor,vol. I, Centrul de Material Didactic şi Propagandă Agricolă, Bucureşti.
4. *Manolache, C., Bogulenu, Gh.,* 1967, Entomologie agricolă, Întreprinderea poligrafică „Crişana", Oradea.
5. *Paşol, P., Dobrin, Ionela, Frăsin, Loredana,* 2007, Tratat de entomologie specială, Editura Ceres, Bucureşti.
6. *Teodorescu, Georgeta, Toman, T., Sumedrea, Mihaela,* 2003, Entomologie horticolă, Editura Ceres, Bucureşti

THE EFFECT OF RUMINAL UNDEGRADABLE PROTEIN FROM DIFFERENT SOURCES OF SOYBEAN MEALS ON FEED INTAKE AND MILK PRODUCTION OF DAIRY COWS IN THE FIRST PERIOD OF LACTATION

ALOBEID H.[1] STOICA I.[1], DRAGOMIR C.[2]
[1] Faculty of Animal Science, University of Agriculture Science and Veterinary Medicine Bucharest, Bd. Mărăşti, Nr. 59, Bucureşti, Romania, [2] National Research-Development Institute for Animal Biology and Nutrition, Calea Bucuresti, Nr.1, 077015, Ilfov, Romania,

Key words: undegradable protein; soybeans meal; ruminants

SUMMARY

Three soybean meal sources (SBM 2, SBM I and SBM III) were chosen as sources of undegradable protein, RUP, to study the effect of different levels of RUP on dry matter intake, nutrients intake, milk production and milk composition. The three soybean meal sources were used in the rations of 12 dairy cows, in their first period of lactation (33.42 $\pm$ 1.78 day / lactation) for 36 days. Total dry matter intake for the experimental groups were 17.34 kg DM / day/cow, 17.47 kg DM / day/cow and 17.33 kg DM / day/cow for group 1, group 2 and group 3 respectively. Energy intake was 15.39 UNL / day/cow, 15.60 UNL / day/cow and 15.42 UNL / day/cow for group 1, group 2 and group 3 respectively. Digestible protein intake, PDIN, was 1313.66 g / day/cow, 1303.91 g / day/cow and 1294.56 g / day/cow for group 1, group 2 and group 3 respectively. Digestible portein intake, PDIE, was 1294.36 g / day/cow, 1316.23 g / day/cow and 1301.26 g / day/cow for group 1, group 2 and group 3 respectively. The degradable protein intake, RDP, was 1134.74 g / day/cow, 1046.29 g / day/cow and 1059.61 g / day/cow group 1, group 2 and group 3 respectively. The undegradable protein intake, RUP, was 465.85 g / day/cow, 503.99 g / day/cow and 493.14 g / day/cow for group 1, group 2 and group 3 respectively. Milk production of the cows used in the experiment was 21.24 kg / day, 23.35 kg / day and 22.24 kg / day for group 1, group 2 and group 3 respectively and the recalculated milk production at 4 % fat was 22.04 kg / day, 23.53 kg / day and 22.87 kg / day for group 1, group 2 and group 3, respectively. Protein content in milk, of the experimental groups, was 3.14 %, 3.37 % and 3.21 % for group 1, group 2 and group 3, respectively. Fat content in the milk, of the experimental groups, was 4.25 %, 4.05 % and 4.19 % for group 1, group 2 and group 3, respectively.

The ruminal undegradable protein has an important role especially when microbial protein is insufficient to achieve planned production in the first period of lactation (Kalscheur et al. 2006). This protein is resistant against ruminal degradation and reaches the intestine without any modification (Merchen and Titgemeyer, 1992). The natural sources of ruminal undegradable protein used in ruminant feed are fish meal, feathers meal, blood meal, corn gluten, brewers grains and dried distilled grains (Santos et al., 1998). Also, there are other important sources of undegradable protein such as soybeans meal, rapeseeds meal and the other meals.

The ruminal undegradable protein may improve the performance of ruminants by changing the ratio between the protein and energy from the ration. Kumar et al. (2005) studied the effect of increasing the amount of ruminal undegradable protein in the ration on the feed intake in crossbred cattle. They reported an increase in the DMI when the RUP amount increased. Chaturvedi and Walli (2001) observed a 8.3% increase in the DMI in early lactating dairy cows when the RUP was increased from 29 to 43% of crude protein CP. Different levels of RUP were used to feed Awassy ewes, in order to study their effect on the DMI (Haddad et al.2005). Increasing the RUP from 20 to 35% of CP has increased the DMI (Kridli et al. 2001).

It was studied also the effect of RUP on milk production and composition. Kumar et al. (2005) studied the effect of 2 levels of RUP on milk production of dairy cows. This was higher with 13.7 % when the level of RUP from the ration was increased from 41 to 48% of PB. Similar results were obtained by Chaturvedi and Walli (2001). They reported an increasing of 8.2% in 4% fat milk production of dairy cows fed rations with 56% RUP from total PB, compared to cows who were fed rations with 29% RUP. When they were used 10% more then the recommendations of NRC for RUP quantity, the milk production of diary cows was higher with 1.5 kg/ day compared to the cows that were fed only by following the NRC recommendations for RUP (Flis and Wattiaux, 2005). The increased milk production in lactating ruminants might be the result of increased DMI due to increasing RUP level (Westwood et al., 2000). Another explanation for this may be the increased supply of metabolizable protein and amino acids (Gulati et al., 2005). Recent studies reported an increase in the percent of milk protein by increasing the level of dietary RUP in lactating cows (Chaturvedi and Walli, 2001). The objective of this study was to examine the effect of different levels of RUP from different sources of soybean meals on feed intake, milk yield and composition of early lactating cows.

1. MATERIAL AND METHOD

Twelve early lactating cows, four cows in each group, were used to study the effect of varying ruminal undegradable protein RUP on feed intake, milk production and its composition. The animals are 50.67±1.70 months old and 3.42±1.78 days in lactation. Cows were feed individually in separate stalls. Three experimental diets were formulated as follows: the same basic diet for all the three groups (1, 2 and 3) which contained corn silage 57%, wheat straw 43% and different concentrate diets. For group 1: corn 60%, barley 7.5%, wheat bran 4%, soybean meal source 2 (SBM 2) 22%, salt 0.5%, calcium carbonate 2.5%, calcium phosphate 2.5%, minerals and vitamins 1%. For group 2: corn 60%, barley 7.5%, wheat bran 4%, soybean meal source I (SBM I) 22%, salt 0.5%, calcium carbonate 2.5%, calcium phosphate 2.5%, minerals and vitamins 1%. Group 3: corn 60%, barley 7.5%, wheat bran 4%, soybean meal source III (SBM III) 22%, salt 0.5%, calcium carbonate 2.5%, calcium phosphate 2.5%, minerals and vitamins 1%. The total content of RUP for the three experimental groups was: 474 g RUP for group 1, 511 g RUP for group 2 and 502 g RUP for group 3. The chemical compositions and nutritive values of ration components are presented in table 1.

STATISTICAL ANALYSIS

The data collected on DMI, milk yield, milk composition and nutrient intake were analyzed using the MIXED procedure (SAS Inst. Inc.) and the residual maximum likelihood procedure. The smallest value of the Akaike's information criteria was used to select the most appropriate covariance structure. The spatial covariance structure SP (exp) was used for estimating covariances. The subject of the repeated measurements was defined as cows from the groups. The statistical models are shown below:

Y_{ijk} = μ+p1DM +p2 UNL + TRi+ c1d1 (TR_i) + c2d2 (TR_i) + c3d3 (TR_i) + c4d4 (TR_i) + COW $(TR)_{ji}$+ PE_j + e_{ijk}

Where:

Y_{ijk}= dependent variable, μ= population mean, p1= linear regression coefficient of dependent variable on dry matter intake (DMI), p2= linear regression coefficient of dependent variable on UNL, TRi= fixed effect of the treatment, i (1,2,3), c1, c2, c3 and c4= coefficient of dependent variable on the term of Ali & Schaeffer function in treatment i, d1, d2, d3 and d4 = term of Ali & Schaeffer function of fixed lactation curve in treatment i with d1= dim/305, d2= $(dim/305)^2$, d3= ln(305/dim), d4= $(\ln(305/dim))^2$, COW$(TR)_{ji}$= random animal effect for animal j in treatment i , PE_j= random permanent environmental effect of animal j, e_{ijk}= random residual error, assumed to be normally, identically and independently distributed. All means were tested by least square difference (SAS, 1988). J = (1,…., 12) cows, K= (1,…., 36) day of experiment observation.

Y_{ijk} = μ+ TRi+a1DIM (TRi) + COW $(TR)_{ji}$+ PE_j + e_{ijk}

Where,

Y_{ijk}= dependent variable, μ=population mean, TRi= fixed effect of the treatment i, a1= coefficient of dependent variable on the day in milk in treatment i, COW$(TR)_{ji}$= random animal effect for animal j in treatment i, PE_j= random permanent environmental effect of animal j, e_{ijk}= random residual error, assumed to be normally, identically and independently distributed. Significance was declared at $p < 0.05$.

Table 1

The chemical composition and the nutritive values of diets components

	Corn silage	*Wheat straw*	*Corn*	*Barley*	*Wheat bran*	*SBM 2*	*SBM I*	*SBM III*
DM g	260	850	874	894	880	891	920	900
OM g	936	928	984	961	935	939	911	907
CP g/kg DM	78	76	95	143	155	424	358	369
Fat g/kg DM	16	35	33	20	40	22	190	169
Fiber g/kg DM	296	371	40	76	152	74	62	52
Ash g/kg DM	64	72	16	39	65	61	89	92
EN_L MJ/kg DM	4.90	4.31	8.68	7.34	4.39	8.48	9.88	9.64
Dr[1] %	82	65	40	88	74	80	66	69
RUP[2] g/kg DM	12	27	57	17	40	85	122	114

[1] Ruminal degradability, [2] Ruminal undegradable proteins.

2. RESULTS AND DISCUSSIONS

Dry matter intake, DMI, energy consumption represented by milk nutritive unit, UNL, intestinal digestible intake, ruminal degradable protein, RDP, and ruminal undegradable protein, RUP, are presented in table 2. DMI was relatively higher for group 2 with SBM I, 17.47 kg DM/ d compared to group 1 and group 3, 17.34 and 17.33 kg DM/ d. By using soybean meal I, the DMI was increased ($p < 0.01$) compared to animals from group 1 that were fed soybean meal 2. No significant differences were noticed between animals that were fed soybean meal 2 and those who were fed soybean meal III ($p > 0.05$). A small difference was observed in DMI between group 2 and group 3 ($p < 0.01$). The same results were observed by Davideson et al. (2002) when they used rations with higher level of RUP. Chaturvedi et al. (2001) they used 3 experimental rations with different ratio between RDP and RUP and they studied their effect on DMI. They reported a linear decrease of DMI along with decreased ruminal undegradable protein. Similar observations were reported by Kridli et al. (2001), Haddad et al. (2005) and Lee et al. (2001). Higher DMI along with increasing level of ruminal undegradable protein was observed by Kalbande and Chainpure (2001). In the same time, proteins with high ruminal degradabilities decreased DMI by increasing the level of NH4 in the rumen and the level of plasma urea (Fenderson and Bergen, 1974). Energy consumption was different between the experimental groups. The highest energy intake was registered for animals that were fed soybean meal I (15.60 UNL/ cow/ d). Protein intake as intestinal digestible protein, ruminal degradable protein, RDP, and ruminal undegradable protein, RUP, was affected by the use of different sources of soybean meal with different ruminal degradability of the protein. The highest RDP intake (1134.74 g/ cow/ d) was reported for group 1. The lowest RDP intake (1046.29 g/ cow/ d) was reported for group 2. Concerning the RUP intake, this was higher for group 2 (503.99 g/ cow/ d) compared to group 1 (465.85 g/ cow/ d). This difference was significant between group 1 and 2 ($p < 0.01$).

Table 2

Daily nutrient intake in early lactating cows fed diets containing varying RUP

	Group1(SBM 2)	*Group2(SBM I)*	*Group3(SBM III)*	*SE*	*Pr > |t|*
DM kg / d	17.34[a]	17.47[b]	17.33[ac]	0.0245	<.0001
UNL[1]	15.39[a]	15.60[b]	15.42[ab]	0.1473	<.0001
PDIN[2] g / d	1313.66[a]	1303.91[a]	1294.56[a]	12.0987	<.0001
PDIE[2] g / d	1294.36[a]	1316.23[b]	1301.26[bc]	10.7902	<.0001
PDIA[2] g / d	376.39[a]	410.73[b]	400.84[c]	3.9244	<.0001
RDP[3] g / d	1134.74[a]	1046.29[b]	1059.61[bc]	14.2058	<.0001

RUP[4] g / d	465.85[a]	503.99[b]	493.14[c]	4.8271	<.0001

[a,b,c,d] Means in rows with different superscripts differ (P< .05).
[1] Nutritive milk unit, [2] Intestinal degistable protein permised of energy/ protein, [3] Ruminal degradable protein, [4] Ruminal undegradable protein.

Milk production, 4% fat recalculated milk production, protein milk content and fat milk content are presented in table 3. Milk production from cows that were fed soybean meal I was higher with 10% compared to cows that were fed soybean meal 2 and 5% higher than the cows that were fed soybean meal III. These differences weren't significant ($p > 0.05$). Higher milk production from group 2 may be explained first of all by the increased DMI and increased level of ruminal undegradable protein. An increased milk production of the cows that were fed higher quantities of ruminal undegradable protein was mentioned by other researchers (Forster et al., 1982, Petit and Veira, 1991, Sklan and Tinski, 1993, Shirley et al., 1998, Kalscheur et al., 1999, Westwood et al., 2000, Chaturvedi and Walli, 2001, Flis and Wattiaux, 2005). They explained the increasing of milk production along with increasing the level of RUP by stimulating dry matter intake. Increasing the level of ruminal undegradable protein may increased the milk yield directly through either increased supply of limiting amino acids to mammary gland for protein synthesis or through enhanced gluconeogenesis in liver resulting in increasing supply of glucose to mammary gland for lactose synthesis (Clark, 1975). Other explanation, the ruminal undegradable protein may change hormonal status, especially increase concentration of plasma growth hormone which causes nutrient partitioning in favor of milk production and away from the fat deposition (Sartin et al., 1985). Protein milk content was higher for group 2 (3.37%) compared to groups 1 and 3 (3.14% and 3.21%). Regarding the fat milk content this was higher, 4.25 %, for group 1 than groups 2 and 3 (4.05% and 4.19). These differences, between experimental groups, regarding the protein and fat milk content, weren`t significant ($p > 0.05$). The increased milk protein contents were due to a increase in provision of amino acids to the mammary gland by increasing the level of RUP in the diets.

Table 3

Daily milk production and compozition in early lactating cows fed diets containing varying RUP

	Group1(SBM 2)	*Group2(SBM I)*	*Group3(SBM III)*	*SE*	*Pr > |t|*
Milk yield kg / d	21.24[a]	23.35[a]	22.24[a]	0.6913	<.0001
4%FCM[1] kg/d	22.04[a]	23.53[a]	22.87[a]	0.1391	<.0001
Protein %	3.14[a]	3.37[a]	3.21[a]	0.0747	<.0001
Fat %	4.25[a]	4.05[a]	4.19[a]	0.1889	<.0001

[a,b,c,d] Means in rows with different superscripts differ (P< .05).
[1] Fat corrected milk.

3. CONCLUSIONS

Using soybean meal with low ruminal degradability of protein has increased dry matter intake, milk production and protein milk content of early lactation dairy cows. These results proved the importance of ruminal protein degradability and the balancing efficiency of the diets with optimal ratio of RDP: RUP.

REFERENCES

1. *Chaturvedi, O. H. and T. K. Walli. 2001*. Effect of feeding graded levels of undegraded dietary protein on voluntary intake, milk production and economic return in early lactating crossbred cows. Asian-Aust. J. Anim. Sci. 14:1118-1124.
2. *Clark, J. H. 1975.* Lactational responses to postruminal administration of protein and amino acide. J. Dairy Sci. 58: 1178-1197.
3. *Davidson, S., B. A. Hopkins, D. E. Diaz, S. M. Bolt, C. Brownie, V. Fellner, and L. W. Whitlow, 2003*. Effects of Amounts and Degradability of Dietary Protein on Lactation, Nitrogen Utilization, and Excretion in Early Lactation Holstein Cows. J Dairy Sci. 86: 1681-1689.
4. *Flis, S. A., and M. A. Wattiaux. 2005*. Effects of Parity and Supply of Rumen-Degraded and Undegraded Protein on Production and Nitrogen Balance in Holsteins. J Dairy Sci 88: 2096-2106.
5. *Forster, R. J., D. G. Grieve, J. G. Buchanan-Smith, and G. K. Macleod. 1983*. Effect of Dietary Protein Degradability on Cows in Early Lactation. J Dairy Sci. 66: 1653-1662.
6. *Fenderson, C. L. and W. G. Bergen. 1974*. Effect of excess dietary protein on steers. J. Anim. Sci. 39:998.
7. *Gulati, S. K., M. R. Garg and T. W. Scott. 2005*. Rumen protected protein and fat produced from oil seeds and meals by formaldehyde treatment, their role in ruminant production and product quality: A review. Aust. J. Exp. Agric. 45:1189-1203.
8. *Haddad, S. G., R. T. Kridli, D. M. Al-Wadi. 2005*. Influence of Varying Levels of Dietary Undegraded Intake Protein Intake on Nutrient Intake, Body Weight Change and Reproductive Parameters in Postpartum Awassi Ewes. Asian-Aust. J. Anim. Sci. Vol. 18 No. 5 : 637.
9. *Kridli, R. T, S. G. Haddad, M. M. Muwalla, 2001*. The Effect of Feeding Ruminally Undegradable Protein on Postpartum Reproduction of Awassi Ewes. Asian-Aust. J. Anim. Sci. Vol. 14 No. 8 : 1125.
10. *Kalscheur, K. F, R. L. Baldwin, VI, B. P. Glenn, and R. A. Kohn, 2006*. Milk Production of Dairy Cows Fed Differing Concentrations of Rumen-Degraded Protein. J. Dairy Sci. 89: 249-259.
11. *Kalbande, V. H. and A. H. Chainpure. 2001*. Effect of feeding bypass protein with urea treated jowar kadbi on performance of cross berd calves. Asian-Aust. J. Anim. Sci. 14:651-654.
12. *Kalscheur, K. F., J. H. Vandersall, R. A. Erdman, R. A. Kohn and E. Russck-Cohen, 1999*. Effects of dietary crude protein concentration and degradability on milk production responses of early, mid and late lactation dairy cows. J. Dairy Sci. 82:545-554.
13. *Kumar,.M., Ravi, D. P. Tiwari, Anil Kumar. 2005*. Effect of Undegradable Dietary Protein Level and Plane of Nutrition on Lactation Performance in Crossbred Cattle. Asian-Aust. J. Anim. Sci. Vol. 18 No. 10 : 1407.
14. *Lee, M., S. Hwang and P. W. Chiou, 2001*. Application of rumen undegradable protein on early lactation dairy goats. Asian-Aust. J. Anim. Sci. 14:1549-1554.
15. *Merchen, N.R. and E.C. Titgemeyer. 1992*. Manipulation of amino acid supply to the growing ruminant. J. Anim. Sci. 70:3238-3247.

16. *Petit, H. V. and D. M. Veira. 1991*. Effect of grain level and protein source on ruminal fermentation, degradability and digestion in milking cows fed silage. J. Dairy Sci. 74:2256-2267.
17. *Sklan, D. And M. Tinsky. 1993*. Production and reproduction responses by cows fed varing undegradable protein coated with rumen bypass fat. J. Dairy Sci. 76:216-223.
18. *Shirley, J. E., D. Piehl and E. C. Titgemeyer. 1998*. Effect of level and degradability of dietary protein on the performance of lactating dairy cows. J. Anim. Sci. 76 (Suppl, 1):251.
19. *Santos, F. A. P., J. E. P. Santos, C. B. Theurer, and J. T. Huber. 1998*. Effects of rumen undegradable protein on dairy cow performance: A 12-year literature review. J. Dairy Sci. 81:3182–3213.
20. *Sartin, J. L., K. A. Cummins, R. J. Krempainen, D. N. Marple, C. H. Rahe and J. C. William. 1985*. Glucagon, insulin and GH responses to glucose infusion in lactating cows. Nutr. Abstr. Rev. (Series B) Abstract No. 4371.
21. *SaS User's Guide. 1996*. Statistics, version 6.12. SaS Inst., Cary, North Carolina, USA.

PROTEIN RUMINAL DEGRADABILITY AND INTESTINAL DIGESTIBLE PROTEIN VALUE FROM SAFFLOWER MEAL

ALOBEID H.[1] STOICA I.[1], DRAGOMIR C.[2]
[1] Faculty of Animal Science, University of Agriculture Science and Veterinary Medicine Bucharest, Bd. Mărăşti, Nr. 59, Bucureşti, Romania, [2] National Research-Development Institute for Animal Biology and Nutrition, Calea Bucuresti, Nr.1, 077015, Ilfov, Romania,

Key words: safflower meal; protein; ruminal degradability

SUMMARY

Safflower meal was treated for 10 minutes at 80˚C and 125˚C. Dry matter degradability from the safflower meal was 54.25%, 45.19% and 38.35% for the control sample and the heat treated samples. The crude protein degradability from the safflower meal was 88.58%, 85.34% and 75.10% for the control sample and the heat treated samples. The nutritive value of the safflower meal obtained after the studies on degradability was 1.08 UNL. 23.58 g, 30.27 g and 51.41 g PDIA for the control sample and the heat treated samples. 155.27 g, 157.14 g and 163.06 g PDIN for the control sample and the heat treated samples. 83.43 g, 89.35 g and 108.04 g PDIE for the control sample and the heat treated samples. 228.62 g, 220.26 g și 193.83 g RDP for the control sample and the heat treated samples. 29.48 g, 37.84 g și 64.27 g RUP for the control sample and the heat treated samples.

Safflower (*Carthamus tinctorius*) is an annual plant, cultivated in the dry and hot regions. Safflower is used mainly for oil extraction, birds feed and in small quantity for ruminants feed as whole seeds or meals. Commercial safflower meal with 25% protein is considered a high protein by-product. Meal from de-hulled seeds is a high quality protein supplement similar to canola meal, but with slightly more protein and energy. Most commercial safflower meals includes hulls. This results in a medium protein (25% CP) meal that is high in fiber content (50% ADF). The fiber content of this meal is too high for most swine and poultry diets. Hulled safflower meal is comparable to dried brewers' grains as a feed for ruminants, although the fiber is less digestible. Limited information indicates that safflower meal is relatively high in ruminal bypass protein, making it a good alternative protein supplement for lactating dairy cows. Studies on safflower meal is very rare and their use in livestock feed are limited. The objective of this study was to characterize the safflower meal starting from its chemical composition and to determine the ruminal degradability of protein and dry matter. A further objective is to study the effect of heat treatment on the ruminal degradability and the nutritive value of safflower meal.

1. MATERIAL AND METHOD

SAFFLOWER MEAL

Safflower meal was heat treated at 80°C and 125°C for 10 minutes. Heat treatment was applied in an oven, safflower meal being spread on trays in 2 cm layers. After that, it was left for cooling.

ANIMALS AND DIETS

Three non lactating cows, fitted with ruminal cannulas, were fed a diet designed to meet maintenance requirements and to ensure optimum conditions for rumen microbial ecosystem. The diet fed in 2 meals/ day consisted in 5 kg of barley hay, 100g molasses and 2 kg of compound feed, composed of: 38.5% barley, 38.5% dry beet pulp, 18% sunflower meal, 2% calcium phosphate, 1.5% salt and 1.5% specific vitamin-mineral premix.

IN SITU INCUBATION

Ruminal degradability was determined using an in situ method, adapted from Michalet-Doreau et al., 1987 and Dulphy et al., 1999. Approximately 3 g of safflower meal were incubated in sewed nylon bags measuring 6 × 10 cm and having an average pore size of 50 µm. Bags were incubated for 0, 2, 4, 8, 16, 24 and 48 hours in the dorsal rumen. The bags for 2, 4 and 8 hours were inserted at the same time (T_0), whereas the bags for 16, 24 and 48 hours were inserted at (T_8), after removal of the first bags. After removal, the bags were rinsed, stored in the freezer until completion of the series, intensively washed (in a washing machine) and dried at 65°C for 48 hours. The content of incubated bags was pooled per incubation time (3 repetitions, corresponding to the three fistulated cows), and analyzed for N content by Kjeldahl method.

CALCULATIONS

Data were corrected for microorganisms firmly attached to dietary particles which are not removed through mechanical contamination, using the corrections proposed by Ould-Bah, 1989, then fitted with the nonlinear regression equation: P = a + b(1- ec*t) proposed by McDonald and Orskov, 1979. The nonlinear parameters, a, b and c were analyzed using a Nlmixed procedure (SAS, 1996). Effective degradability, d (%) was calculated using a rate of solid outflow from the rumen of .06/ h (equivalent to diary cow with a milk production of 15 l/d). The rumen undegradable protein was calculated as %RUP = 100- %Ed, were Ed is the effective degradability. The nutritive value of safflower meal was calculated based on the chemical composition and the in situ degradability using the equations of the Romanian system of feed nutrition values (Burlacu, 2002).

2. RESULTS AND DISCUSSIONS

The chemical composition of safflower meal is: dry matter 93.88%; crude protein 25.81%; fat 1.3%; cellulose 34.3%; ash 5.8%. This variant of safflower meal has a high content of fiber (34.3%). High fiber content affects the digestibility of safflower meal. The parameters of rumen degradation and effective degradability were presented in tables 1 and 2. The proteic and the energetic nutritive value of safflower meal determined based on the results from the in situ technique measurements are shown in table 3.

The parameters of rumen degradation and effective degradability were influenced by the heat treatment and the effective rumen degradations of safflower meal were reduced for all treatments. Thus, DM degradability was reduced by -16.7% and -30% for t_1 and t_2 respectively. CP degradability was also reduced with: - 3.66% and – 15.22% for t_1 and t_2 respectively. The heat treatment of safflower meal increased the undegradable protein by +28.36% and + 118.01% for t_1 and t_2 respectively. The energetic value of safflower meal was not affected by the heat treatment but in the same time heat treatment changed the proteic values of the safflower meal. Heat treatment of safflower meal reduces the degradation of DM and CP, this effect being partially related to blocking of reactive sites for microbial proteolysis enzymes and partly to reduction of protein solubility (Broderick and Craig, 1980). Heated safflower meal increased the PDIA values with +28.37% and +118.02% for t_1 and t_2 respectively. PDIN values were increased with +1.20% and +5.02% for t_1 and t_2 respectively. PDIE values also increased with +7.09% and +29.49% for t_1 and t_2 respectively.

Table 1

Ruminal dry matter degradability of heat treated safflower meal

Safflower meal treatment	Degradability Parameters[1]			Effective Dry Matter Degradability (Ed)	r^2
	a[1]	b[1]	c[1]		
Control (t_0)	41.14	20.82	10.21	**54.25**	0.9477
Heated at 80°C for 10 min (t_1)	26.79	28.71	10.71	**45.19**	0.9698
Heated at 125°C for 10 min (t_2)	19.59	33.24	7.77	**38.35**	0.9886

[1] a, b and c are nonlinear parameters, where a= rapidly degraded fraction, b= slowly degraded fraction degraded at rate c; r^2 is the coefficient of determination. Effective DM and CP degradabilities (Ed) are calculated on the basis of a ruminal outflow rate of .06/h.

Table 2

Ruminal crude protein degradability of heat treated safflower meal

Safflower meal treatment	Degradability Parameters[1]			Effective Dry Matter Degradability (Ed)	r^2
	a[1]	b[1]	c[1]		
Control (t_0)	69.23	21.53	53.39	**88.58**	0.9158
Heated at 80°C for 10 min (t_1)	68.75	22.04	18.27	**85.34**	0.9218
Heated at 125°C for 10 min (t_2)	19.93	63.18	41.33	**75.10**	0.9923

[1] a, b and c are nonlinear parameters, where a= rapidly degraded fraction, b= slowly degraded fraction degraded at rate c; r^2 is the coefficient of determination. Effective DM and CP degradabilities (Ed) are calculated on the basis of a ruminal outflow rate of .06/h.

Table 3

The nutritive value of heat treated safflower meal

Safflower meals	t_0	t_1	t_2
UNL[1] / kg.DM	1.08	1.08	1.08
PDIA[2] g / kg / DM	23.58	30.27	51.41
PDIN[3] g / kg / DM	155.27	157.14	163.06
PDIE[4] g / kg / DM	83.43	89.35	108.04
RDP[5] g / kg / DM	228.62	220.26	193.83
RUP[6] g / kg / DM	29.48	37.84	64.27

3. CONCLUSIONS

Safflower meal studied has relatively low dry matter degradability and high protein degradability. The high energy content of safflower meal along with its content of intestinal digestible protein can lead to an increased use of this meal in ruminants feed. The heat treatment of safflower meal has decreased the ruminal protein degradability. More investigations are needed to characterize safflower meals and their use in ruminant nutrition.

REFERENCES

1. *Burlacu, Ghe., A. Cavache, R. Burlacu, 2002*. Potențialul productiv al nutrețurilor şi utilizarea lor, Ed. Ceres, Bucureşti.
2. *Dulphy, J.P., Demarquilly Camille, R. Baumont, L. L'Hotelier, C. Dragomir, 1999*. A study of modes of preparation of fresh and conserved forage samples for in situ measurementof dry matter and nitrogen degradation in the rumen, Annales de Zootechnie, 48, 4, 275-288.
3. *Michalet-Doreau B, Verite R, Chapoutot P 1987.* Méthodologie de mesure de la degradabilite in sacco de l`azote des aliments dans le rumen. Bull. Tech. C.R.Z.V. Theix INRA, 69, 5-7.
4. *Orskov ER, McDonald I 1979* - The estimation of protein degradability in the rumen from incubation measurements weighted according to rate of passage. Journal of Agricultural Science Cambridge, 92, 499-503.
5. *Ould-Bah M Y 1989.* Adaptation de la technique in sacco a l etude de la degradation dans le rumen de l azote des fourrages et application a l etude des fourrages verts et conserves. These, Academie Montpellier, France.

6. *SaS User's Guide. 1996.* Statistics version 6.12. SaS Inst., Cary, North Carolina, USA.

PRELIMINARY RESEARCH ON THE NUTRITIVE VALUE OF SORGHUM GRAINS IN FATTENING STEERS DIETS

DORICA VOICU, I. VOICU, VERONICA HEBEAN,
MIHAELA HĂBEANU, NICOLETA CIUCĂ
Național Research - Development Institute for Animal Biology and Nutrition (IBNA)

Key words: steers, sorghum grains, chemical composition, nutritive value.

SUMMARY

The purpose of this paper is the study of the energy and protein nutritive value of sorghum grains used as alternative to the classical cereal grains used in the diets for fattening steers in the plain areas without irrigation facilities. The chemical composition of the sorghum grains was determined by Weende using the standard methods currently used worldwide to evaluate the dietary raw ingredients for fattening steers. The nutritive values produced by the processing of the primary data are generally in agreement with the literature. As expected, the evidence of chemical composition show a small difference in the feeding value of the sorghum grains compared to corn: 1.34 FU for the sorghum grains, compared to 1.52 $FU_{/t}$kg DM for the corn.

The speeding pace of modernization in animal husbandry requires the existence of a strong feeding support. The use of the classical forages in animal feeding has a new competitor, besides the use for human feeding: the production of biofuels. The corn is thus used increasingly in the alcohol industry and for biogas production; wheat is used preponderantly for bakery purposes but it also used in reasonable amounts in animal diets due to its high fibre content. Hence, sorghum may be grown, particularly in the drought areas in southern Romania, as replacer of the corn crops.

Sorghum can also be used to feed all species of forma animals, while the wastes remaining after the harvest of grains can be ensiled and used as bulk forage for ruminants. Sorghum was little used in Romania in cattle feeding, its use increasing after 1985, when several experiments were conducted in order to determine its chemical composition and feeding value, as well its dietary efficiency at various inclusion rates, particularly in the diets for fattening steers.

Sorghum grains have a chemical composition similar to that of the ear corn and its full or partial replacement gives almost the same performance, particularly when used for meat breeds.

In terms of energy and protein productive potential, INRA reported (1988): 1.18 FU/kg DM and 75 g DP/kg for sorghum grains, compared to 1.29 FU/kg DM and 68 g DP/kg in ear corn.

Stoica et al., (1997; 2001) reported a similar feeding value for sorghum, about 1.15 FU/kg DM and 70 g DP/kg, under similar experimental conditions.

Hebean V. et al., (1990) observed a similar weight gain in the fattening steers fed on diets with sorghum grains, with the gain of the steers fed on corn-based compound feed, the differences not being significant.

The sorghum grains may contain, under particular conditions of soil and climate, a cyanogenous glycosides which, transformed in cyanhydric acid, may be toxic to the animals. Leaving from this fact, the worldwide research focused on the use of pre-treated ground sorghum grains used in mixtures with other concentrate feeds in various proportions, with the purpose to reduce its toxicity. Other research focused on the improvement of steer meat quality by feeding sorghum flakes obtained by steam treatment (Brandt et al., 1992) or distilled sorghum grains (Roebler et al., 2005).

After the qualities of sorghum both as production of grains and as green mass have been reconsidered, there was an enhanced interest of the specialists for a better utilization of the sorghum in fattening steers feeding, particularly, without affecting animal health and performance.

The use of more or less known feeds in animal feeding requires knowledge on their chemical composition. The chemical assays include the dry matter (DM), crude protein (CP), ether extractives (EE), gross fibre (GF) gross ash (GA) and nitrogen-free extractives (NFE).

The gross chemical composition is different, for the same forage, from one country to another, function of the soil, or hybrid, of the technology pf production, manner of preservation, which makes that some studies reported by the literature are insufficient to evaluate the feeding value of a forage.

The feeding value of a forage represents its capacity to meet the feeding requirements of the animals for maintenance or for the synthesis of various products, or for both.

The forages differ by their chemical composition and energy level and are used according to the different animal species, categories and physiological state.

The determination of the feeding value of a forage is a dynamic process which requires the permanent updating of the data existing at a specific time, because of the change in the soil and climate conditions, because of the improved plant cultivars and improved animal breeds.

Within this context, in a first stage we performed chemical analyses to determine the energy and protein feeding value of the forages to be used in fattening steers feeding.

1. MATERIAL AND METHOD

The determinations of composition were conducted in the Laboratory of chemistry and nutrition physiology from INCDBNA, laboratory accredited according to SR EN ISO 17025:2005 standard. The standard protocols for chemical analyses were used to determine the dry matter (DM), crude protein (CP), ether extractives (EE) gross fibre (GF) and gross ash (GA) expressed per 100 g DM. Protein was determined with the classical semiautomatic Kjeldahl on a Kjeltek auto 1030 – Tecator analyzer. The ether extractives were extracted using the classical method improved by continuous extraction in solvent followed by fat determination after the solvent was removed in a Soxhlet equipment. The gross fiber was determined with the classical semiautomatic Fibertec-Tecator method, while the ash was determined by calcinations at 550°C until a constant mass was observed (Criste et al., 2003). The NFE content (nitrogen-free extractives) was calculated using the following formulation: NFE = DM – (CP + EE + GF + GA).

Because of the differences due to the type of forage and animal species, as shown above, it was difficult even from the beginning to compare the feeding value of the forages (basic forage and the replacer).

The feeding value of the forages can not be differentiated only using the dietary gross energy, because it is similar in most of the forages.

This differentiation is possible only using the forage content in net energy (Burlacu, 1991), similar to the modern systems of evaluating the feeding value of feeds, for fattening o for milk production.

Starting from these considerations we determined the feeding value of the forages to be used to fatten the steers, using the regression equations. The feeding value was expressed in feed units for meat production, in intestinally digestible protein allowed by the dietary nitrogen content (IDPN) and in intestinally digestible protein allowed by the dietary energy content (IDPE). These evaluations were performed on the basis of the chemical composition determinations of the forages as such (Table 1) and of the digestibility coefficients, according to the new system for the evaluation of the energy and protein feeding value of the forages used by most countries with developed animal husbandry, also adopted by Romania (Burlacu et al., 2002).

The calculation of FUmeat required the determination of the net energy for meat production (NEm), starting from the ingested gross energy (GE), from energy digestibility (Ed), from the ratio of the metabolisable energy to the digestible energy (ME/DE) and from the yield of ME use as net energy for meat production (k_f), using the following formula:

$$NEm = BE * Ed * ME/DE * k_f$$

The gross energy (GE) was determined using regression equations function of the type of forage:

- for concentrates:

GE kcal/kg DM) = 5.72*CP + 9,50*EE + 4,79*GF + 4,17*NFE + Δ

where CP, EE, GF and NFE in g, and the values of delta varies with the type of forage;

- For silages:

GE (kcal/kg OM) = 3910 + 2.450 (g CP/kg OM) + 169.7 pH

Energy digestibility (Ed) was determined with the help of formulas, differing with the type of forage, used to calculate the digestible energy:

DE (kcal/kg DM) = GE*Ed

The metabolisable energy (ME) of the forages, which is used differently by the animals for maintenance or for various types of production (Blaxter, 1962, cited by Nicolae and Petroman, 1999), was calculated with the following formula:

ME (kcal/kg DM) = DE*(0.8417 – 9.9*10^{-5} GF – 1.96*10^{-4} CP + 0.0265)

where GF (gross fiber) and CP (crude protein) are given by kg organic matter (OM).

The yield „k_f” was calculated with the following formulation:

$K_f = 0.78\ q + 0.006$ (q = ME/GEB)

To transform the NEm of the forages in FUmeat, it was divided by 1472 kcal NE (reference value of the oats grains used as standard in Romania):

FUmeat = NEm/1472 kcal (6.16 MJ)

The protein feeding values (IDP – real intestinally digestible protein) of the forages was calculated starting from 4 characteristics of each forage:

- The total content of crude protein (CP);
- The theoretical degradability of the protein in the rumen (TD);
- The ruminal content of digestible organic matter (DOM);
- The real digestibility in the small intestine of the dietary amino acids (rd) using the following formula:

IDPN (g/kg DM) = IDPA + IDMPN

where IDPA = dietary protein digestible in the intestine;

IDPMN = intestinally digestible microbial protein allowed by the nitrogen content of the diet.

IDPA (g/kg DM) = CP (g/kg DM) * (1 – TD) * 11.1 * rd

IDMPN (g/kg DM) = CP (g/kg DM) * [1 – 1.11 (1 – TD)] * 0.9 * 0.8 * 0.8

considering that 90% of the ruminal nitrogen matter is retained, that the microbial nitrogen matter contain 80% amino acids with 80% digestibility.

IDPE (g/kg DM) = IDPA + IDPME

where, IDPME = intestinally digestible microbial protein allowed by the energy content of the diet.

IDPME (g/kg DM) = DOM * 0.145 * 0.8 * 0.8

where: DOM (g/kg DM) is the fermentescible organic matter used to synthesize 145 g microbial protein.

The feeding values of the corn silage and of the raw materials to be used for the compound feeds manufacture were expressed in meat feed units (FUmeat), in intestinally digestible protein allowed by the dietary nitrogen content (IDPN) and in intestinally digestible protein allowed by the dietary energy content (IDPE), in calcium (g Ca) and in phosphors (g P).

2. RESULTS AND DISCUSSIONS

Table 1 shows the chemical composition of the dietary ingredients determined by Weende. It showed that the corn had a quite large amount of dry matter (DM), of 321 g, 84 g CP, 234 g GF and 18.12 MJ GE/kg DM.

The compound feed ingredients will have different contributions to the CF protein level: 82 g from corn, 130 g from wheat, 120 g from sorghum grains and 314 g/kg DM from sunflower meal. The amount of gross fiber was 28 in corn and wheat, 95 g in the sorghum grains and 203 g/kg DM in the sunflower meal. Recent research (Abdul et al., 2008; Baran et al., 2008; Singh et al., 2009) and older investigations (Jambunathan et al., 1981), report rather similar values with the ones we obtained for the chemical composition of the sorghum gains for most nutrients.

Table 1

Chemical composition of the dietary ingredients (g/kg feed/1000g DM)

	DM	OM	CP	EE	GF	NFE	GA	GE (MJ)
Corn silage	321 1000	304 947	27 84	7 22	75 234	195 607	17 53	5.82 18.12
Corn	864 1000	853 987	71 82	27 31	24 28	731 846	24 28	15.67 18.14
Wheat	880 1000	861 978	114 130	18 20	25 28	704 800	19 22	16.23 18.44
Sorghum grains	874 1000	851 974	105 120	39 45	74 85	633 724	23 26	16.61 19.01
Sunflower meal	916 1000	855 934	288 314	10 11	186 203	371 406	61 66	17.15 18.72

The chemical composition data suggest the necessity for a smaller difference between the feeding value of the sorghum grains an that of the corn, than it actually exists, phenomenon also reported by older research by Rick Stock et al., 1974.

Analysing the indices of feeding value given in Table 2, we may notice that the energy and protein feeding values of the surveyed forages, as calculated with the equations of Burlacu et al., 2002, generally are in agreement with the literature values. As expected, the chemical composition data suggested the existence of a smaller difference of the feeding value of the sorghum grains, compared to that of the corn: 1.34 FUmeat for the sorghum grains, compared to 1.52 FUmeat/kg DM in corn.

Table 2

Feeding value of the dietary forages

	DM (g/kgDM)	FUmeat /kg DM	IDPN (g/kgDM)	IDPE (g/kgDM)	Ca (g/kgDM)	P (g/kgDM)
Corn silage	321	1.04	45	60	3.70	2.54
Corn	864	1.52	96	116	0.30	3.50
Wheat	880	1.45	81	85	0.65	3.75
Sorghum grains	874	1.34	97	120	0.30	3.1
Sunflower meal	916	0.85	202	136	4.50	11.20

3. CONCLUSIONS

The values on the chemical composition of the sorghum grains as resulting from the laboratory analyses show that this forage can be an alternative to the corn and barley in the diets for fattening steers, providing sufficient nutrients and balancing the diets as energy and protein content.

The expansion of sorghum crops on alkali soils which are less favourable to corn crops, might increase the areas allotted for seed production. The increased resistance to heat during the germination-vegetation period, might make sorghum a solution for the arid areas from Romania.

Sorghum has specific for soil and climate, being resistant to drought, with little requirements for growth. Corn doesn’t grow under the conditions which are suitable for sorghum. Sorghum crops are not in competition with corn crops, on the contrary, it contributes to the increase of the total production of energy concentrates by taking over the areas which are not fitted to corn, barley of other cereals.

REFERENCES

1. *Abdul S. B., S. M. Yashim and G. E. Jokthan* (2008) – Effects of supplementing sorghum stover with poultry litter on performance of Wadara cattle. American-Eurasian Journal of Agronomy 1 (1): 16 -18.
2. *Baran M. S., R. Demirel, B. Yokus and N. Kocabagli* (2008) – The effects of sorghum grain on live weight gain, feed conversion ratios and digestibility of nutrients in beef cattle. Journal of Animal and Veterinary Advances 7 (9): 1123 – 1127.
3. *Brandt R. T., Kuhl G. L., Campbell R. E., Kastner C. L., Stroda S. L.* (1992) – Effects of steam-flaked sorghum grain or corn and supplimental fat on feedlot performance, carcass traits, longissimus composition, and sensory properties of steers.
4. *Burlacu Gh.* (1991) – Metode şi tehnici pentru aprecierea valorii nutritive a nutreţurilor. Editura Ceres, Bucureşti, 9 – 215.
5. *Burlacu Gh., Cavache A. şi Burlacu R.* (2002) – Potenţialul productiv al nutreţurilor şi utilizarea lor. Editura Ceres, Bucureşti, pag. 13 - 31.
6. *Criste Rodica Diana, Veronica Hebean, Doina Valentina Grossu, Margareta Olteanu, Dragomir C. şi Anca Bercaru* (2003) – Metode analitice specifice studiului nutreţurilor, Colecţia Cărţile Centrului de Excelenţă „Nutriţia şi alimentaţia animalelor”, Vol. I, pag. 21-67.
7. *Dihoru Alexandrina,Veronica Hebean, Voicu Ilie, Constantin Ion* (2003) - Cultura sorgului zaharat şi industrializarea lui totală. Perspectivă pentru dezvoltarea durabilă a agriculturii româneşti. SC Chiminform Data SA, Bucureşti, Capitolul IX, pag. 104 – 119.
8. *Jambunathan R., Singh U. and Subramanian V.* (1981) – Grain quality of sorghum, pearl millet, pigeon-pea and chick-pea. Intrenational Crops Research Institute for the Semi-arid Tropics, Patancheru, India.
9. *Nicolae M., Cornelia Petroman* (1999) – Nutreţurile, valoarea nutritivă, sortimente, controlul sanitar – veterinar. Editura Agriş – Redacţia revistelor agricole, Bucureşti.
10. *Roeber D. L., R. K. Gill and A. DiCostanzo* (2005) – Meat quality responses to feeding distiller's grains to finishing Holstein Steers. J. Anim. Sci. 83:2455 – 2460.
11. *Singh S., S. S. Kundu, B. P. Kushwaha and S. B. Maity* (2009) – Dietary energy levels response on nutrient utilization, nitrogen balance and growth in Bhadawari buffalo calves. Livestock Research for Rural Development 21 (8).
12. *Stock Rick, Terry L. Mader* (1974) – Grain sorghum processing for beef cattle. The Board of Regents of the University of Nebraska on behalf of the University of Nebraska-Lincoln Extension.
13. *Stoica Ioan* (1997) – Nutriţia şi alimentaţia animalelor, Editura Coral Sanivet, Bucureşti.
14. *Stoica Ioan şi Liliana Stoica* (2001) – Bazele nutriţiei şi alimentaţiei animalelor, Editura Coral Sanivet, Bucureşti.
15. XXX INRA (1988) - Alimentation des bovins, ovins & caprins, Editura Jarrige, Paris.

NUTRITIONAL SOFTWARE TO FORMULATE AND EVALUATE COMPOUND FEED RECIPE FOR PIGS

I. SURDU[1], TOMITA DRĂGOTOIU [2], MONICA MARIN[2],
GH. BUDAN[1], D. DRĂGOTOIU [2]SIMONA DECU[1]
S.C SIAT S.A. Bucharest[1],
University of Agronomical Sciences and Veterinary Medicine Bucharest[2]

Key words: pigs, nutritional software, compound feed

SUMMARY

The software for the formulation and calculation of compound feed recipe for swine includes modules that allow nutritionists / farmers to undertake the following activities: Evaluation of the nutritional characteristics of the ingredients from the composition of rations for pigs; Defining specific fodder data base, calculation of nutritional requirements for pigs depending on age, weight, sex, commercial type, living environment, physical activity and economic performance desired (growth and quality of growth). Formulation and ration calculation for user selected animal, estimated efficiency ratio set by the user for selected animal, estimated feed requirements for a livestock farm with an established user for a defined time period (one year) and cultivated area which allows the feeding of livestock during that; The software developed is an important logistical support for further development of research in the field, as an effective nutritional tool to improve feed and fodder use for pig growth and improvement towards the desired economic performance. To achieve the above functions the software for the formulation and calculation of nutritional rations contains four modules: Evaluation for nutritional values of fodders; Calculus for nutritional requirements for pigs; Conception, calculus and estimation on a ration’s efficiency module. Calculation of surface and forage crops need for the farm.

The first module, which relates to evaluation for nutritional values in pigs compound feed receipe, contains a data base with specific items for nutritional metabolism of pigs. Fodders are divided on multiple level, generally noted as: Group, Subgroup, Type, Subtype, Product, By-product.

The main nutrients considered to evaluate nutritional values in pigs compound feed receipe are: brute energy, total proteins, total nitrogen, aminoacids, total fats, saturated fatty acids, monounsaturated fatty acids, polyunsaturated fatty acids, available carbohydrates, total carbohydrates, saccharides, cellulose, ashes, humidity, vitamins and minerals.

The data basis includes two parts: a references data base, containing standard values for products with established values, given by the reference materials, and an user data base with complete access regarding adding or correcting data given by the lab tests.

The reference data provides evaluation methods for nutrient calculus, conforming to the methods elaborated in cooperation with specialists from INCDZ Balotesti. This module formulates the calculus for nutritional requirements, based on mathematic models, and performs the selection for nutritional requirements from a data base with nutritional specifications.

The module for conception, calculus and estimation on a pig compound feed recipe’s efficiency permits to set up a feed ration conforming to nutritional requirements established by the model, nutritionist or user and to establish a degree of fulfillment for nutritional requirements in a diet. An efficiency report shows the lack or excess of nutrients, so the user could take a corrective measure. Rations are calculated in kilograms of fodder a day.

The module for calculation the necessary production of feed crops and the area that allows the forage crops need for the farm use as data input the number of pigs from farm and a ration for each age group (five groups). Based on these input is calculated daily quantity for each pig and yearly requirement for all animal from farm. By entering and updating the production per hectare for feed materials from model result the area under cultivation at the farm level required.

Determination of optimal dietary nutrition for pig is a complex process that requires the integration of a large volume of data and information. A pigs compound feed recipe's conception and evaluation, by elaborating a software application, refers to creating applicative modules that are acting as:

- Defining a nutritional data base
- Evaluation of nutritional characteristics for ingredients contained by pig compound feed recipe
- Calculating the pigs nutritional request
- Formulation and evaluation on a diet

This software application is an important logistical support to consequently develop a basis research and also an efficient tool for nutritionists and farmers, in order to improve the use of fodder for pigs and achieve desired growth and improve economic performance. The nutritional software CARSUIN, created in a team effort with specialists from SIAT Bucharest, University of Agronomical Sciences and Veterinary Medicine Bucharest, and National Institute for Research and Development in Nutrition and Animal Biology Balotesti, represents the reference element to create a useful simplified nutritional instruments for farmers.

1. MATERIAL AND METHOD

This research intend to elaborate and develop scientifically sustained methods and instruments for calculus and formulation of nutritional pigs diets, in order to ensure nutrient requirements for obtaining a gain of weight, meat quality, and economic efficiency (price cost). This is a complex investigation, including characteristics related to studying and elaborating of a scientific support, as parts of the swine nutritional system, as well as to practical applicability by designing and elaborating the software for formulate and calculating a daily diet.

With the purpose of fulfilling the above mentioned functions, the software for conception and calculus on a diet, includes 4 modules:

- a module for evaluation of nutritional values in food
- a module for calculus of nutritional requests
- a module for conception and estimation on a diet's efficiency
- a module for calculating the quantity of fodder for all farm and the area cultivated to ensure this yield.

The first module, which relates to evaluation for nutritional values in pigs feeding, contains a data base with specific items for nutritional metabolism of pigs. Fodder supplies are divided on multiple level, generally noted as: Group, Subgroup, Type, Subtype, Product, By-product.

The main nutrients considered to evaluate nutritional values in pigs feeding are: brute energy, total proteins, total nitrogen, total fats, saturated fatty acids, monounsaturated fatty acids, polyunsaturated fatty acids, available carbohydrates, total carbohydrates, saccharides, cellulose, ashes, humidity, A vitamin, retinol, β-carotenes, D vitamin, D3-cholecalciferol, D2-ergocalciferol, E vitamin, tocopherol, K vitamin, B1 vitamin (thiamin), B2 vitamin (riboflavin), equivalent niacin, niacin, tryptophan, B6 vitamin, pantothenic acid, biotin, folates, B12 vitamin, C vitamin, L-ascorbic acid, L-dehydroascorbic acid, sodium, potassium, calcium, magnesium, phosphor, iron, copper, zinc, iodine, manganese, chromium, selenium, nickel, total saccharides, amidone, total nutritional cellulose, total saturated fatty acids, total monounsaturated fatty acids, total polyunsaturated fatty acids, total fatty acids n-3, total fatty acids n-6, trans fatty acids, cholesterol, isoleucine, leucine, lysine, methionine, cistine, phenylalanine, tyrosine, threonine, tryptophan, valine, arginine, histidine, alanine, aspartic acid, glutamic acid, glicine, proline, serine, other fatty acids.

The data basis includes two parts: a references basis, including standard values for products with established values, given by the reference materials, and a user basis, with complete access regarding adding or correcting data given by the lab tests. The number of considered nutrients is highly enough to permit a hypothesis formulation and a fair analysis towards studied effects.

The software structure is an important factor establishing an easy access to a data basis. For our application, the data base requires a MICROSOFT ACCESS format.

Food requirements are minimum quantities of nutrients provided to a swine in order to meet maintenance needs, achieving a gain in weight and a higher quality, achieving a certain physical activities. Energy, protein, essential AA, vitamins, macro and microelements requirements are calculated for all pig body functions, including: maintenance, physical activity, environment, housing, body weight gain, depending on age / weight, sex, race.

The software modules are written with MICROSOFT VISUAL C, they have a dynamic character and promotes the development as an user application.

2. RESULTS AND DISCUSSIONS

The nutritional software CARSUIN is an application written with MICROSOFT VISUAL C and uses Windows specific tools and controls. CARSUIN includes seven menus: File, Edit, Entry, Tools, View, Window and Help. File, Edit, View and Window comprise submenus, with standard Windows associated functions and commands. Entry and Tools have submenus used to select a particular window and specific commands to elaborate file proceedings on nutrient requirements, diet formulation and evaluation; Help menu contains the interactive on-line manual.

The following is a description of the main dialog windows, including associated functions and commands.

The module for evaluation of nutritional values in fodder is conceived as a view and edit screen for data basis. It represents a modeless dialog, with tab controls associated to nutrients group and some universal controls.

- Tab controls allow dealing with nutrient’s characteristics, as grouped:

Brute Chemical Composition, Saccharides, Amino Acids, Macro-elements, Micro-elements, Vitamins, Saturated Fatty Acids, Mono-unsaturated Fatty Acids, Poly-unsaturated Fatty Acids, other Fatty Acids.

• Universal controls include:

Selection controls for current data base; Nutritional tree; Data basis navigation controls (first, last, previous, next, any leap); Viewing controls for data basis status (current position in data basis, total number of categories and nutrients, code, ID, nutrient situation on the tree); Searching and sorting controls, considering particular characteristics; Adding, modifying and deleting controls (categories and nutrients); Other controls (copy, past, reread, “white” article (=uninitialized).

Example: Brute chemical composition for a nutrient:

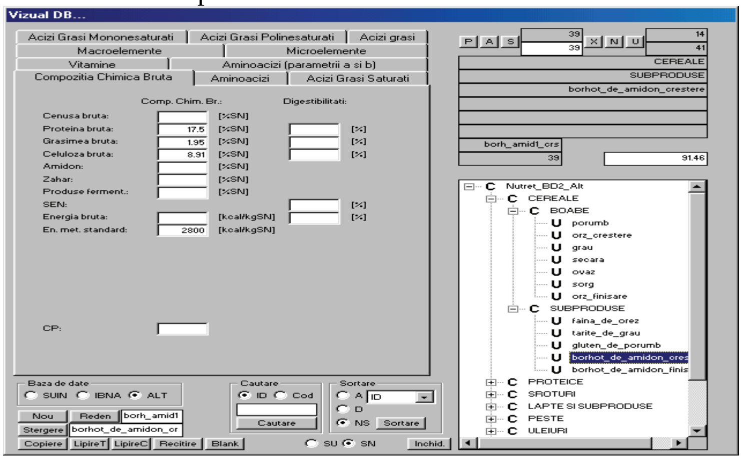


Fig. 1. "Brute chemical composition" Tab

The module for calculus of nutritional requests is carried out as a necessary evaluation screen (energy, protein, etc.), based on an individual description. It is realized with tab controls, including:

• A tab for user requirements generated by the model;

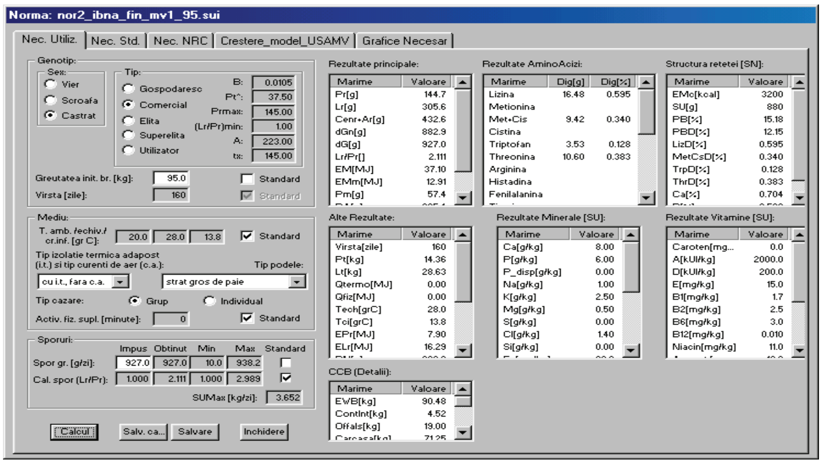


Fig. 2. "Requirement generated by the model" Tab

•A tab for standard requirements, obtained from the standard database

•A tab for requirements from USAMV model, derived from the model proposed by NRC (Nutrient Requirement of Swine- Tenth Revised Edition 1998)

•A tab for rendering the growing. It displays the change of the body weight in a time period, by providing rations that are entered as ration files.

For the cases where the calculus is performed using the models (the first and the USAMV ones) the tabs include the results of the calculus too, so a tab to display the results is here not necessary.

Example: the "Requirement from USAMV model" growing Tab is presented in figure 3.

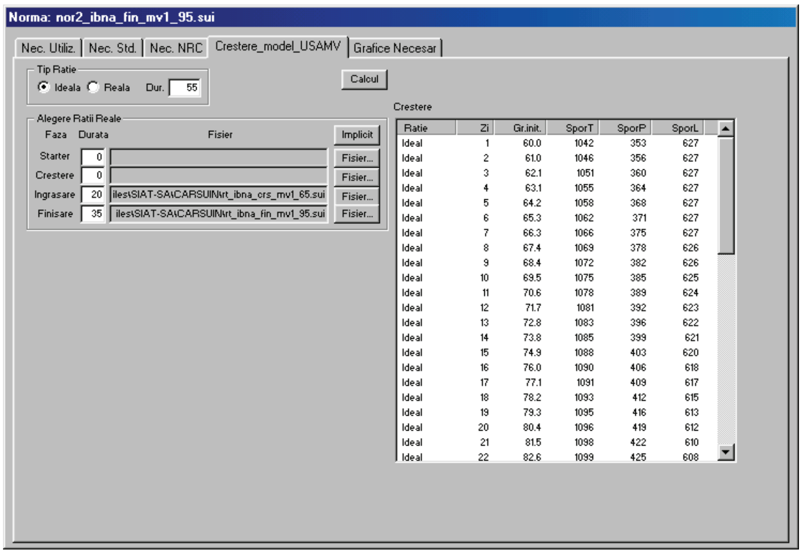


Fig. 3. "USAMV Growing model" Tab

The module for conception and estimation of the ration efficiency is done by two screens.

The first screen allows the qualitative conception of a ration. It is the only one where this task may be done. But other tasks may be performed too, as follows: displaying the ingredient parameters (characteristics); the initial amount of every ingredient can be set; working with mixed compound feed (opening, saving to the database, deleting, renaming, displaying parameters before saving to the database); rations with ingredients contained in all the databases can be created; displaying parameters with two types of measure units (SU, SN); easy scrolling through the many ingredient parameters can be done; the parameters for printing can be chosen (at most 14 on a single sheet). The ingredient parameters may by modified locally. Many other useful data may be displayed.

The second screen operates many data, especially the ration, computed as mentioned above, and the nutritional requirements. It solves a lot of tasks, it computes especially the ration efficiency and shows how the proposed ration is able to comply the nutritional requirements.

The group Ration efficiency shows results.

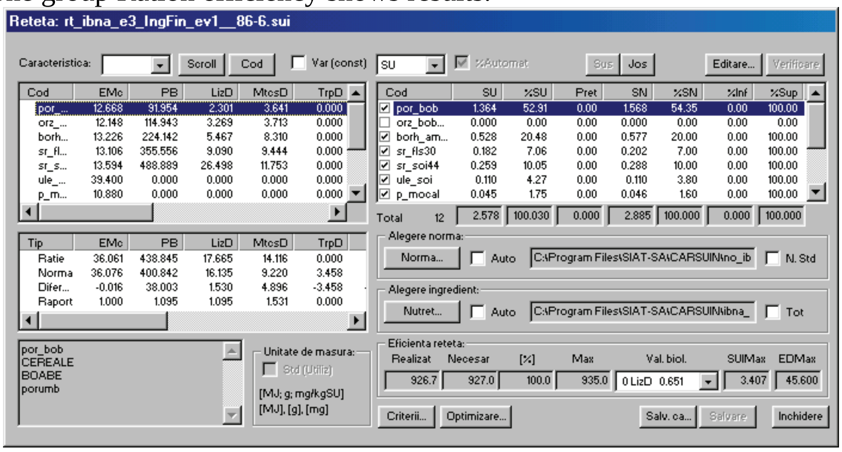


Fig. 4. "Ration" Screen

The module for calculation of the necessary production and area is carried out as a screen where some data are entered, as follows: the number of swines, divided according to age groups (the rations vary with the age); and a ration file that contains the ration of that age group, computed as well as possible, using the previous suited screens.

After starting the calculus a result for 1 animal and 1 day, and another for all animals and time period (1 year) (hence a total) are obtained. Knowing the yield prodution, entered by the user, the necessary cultivated area is computed.

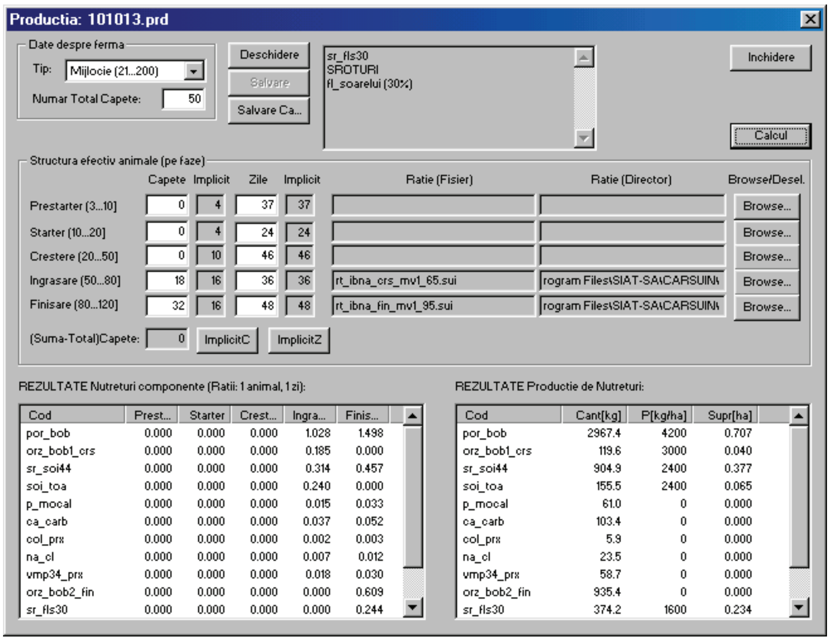


Fig. 5. "Production" screen

3. CONCLUSIONS

The software application CARSUIN presents a scientific and practical utility. It allows the nutritional characterization from various points of view (energy, protein, aminoacids, fat, fatty acids) and takes into consideration the metabolism of the growing swines.

The application uses two databases for ingredients, all having the same structure. One database is completely for the user and contains ingredients especially for that user. Ingredient categories and new ingredients can be added within this database and any values of characteristics can be modified.

The nutritional requirements can be estimated for various swine's types, according to the weight/age, commercial type, environment, housing, physical activity, they are dependent on the desired economic performance (body weight gain, gain quality).

Nutritional software CARSUIN is an application intended to be used by nutrition specialists and swine growing farms in order to formulate rations for growing swines, for pork meat production.

REFERENCES

1. *Gh. Burlacu, A Cavache, R. Burlacu, I. Surdu*, 2002, *Potentialul productiv al nutreturilor si utilizarea lor*, Editura Ceres, Bucuresti, I.S.B.N.: 973-40-0541-3;

2. *Gh. Burlacu, R. Burlacu, A. Cavache, I. Surdu*, **(1998 republicat 2002)**, *Ghid pentru alcătuirea rațiilor de hrană la porci*, editat de M.A.A., Agenția Națională de Consultanță Agricolă, O.J.C.A. Constanța, I.S.B.N.: 973-8036-00-3;
3. *A. Danfaer*, 2000, *A pig model for feed evaluation*, CAB International.
4. Microsoft Visual Tools – Users guide ;
5. Microsoft Visual Studio – MSDN Library ;
6. Microsoft Visual Studio – Developing for Windows and Web ;
7. CDC – *Nutrient Database for Standard reference*,1990 ;
8. The National Academies Press- *Building North American Feed Information System*, 1995 ;
9. *Tommy G. Thomson*, 2003 – *Trans Fatty Acids in Nutrition Labeling, Nutrient Claims, and Health Claims* ;
10. US Nationl Swine Registry – *Meat Quality*.
11. US National Research Council, 1998, *Nutrient Requirements of Swine*, Tenth Revised Edition;

IDENTIFICATION OF THE MAIN PROTEIC FRACTIONS BY ELECTROPHORESIS ON POLYACRYLAMIDE GEL OBTAINED FROM BIOLOGICAL SAMPLES OF DUD LEAF, FROM THE MORUS GENUS, CONTAMINATED WITH HEAVY METALS

CRISTIANA DIACONESCU[1] ,MARIA ICHIM[2],DOINA BRAILOIU[3],
LAURA URDES[1],DANA POPA[1]
1.University of Agricultural Sciences and Veterinary Medicine Bucharest, Bucharest
2.S.C. Bioing
3. S.C. Sericarom-Baneasa, Bucharest

Keywords: polyacrylamide gel electrophoresis, lead contamination

SUMMARY

The degradation of agricultural lands in Romania can take place by the processes of contamination / pollution with heavy metals: iron, manganese, copper, zinc, lead, cadmium, chromium, cobalt, nickel. Soils from the Baia Mare region are full of toxic substances based on lead.

Research conducted in the field of the pollution / contamination of soils with heavy metals revealed several possibilities of recovery, one of which is the extraction of these metals from the soil by cultivating plants with high absorption capacity for pollutant elements. Such a plant is the mulberry tree (Morus sp.) (Lacatusu, R., 2004).

Heavy metals may have undesirable effects on protein (amino acid in the oxidation of side chains), antioxidant enzymes and other biochemical compounds from plants. For this reason, the current paper investigates the main protein fractions, by using the polyacrylamide gel electrophoresis SDS-PAGE procedure, from mulberry leaves harvested from the polluted Baia Mare area, compared with the mulberry leaves harvested from the control group Baneasa (SCSericarom Research Branch).

Electroforegrame analysis revealed significant differences in the number of protein fractions, much lower in the leaves contaminated with heavy metals than in the control group samples. This result entitles us to conclude that in areas polluted by heavy metals, plants of the Morus genus, which have a greater absorption capacity of these chemicals, undergo qualitative changes in their leaf biochemical compounds (proteins).

Heavy metals are chemical elements common to all soils, and their abundance in uncontaminated soils is between the range of percentages (iron, manganese) and the range of parts per million (copper, cobalt, lead) (Lăcătuşu R., 2004, Lixandru GH 2003).

In some areas the content of these chemicals is greater than the maximum allowed value for the development of vegetation. Due to soil contamination, the soil quality is reduced and the agricultural production is compromised, the consequences being felt in the entire food chain, soil-micro organisms -plants-animals-humans (Budoi G., 2000). Baia Mare region soils are full of lead-based toxic substances. Lead is a toxic metal that once entered into the body, accumulates in the liver, causing anemia, chronic Pb intoxication leading to nervous system disorders.

Researches in the field of remediation solutions for the soils contaminated with lead have evidentiated the possibility to cultivate plants with high absorption capacity for the pollutant elements, including mulberry tree (Morus sp.). But heavy metals may have undesirable effects on some biochemical compounds from plants, especially the proteins and enzymes. Therefore, in the present work we will emphasize the main protein fractions by polyacrylamide gel electrophoresis SDS-PAGE from mulberry leaves harvested from polluted area of Baia Mare, compared with the control group harvested from Baneasa (SCSericarom Research Branch).

MATERIAL AND METHOD

Biological samples were collected from the genus Morus mulberry leaves from different locations (four areas) located in the polluted zone of Baia Mare. The number of locations depended on the nature of emissions, their quantity and size of land areas which they affect. The studies highlighted the major protein fractions by polyacrylamide gel electrophoresis SDS-PAGE, by comparing them with the control group Baneasa, knowing that heavy metals negatively affect both qualitatively and quantitatively some biochemical components in plants.

● In order to extract leaf proteins, the following steps were performed: 100 mg above ground samples/ 50 mg roots samples were weighted, the samples were put in a mojar previously kept in the freezer, 5 ml of phosphate buffer was added and all the mixture was grinded for 2 minutes. Afterwards, the extract was placed in a centrifuge cell using a silicone rubber spatula. All the samples were centrifuged for 20 min at 4500 rpm. The extract was kept frozen until it was used.

● Dialysis: The defrosted samples were pipetted in the dialysis bag. The dialysis bag was placed in a dialysis buffer (phosphate buffer of 7.2 pH) in a Berzelius glass having a magnet. This operation is performed at a temperature of 4°C. The shaking lasts for 8 hours, and the dialysis buffer has to be changed every 2 h. At the end of dialysis, the samples were proportionate in Eppendorf tubes and were frozen (at -45°C) until processing.

● Emphasize of protein factions from dialyzed extract through SDS-PAGE electrophoresis was done according to the technique described by Michalski, W. (1996) and adapted as follows:

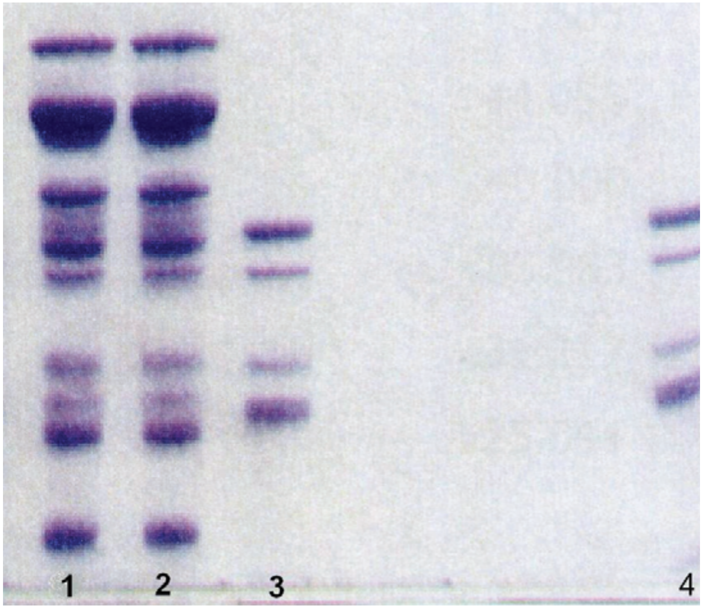
1 ml extract was diluted with 3 ml denaturated buffer and it was heated to 95°C for 4 minutes. For the migration, plates based on polyacrylamide gel were used, placed upright in the tank of the CONSORT E122 electrophoresis apparatus, Belgium. The coloring was performed with Coomassie Brilliant Blue R-250 (sigma).

The following standards were used: bovine serum albumin 76,000 Da, ovalbumin 45,000 Da, 40,000 Da aldolază, cytochrome C 12 384 Da.

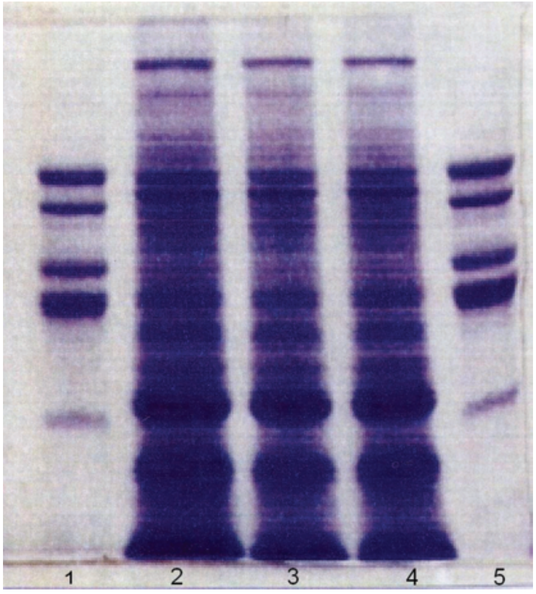
2. RESULTS AND DISCUSSIONS

Figure 1 presents the main protein fractions obtained from mulberry leaves harvested from the area polluted with lead.

Fig. 1. The main protein fractions identified by electrophoresis SDS - PAGE of the mulberry tree - Morus species originating from industrial areas polluted with heavy metals (Baia Mare region).



1, 2 = mulberry leaf protein fractions (genus Morus) in leaves collected from lead-polluted area of Baia Mare
3, 4 = Protein Markers



2, 3, 4 = leaf protein fractions of mulberry (genus Morus) – in leaves collected from Baneasa area - Bucharest
1, 5 = protein markers

Fig. 2. The main protein fractions identified by electrophoresis SDS - PAGE in the mulberry leaves- Morus species- collected from the control group Baneasa

The electric analysis revealed significant differences between the number of leaf protein fractions from heavy metals contaminated leaves, compared to the leaves from the control group (Figure 2).

There is a major decrease in leaf protein concentration in the heavy metal contaminated group, compared to the uncontaminated one, reflected by the existence of only 10 major bands with molecular weights well differentiated from 112,000 to 24,540 Da.

Between these bands there are spaces that show the complete lack of some protein fractions that were found in the uncontaminated leaves, probably representing some of the enzymes that were inactivated by contamination or other denatured proteins.

This entitles us to conclude that in areas polluted by heavy metals, plants of the genus Morus, having a high capacity to absorb these chemicals, undergo qualitative changes in their leaf biochemical compounds (ie proteins).

3. CONCLUSIONS

1. Soil contamination with lead determines changes in the protein spectrum of mulberry leaves, from the Morus specie, found on such lands;
2. In areas polluted by heavy metals, plants of the genus Morus, having a high absorption capacity for these chemicals, undergo qualitative changes of certain biochemical compounds in the leaf.

REFERENCES

1. 1 Budoi G., Agro-soil-and plant-Ped.Bucureşti Did.şi Publishing, 2000.
2. 2. Lăcătuşu R., coordinator- The impact of pollution sources in horticultural periurban and urban sites on the environment and on vegetable products. Fault-East House, Bucharest, 2004
3. 3. Lixandru Gh,-Integrated-fertilization systems in agriculture PIM Publishing, Science, 2003.
4. 4. Michalski, W. - "Methods for chromatographic and electrophoretic Analysis of superoxide dismutases, J. Chrom. B, no. 684, p. 59-75.1996

RESEARCHES REGARDING THE INFLUENCE OF LINOLEIC ACID ENRICHED FOOD OF MUSCLE TISSUES IN LAYING HENS

ELENA POGURSCHI, MARIN MONICA, DUMITRU DRAGOTOIU

Key words: linoleic acid, linolenic acid, muscle tissue, laying hens

SUMMARY

Modern human nutrition promotes the reduction or total exclusion of food involved in diseases of the century, which leads to the involvement of researchers in a series of experiments that aim at obtaining food beneficial to human health. The egg, an important source of energy, contains fractions of saturated fat that lead to a limited consumption by humans. In this research paper, we intended to modify the egg's composition in favour of its constituents with a positive influence on human health, by increasing the concentration of polyunsaturated fatty acids, lipid fractions of real importance in the reduction blood cholesterol and implicitly the one of cardiovascular diseases. But, for obtain, animals products, using different scientific ways, it is obligatory to examine the condition of experimental animals health. In this research paper, we intended also to study which is the effect of the linoleic acid introduced in laying hens food upon the muscle tissues.

1. MATERIAL AND METHOD

In the our coming experiment, biological material was represented by a total of 48 chickens belonging to the ROSO SL 2000 hybrid, chickens aged 33 weeks, which were distributed in 4 experimental groups. At 30 week age chickens have started to be fed with compound feed in which different proportions of soybean oil, linseed oil, and a source of conjugated linoleic acid have been introduced. The structure of the four compound feed which have been used is to be found in table 1.

Table 1

The structure of the compound feed

Specification	Group E1	Group E2	Group E3	Group E4
Corn	37,8	37,8	37,8	37,8
Wheat	22,0	22,0	22,0	22,0
Soy meal	18,0	18,0	18,0	18,0
Flour, hay, alfaalfa	2,0	2,0	2,0	2,0
Soybean oil	10,0	5,0	-	5,0
Linseed oil	-	-	5,0	5,0
Conjugate linoleic acid	-	5,0	5,0	-
DL-methionine	0,2	0,2	0,2	0,2
Calcium carbonate	8,0	8,0	8,0	8,0
Dicalcium phosphate	0,5	0,5	0,5	0,5
Salt	0,5	0,5	0,5	0,5
Vitamin-mineral premix	1,0	1,0	1,0	1,0
TOTAL	100	100	100	100

The compound feed given to the four experimental groups were isocaloric and isoproteic, the metabolized energy reaching the value of 2800 kcal/kg and crude protein was 16.88%. After four weeks of administration of this compound feed were sacrificed three hens from each group, and muscle tissues were sampled for fatty acid composition analysis. Tissues were frozen in liquid nitrogen immediately after sampling (Belury M.A. -1995). Lipid fractions of muscle tissues were separated by chromatographymethod, the results present are the average of two determinations. The compound feed was also analyzed in terms of fatty acid contents.

2. RESULTS AND DISCUSSIONS

Following the analysis of the content of fatty acids in compound feed given, the following results were obtained (table 2)

Table 2

The proportion of the main saturated and unsaturated fatty acids found in combined fodder

Specification	Lot E1	Lot E2	Lot E3	LotE4
Saturated fatty acids				
Stearic ac.	3,75	2,50	2,00	2,82
Palmitic ac.	11,85	7,50	I,01	8,56
Unsaturated fatty acids				
Oleic ac.	17,10	14,78	13,01	14,24
Linoleic ac.	40,52	23,00	8,90	25,81
Linolenic ac.	6,57	3,30	20,54	24,14

Conjugated linoleic ac.	-	25,33	25,33	-

The data analysis shows that the biggest concentration of linoleic acid (40.52%) is found in mixed fodder in which the soybean oil had the largest share (10%). High concentration of linolenic acid (24.14%) is to be found in mixed fodder in which soybean oils have been introduced in equal proportions of 5%, and so as expected, high concentrations of conjugated linoleic acid were found in mixed fodder in which a commercial source of conjugated linoleic acid (25.33%) has been introduced.

Eggs harvested from the 33rd week of life (25% of each batch) were subjected to chemical analysis in order to determine the concentration of fatty acids and the way in which it was infuenced by the given mixed fodder (Tables 3 and 4).

Table 3

The profile of saturated fatty acids of egg yolk

Ac. grasi saturati	Lot E1	Lot E2	Lot E3	LotE4	SEM
Ac. Stearic	11,94	16,30	14,89	11,67	S
Ac. Palmitic	22,83	24,55	25,72	22,91	NS

Table 4

The profile of unsaturated fatty acids of egg yolk

Unsaturated fatty acids	Lot E1	Lot E2	Lot E3	LotE4	SEM
Oleic ac.	30,10	23,55	27,98	31,02	NS
Linoleic ac.	24,01	18,64	12,20	21,41	S
Linolenic ac.	1,32	0,92	5,04	5,02	DS
Conjugated linoleic ac.	-	3,03	2,96	-	NS
Arachidonic ac.	4,08	3,10	2,22	3,12	S
Eicosapentaenoic ac.	0,22	0,20	0,38	0,32	NS
Docosahexaenoic ac.	2,88	1,41	3,55	3,29	DS
Monosaturated fatty ac.	33,98	23,80	30,03	32,89	S
Polyunsaturated fatty ac.	32,51	27,30	26,35	33,16	DS

Following analysis of data from table 4, we can notice that the eggs layer by chickens fed with fodder from lots in which conjugated linoleic acid (E2 and E3) was introduced recorded the lowest concentrations of arachidonic acid (3.10 and 2.22 arachidonic acid% of total fatty acids). This led to obtaining the lowest concentrations of linoleic acid in the total fatty acids of the egg yolks collected from these groups.

Linoleic acid concentration varied in the following order: the highest concentration was recorded at the lot E1 (24.01% of total fatty acids), followed by the E4 group (21.41% of total fatty acids), group E2 (18, 64% of total fatty acids) and the E3 group (12.20% of total fatty acids), the same tendency of variation of the concentration of linoleic acid has been recorded for the compound feed; we can say that there is a directly proportional relationship between the concentration of linoleic acid from food and the one in the egg (E1> E4> E2> E3).

High concentrations of linolenic acid were recorded in egg yolk harvested from lots E 3 (5.04% of total fatty acids) and E4 (5.02% of total fatty acids), compared to other experimental groups. These elevated concentrations of linolenic acid are due to the introduction of linseed into the mixed fodder.

The results regarding the composition of muscle tissues are presented in table 5.

Table5

The unsaturated fatty acids composition of muscle tissues (% from total fatty acids)

Unsaturated fatty acids	Lot E1	Lot E2	Lot E3	LotE4	SEM
Ac. Oleic	29,99	27,01	26,98	28,32	0,560
Ac. Palmitoleic	0,70	0,31	0,59	0,78	0,178
Ac. Linoleic	19,52	15,44	12,89	18,03	0,518
Ac. linolenic	1,04	0,69	2,55	3,49	0,102
Ac. linoleic conjugat	-	1,80	1,89	-	0,041
Ac. Arahidonic	7,97	6,10	5,20	7,32	0,301
Ac. Eicosapentanoic	0,16	0,21	0,55	0,48	0,029
Ac.docosahexanoic	2,28	1,99	5,68	5,08	0,095
Monounsaturated fatty acids	30,69	27,32	27,57	29,10	
Polyunsaturated fatty acids	30,97	26,23	28,76	34,40	

The results obtained show that the concentration of arachidonic acid was much higher in the muscle tissues by chicken fed with fodder without conjugated linoleic acid additions (E1 and E4-7,97% acid arachidonic from total fatty acids and 7,32% acid arachidonic from total fatty acids). This result could be caused by the high amount of linoleic acid in the feed with added soybean oil.

The concentration of eicosapentaenoic acid and docosapentaenoic acid in the muscle of hens of the lots E3 and E4, indicate that conjugated linoleic acid promoted the synthesis or deposition of docosapentaenoic acid and eicosapentaenoic acid. This finding illustrates that conjugated linoleic acid increases the level of n-3 long chain polyunsaturated fatty acids. Michael Dugan and al. (2002) showed that arachidonic acid and docosapentaenoic acid could affect each other's levels.

This study indicated that the conjugated linoleic acid reduced monounsaturated fatty acid and nonconjugated linoleic acid polyunsaturated fatty acids content in tissue lipids. The concentration of docosapentaenoic acid in lipid was increased by dietary with conjugated linoleic acid, which could be related to the decreased arachidonic acid content.

A disadvantage of placing in a conjugated linoleic acid into food is that it increases the concentration of saturated acids (palmitic and stearic) in expense of unsaturated fatty acids, the latter having beneficial effects on human health.

Placing conjugate linoleic acid into the food in laying hens led to the reduction of concentration of mono fatty acids (27,32% of total fatty acids - E2 and 27,57% of total fatty acids-E3), compared to lots that who's food wasn't introduced this acid, the differences being significant. Polyunsaturated fatty acids had the same decreasing tendency.

3. CONCLUSIONS

► Introducing conjugated linoleic acid into the food of laying hens leads to low arachidonic acid and linoleic acid quantities in eggs and muscle tissues;
► A direct relationship between the concentration of linoleic acid in food and the egg and the muscle tissues has been noticed;
► The introduction of linseed oil in the food laying hens lead to an increase of linolenic acid in the egg;
► The introduction of conjugated linoleic acid into the food leads to increased saturated fatty acids in the egg and tissues to the detriment of unsaturated fatty acids, lipid fractions with beneficial effects on human health;
►There is a direct relationship between the concentration of oleic acid and docosahexaenoic acid given by the fact that linolenic acid intensifies docosahexaenoic acid's biosynthesis;
►Linoleic acid influences the biosynthesis of arachidonic acid;
► Conjugated linoleic acid leads to a decrease of the concentration of oleic acid, by its ability to inhibit the synthesis of n9 acids.

REFERENCES

1. *Ahn D.U., F.H. Wolfe,* (1995) – Dietary ά-linolenic acid and mixed tocopherols, and packaging influences on lipid stability in broiler chiken breast and leg muscle. J.Food Sci. 60:1013-1018.
2. *Ahn D.U., J.L. Sell* (1999) - Effect of dietary conjugated linoleic acid on the quality characteristics of chicken eggs during refrigerated storage.Poultry science78:922-928.
3**.** *Alvarez C., P. Garcia-Rebollar, P. Cachaldora ,J. Mendez , J.C. Blas* , (2005) - Effects of dietary conjugated linoleic acid and high-oleic sunflower oil on performance and egg quality in laying hens. Br.Poult.Sci., 46(1), pg.80-86.
4. *Belury M.A.* (1995) - Conjugated dienoic linoleate: a polyunsaturated fatty acid with unique chemoprotective properties. Nutr.Rev., 53, pg.83-89.
5. Ip C., C. Jiang (1995) – Effect of timing and duration of dietary conjugated linoleic acid on mammary cancer prevention. Nutr. Cancer 24:241-247.
6. *Ip C., C. Jiang, H.J. Thomposon and J.A. Scimeca* (1997) - retention of conjugated linoleic acid in the mammary gland is associated with tumor inhibition during the post-initiation phases of carcinogenesis. Carcinogenesis 18:755-759.
7. *Lee K.N., M.W. Pariza, J.M. Ntambi* (1998) – Conjugated linoleic acid decreases hepatic stearoyl-CoA desaturase m RNA expression. Biochem.Res. Commun.
8. Michael Dugan, Jennifer Aalhus (2002) – CLA has surprising effects on pork quality. Feed Mix, pg. 12-14.
9. *Elena Pogursch*i (2007) – Research concerningthe influence of some nutritional factors on some egg quality parameters. Ph. Thesis.
10. Sugano M., Tsujita A., M Yamasaki, (1998) - Conjugated linoleic acid modulate tissue levels of chemical mediators and immunoglobulins in rats.Lipids 33:521-527.
11. Stoica I., Stoica L. (2001) – Bazele nutriției și alimentației animalelor. Ed. Coral Sanivet, București.

RESEARCHES REGARDING THE INFLUENCE OF COMPOUND FEED ON GROWTH OF REPLACEMENT YOUNG QUAILS

LUCIAN IONIȚĂ, CORNEL OCTAVIAN PANĂ,
CONSTANTIN STANCA, MONICA MARIN

Key words: quail, young quail, growth parametters, feeding

SUMMARY

The aim of the research was to determine whether a system can be practiced trifazial feeding in young quail breeding that would reduce the nutritional parameters of recipes compound feed from the age of 14 days. Research has been conducted in SC Nova SRL Bucharest farm on two groups of young quail population „of Balotesti”. The size of each batch was 100 head, the transfer into batteries of cages designed specifically young quails. From a weight of 8.90 ± 0.15 at age 1 day in both groups at 42 days reached a weight of 197.49 ± 2.29 in control group and 201.42 ± 2.17 to experimental group. Average daily gain during 1-6 weeks of growth was 4.49 ± 0.59 in control group and 4.60 ± 0.61 for the experimental group. During 1-6 weeks of growth, the differences between the mean specific consumption of the two groups are insignificant (3.56 g CN / g increase in the control group and 0.76 ± 3.47 g CN / g ± 0.76 increase in experimental group). Research results indicate that the formula may change replacement compund feed for youth from the age of 14 days without being significantly affected the growth parameters in young quail resulting in reduced feeding costs.

Quail is the smallest species of birds raised for meat and eggs [6], but also as a laboratory animal [2]. Japanese quail growth has seen great development in recent decades due to the biological characteristics of this bird, which causes high levels of production and economic efficiency and market requirements for meat and quail eggs with recognized quality (high biological and nutritional value, taste particularly) and recommended by herbal medicine for their therapeutic effect. Among the main productive characteristics of the quail is highlighted: rapid rate of growth (reaching the adult age of 5-6 weeks after hatching), early sexual maturity, short interval between generations, laying high rate, low feed and low places accommodation [1].

1. MATERIAL AND METHOD

Research has been conducted in SC Ferma Nova SRL Bucharest on two groups of young quail population "of Balotesti. The size of each batch was 100 head, the transfer into batteries of cages designed specifically young quails. Collecting data on live weight was made by weighing individual. In order to determine the live weight at age 1 day and 7 days of age were weighed approximately 200 babies that were extracted from a population of 3,000 heads. We calculated the mean weight and variance parameters that were considered valid for both age groups formed after 14 days. From the age of 14 days the chickens from the two groups were fed differently. During the study, chickens were maintained as follows: 0-14 days during quail chicks were maintained on land, permanent litter, warm with electric lamp. Between 14-42 days quail chicks were kept in battery cages specially designed for young quails. The control group received compund feed as follows: in the period 0-25 days and I received the recipe, and between 26-42 days received formula II. The experimental group received food as follows: 1-14 days during the first recipe I, 15 to 28 days during an experimental recipe denoted E II, and between 28 - 42 days recipe II.

Recipes used in the experiment had the following structure and nutritional parameters:

Table 1

Structure recipes used in the experiment compound feed

Ingredients	UM	Recipe I	Recipe II	Recipe E II
Corn	%	53,35	56,00	59,00
Soybean meal	%	34,50	29,4	33,40
Sunflower meal	%	-	5,50	3,38
Fish flour	%	6,50	-	1,62
Oil	%	2,30	5,00	-
DL- methionine 98 %	%	0,15	0,18	0,20
L-Lyzine HCL	%	-	0,2	0,3
Calcium carbonate	%	1,40	1,62	1,62
Dicalcic phosphate	%	1,00	1,3	1,3
Salt	%	0,30	0,30	0,30

Premix vitamin.-mineral	%	0,50	0,50	0,50
Total		100	100	100

Table 2

Nutritional parameters of recipes compound feed used in experiment

Parametrii	U.M.	Rețeta I	Rețeta II	Rețeta E II
Metabolizable Energy	Kcal/kg FC	2983	3124	2864
Crude Protein	%	25,15	20,29	22,82
Lyzine	%	1,40	1,06	1,38
Methionine + cystine	%	0,96	0,81	0,90
Crude cellulose	%	2,81	3,59	3,48
Calcium	%	1,25	1,02	1,06
Phosphorum	%	0,76	0,64	0,68

Energy-protein al ratio for recipe I = 119 kcal EM/%PB. Energy-protein al ratio for recipe II = 154 kcal EM/%PB. Energy-protein al ratio for recipe E II = 126 kcal EM/%PB.

Environmental conditions have been maintained quail chicks of the two groups during the breeding ground and batteries were identical in both groups and were within the limits of literature. [13]

Data were recorded and its effect was statistically Classic Student test to determine significance differences between control group and experimental group.

2. RESULTS AND DISCUSSIONS

1. EVOLUTION OF AVERAGE LIVE WEIGHT AND AVERAGE DAILY GAIN OF YOUNG QUAILS FROM THE TWO GROUPS DURING 1-6 WEEKS OF GROWTH

From an average weight of 8.90 ± 0.15 at age 1 day in both groups reached the age of 42 days at a weight of 197.49 ± 2.29 in control group and 201.42 ± 2.17 for the experimental group, the differences between the two groups was insignificant, except when the age of 28 days between the average live weight of the two groups separately recorded significant differences. highest daily average growth rate recorded in the second week of growth (6.55 g / head) and fifth week of growth (5.51 g / head) in the control group and the fourth week of the experimental group (5.67 g / head).

Table 3

The evolution of average live weight and average daily gain of young quails from two groups during 1-6 weeks of growth

	Average live weight	Average daily gain

Age (week)	**Control group**	**Experimental group**	**Control group**	**Experimental group**
	$X \pm s_X$ (g/cap)	$X \pm s_X$ (g/cap)	$X \pm s_X$ (g spor/zi)	$X \pm s_X$ (g spor/zi)
1 zi	8,90 ± 0,15	8,90 ± 0,15	-	-
I	25,27 ± 0,51	25,80 ± 0,51	2,34	2,34
II	71,14 ± 1,04***ns***	70,08 ± 1,02***ns***	6,55	6,55
III	99,4 ± 1,66***ns***	100,46 ± 1,19***ns***	4,03	4,34
IV	131,71 ± 2,21**	140,16 ± 1,78**	4,62	5,67
V	170,31 ± 2.37***ns***	174.6 ± 1,72***ns***	5,51	4,93
VI	197.49 ± 2.29***ns***	201,42 ± 2,17***ns***	3,88	3,83
Average I - VI			4,49 ± 0,59***ns***	4,60 ± 0,61***ns***

Average daily gain throughout the growing period was 4.49 ± 0.59 in control group and 4.60 ± 0.61 for the experimental group, the differences between the two groups were insignificant.

In a study conducted in Romania by Elena Popescu-Micloşanu and Ioniță L. (2009) on an effective youth quail population "of Balotesti" has established a body weight at age 1 day and 8.86 g body weight at the age of 42 days from 205.3 g. The average daily growth rate between 1-6 weeks of growth was 4.65 g, while average daily feed consumption was 15.63 g compound feed combined / heads / period. The specific consumption was 3.46 g fodder / g gain. The data are similar to those found in this study two groups of young quail examined. In a study conducted in Egypt [9] was determined an average weight at the age of 42 days similar to that in the quail from the two lots of this study (199.89 g / head) and a somewhat smaller weight gain than the population Baloteşti (167.67 g gain / head /period 7 - 42 days compared with the control group and 176.15 to 172.22 experimental group).

In a study conducted in Turkey [11] has resulted in body weight at the age of 42 days of 178.23 g.

In another study conducted in Egypt [4] on an effective youth quail meat mentioned growth parameters in young quail superior to those registered in the two groups of young quail in this study (live weight at age 42 days 246.98 g / head, increased weight gain of 238.04 g / head / period, feed consumption 902.76 g / head / time, specific consumption of 4.06 g / g gain).

2. **EVOLUTION OF AVERAGE DAILY FEED CONSUMPTION AND SPECIFIC CONSUMPTION AT THE YOUNG QUAILS FROM TWO GROUPS DURING 1-6 WEEKS OF GROWTH**

If the week has been a growing take the average food consumption of 4.3 ± 0.58, at the age of 42 days has been a food consumption of 26.20 ± 2.27 in control group and 25 51 ± 2.58 for the experimental group.

Table 4

The evolution of average daily feed consumption and specific consumption at the young quails from two groups during 1-6 wekks of growth

Age (week)	Daily feed consumption		Specific consumption	
	Control group	Experimental group	Control group	Experimental group
	$X \pm s_X$ (g c.f./head)	$X \pm s_X$ (g c.f./head)	$X \pm s_X$ (g c.f./g gain)	$X \pm s_X$ (g c.f./g gain)
I	4,3 ± 0,58	4,3 ± 0,58	1,84	1,84
II	9,85 ± 0,34	10,2 ± 0,44	1,50	1,50
III	15,50 ± 1,23	15,00 ± 1,05	3,84	3,46
IV	17,60 ± 1,34	17,90 ± 1,45	3,81	3,16
V	20,2 ± 1,45	20,80 ± 2,31	3,63	4,23
VI	26,20 ± 2,27	25,51 ± 2,58	6,75	6,65
Average I – VI	15,61 ± 3,15***ns***	15,56 ± 3,12***ns***	3,56 ± 0,76***ns***	3,47 ± 0,84***ns***
Total 42 days	655,55	653,45		

Average consumption of feed during days 1-42 was 15.61 ± 3.15 g compund feed / capita for the control group and 15.56 ± 3.12 for the experimental group, the differences between the two groups insignificant. total feed consumption during the 42 days of growth was 655.55 g compound feed / capita in the control group and 653.45 g fodder / capita in the experimental group. The specific consumption throughout the period of growth was still 3.56 g / g increase in the control group 0.76 ± 3.47 g and nc / g ± 0.84 increase, the differences between the two groups was insignificant.

In a study conducted in Egypt [9] established a higher feed consumption as quail in the two groups (675.49 g fodder / capita / period 7-42 days) and specifically higher than in both groups analyzed quails (6.93 g compund feed / g gain for the period from age 42 days). Doing a cost analysis of the three recipes for compound feed in the two groups of chickens studied, that the cost of feeding the experimental group was about 15% lower than in the control group.

3. **AVERAGE CONSUMPTION OF ENERGY AND NUTRIENTS FROM FEED DURING 1-6 WEEKS OF GROWTH AT THE YOUNG QUAIL FROM TWO GROUPS**

Energy consumption during 1-42 days in control group was 47.18 ± 9.82 kcal ME / head / day, respectively 10.76 ± 2.38 g gain, while the experimental group it was 44.51 ± 8.39 kcal of ME / head / day, respectively, 9.90 ± 2.06 kcal ME / g gain, with 7.97% smaller in the experimental group compared with controls. Crude protein consumption during days 1-42 was 3.35 ± 0.62 g Pb / head / day, respectively 0.756 ± 0.141 g Pb / g increase in the control group, while the experimental group it was 3.43 ± 0.62 g Pb / head / day, respectively 0.763 ± 0.153 g Pb / g increase.

Table 5

The average consumption of energy and nutrients from feed from two groups during 1-6 weeks of growth

Specification	Control group		Experimental group	
	per head/day	per g gain	per head/day	per g gain
Energy consumption	47,18 ± 9,82	10,76 ± 2,38	44,51 ± 8,39	9,90 ± 2,06
Crude protein consumption	3,35 ± 0,62	0,756 ± 0,141	3,43 ± 0,62	0,763 ± 0,153
Lysine consumption	0,223 ± 0,045	0,051 ± 0,010	0,214 ± 0,041	0,047 ± 0,009
Met. + cys. consumption	0,137 ± 0,025	0,031± 0,007	0,143 ± 0,027	0,032 ± 0,006
Crude celullose consumption	0,563 ± 0.136	0,128 ± 0,033	0,564 ± 0,125	0,125 ± 0,031
Calcium consumption	0,160 ± 0,031	0,0366 ± 0,007	0,161 ± 0,030	0,0359 ± 0,008
Phosphorus consumption	0,099 ± 0,017	0,0226 ± 0,004	0,099 ± 0,017	0,0222 ± 0,004

3. CONCLUSIONS

Given these research results can be stated that feeding trifazial the young quails permit lower energy and protein value of between 15 to 28 days without prescription to lower growth performance compared with controls. Decrease the cost of prescription period 15 to 28 days reduces feed costs during the growth of youth and increase profitability growth quail quail for egg production.

REFERENCES

1. *Adeogun I.O. et al. (2004)* : Heritabilities and phenotypic correlations of growth performance traits in Japanese quails, Animal Science Department, Obafemi Awolowo University, Ile-Ife, Nigeria.
2. *Baumgartner J. (1993)* : Japanese quail production, breeding and genetics, Proceedings of the 10th international symposium on current problems of Avian Genetics, pp.101-103, Nitra, Slovakia.
3. *Khalil, H. (2009)* : Productive and physiological respomses of Japanesse quail embryos to light regime during incubation period, Suez Canal University, Egypt, *Slovak J. Anim. Sci., 42, 2009 (2): 79–86*
4. *Panda B., Singh R.P. (1990)* : Development in processing quail, World's P. Sci. J., 46, pp. 219 – 234.
5. *Ragab S. Mona. Aly M.M.M., Hattaba N. A.H., Omar, E.M. (2002*) : Performance of growing and laying Japanese quail fed sorghum grains, Poultry Production Department, Cairo University, Egypt.
6. *Raji A. O., J. Aliyu and J. U. Igwebuike (2009)* : In vivo estimation of carcass components from live body measurements of the Japanesse quail, Department of Animal Science, University of

Maiduguri, Maiduguri, Borno State, Nigeria VOL. 4, NO. 3, 2009 Journal of Agricultural and Biological Science.
7. *Ozbey, O., Erisir, Z.,Aysondu, M.,H., Ozmen O. (2004)* : The effectof High Temperature on breeding and survival of Japanesse quails the are bred under different temperature, , I. J. P. Sci. 3 (7) : 463 – 467.
8. *Vali, N., Edriss M.A. and Rahmani H.,R. (2005)* : Genetic Parameters of Body and Some Carcass Traits in Two Quail Strains, Iran International Journal of Poultry Science 4 (5): 296-300.
9. * * * Code of practice for the housing of animals in designated breeding and supplying establishments/Part. 2/ Quail breeding, 2005, http://scienceandresearch.homeoffice.gov.uk/animal-research.

The 39th International Session of Scientific Communications of the Faculty of Animal Science, Bucharest, Romania
Scientific papers (seria D; vol. LIII) – Animal Science

NECESSITY TO CREATE A REGIONAL MODEL OF BIOTECHNICAL ACTIVITATION OF ARTIFICIAL INSEMINATION AT CATTLE IN MURES COUNTY AND CENTRAL DEVELOPMENT REGION

GABOR VASILE DOREL, ALEXANDRU T.BOGDAN, ROMAN MIRCEA

Key words: artificial insemination, semen

SUMMARY

Currently about 50% of females practiced artificial insemination - semen use farm performance of high genetic value while household farms - the only criterion in choosing the family of frozen semen is the lowest price and of course, a breeding value as.

To make genetic progress must increase the number of cows artificially inseminated, IA also authorize the young bulls, tested at 100 days with high breeding values (SG 125). This leads to accelerate genetic progress.

INTRODUCTION

Profound socio-economic transformation in the last 20 years have led to gradual changes in the structure of ownership of livestock farms, farms last priority of state-owned or privatized by being destroyed in 2002.

Currently, almost the entire population of cattle is the private share, the size of private farms according to the number of existing dairy operation is downright demoralizing, especially if we consider this indicator among the countries included in the EU, which actually compete.

Without making a comparison of the dynamics of the number of farms by size groups since 1995, captures the slow progress in this direction.

1. MATERIAL AND METHOD

A first group of issues concerns the evolution of the species and breeds cattle, how to structure the direction of cattle farms in milk production of dairy herd size in service of their enrollment status in some of the main purposes ameliorative actions so

A. Research on the evolution of the species and breed cattle in Mures county over the period 1990 - 2008;

B. The number of cattle farms and their structure depending on the number of cows in the operation and dynamic range of the years 2000 - 2008;

C. Development of farms for production of milk cows and herds covered by artificial insemination network and official control of production, during the years 2000-2008.

In the second group of problems we have considered the characterization of the main characteristics of the population zoo economics cattle raised under specific conditions and their stage of Mures county improvement.

In this sense the main indices of breeding to first calving age and pursued the interval between births, and between dairy production indices and duration of lactation was established during the dry period, quantitative production of milk, fat and protein (including their content in milk) and total lactation normal, dynamic, and total lactation.

2. RESULTS AND DISCUSSIONS

Breeding activity is ensured by mating and artificial insemination, whose evolution is illustrated in Table 1.

Table 1

In cattle breeding system evolution in Mureş County (between the years 2000 - 2008)

Year	Nucleus effectiv	Natural service		Artificial insemination	
		n	%	n	%
2000	48173	15962	33,06	32247	66,94
2001	45515	7875	17,30	37640	82,70
2002	48628	6560	13,49	42068	86,51
2003	52365	7493	14,31	44872	85,69
2004	55810	3229	5,86	52581	94,14
2005	60025	3862	6,34	56163	93,56
2006	59896	2062	3,44	57834	96,56
2007	52780	4173	7,91	48607	92,09
2008	48900	5567	11,84	43333	88,62

After Suba K.-USAMV Cluj-2010-Doctoral Thesis

If we consider the year 2000, the installed system was practiced in the breeding rate of 33.06% of the total number of females after the report showed a continuous decline until 2006, it reaches only 3.44%, then the next two years to grow again in 2008 being 11.84%.

In other words, the network of artificial insemination has increased as a share of 2000 to 2008 with 32.39%.

Biological material for the covering network, indicating that the bulls were allowed only approx. 10% of those used. In the semen, it comes almost exclusively from SC Semtest SA Tg. Mures, of which 59% of bulls tested, 41% of steers in the so-called test (but for a fee), something on which I will come back to race and membership to improve their value in the future.

What more needs to be emphasized is the fact that the share of females included in the number of artificial insemination network is over 50% higher than that achieved in the country and is now below 60%.

Moreover, concern exists for the cattle breeding business in the area, is illustrated by the birth indexes achieved, indicating that from 78% in 2000, increasing to over 96% in 2007 and nearly 89% in 2008 (Table 2).

Of course, in this respect there are differences between the five areas of activity CTARZ service in the county and the reference year, birth index is between 69.9 to 97%, noting that he had an upward trend in all cases.

Table 2

Evolution index birth between the years 2000 – 2008 the total county and C.T.A.R.Z

Year	**Total county**		**of which on C.T.A.R.Z**									
	I.N	d.c. I.A	Adănuaş		Luduş		M. Niraj		Reghin		Mureş	
			I.N	d.c. I.A	I.N	d.c. I.A	I.N	d.c. I.A	I.N	d.c. I.A	I.N	d.c. I.A
2000	78,0	78,90	72,9	90,70	69,9	76,20	90,3	71,43	80,9	78,14	79,6	79,01
2001	77,8	86,12	75,4	88,60	84,2	86,20	84,4	75,76	77,0	89,54	77,8	86,13
2002	85,9	81,20	87,9	79,21	88,9	84,68	88,0	75,44	83,4	75,60	84,3	81,20
2003	86,6	85,78	84,5	83,40	90,8	91,59	87,7	84,02	80,8	85,97	89,6	85,78
2004	85,0	89,76	87,8	90,60	87,6	96,00	84,3	84,99	83,5	85,91	83,1	89,76
2005	87,6	95,08	84,3	98,80	89,6	100	91,7	90,84	85,5	91,94	88,2	95,08
2006	86,8	97,48	81,6	98,80	93,7	99,50	85,5	95,15	84,1	96,74	87,6	97,48
2007	93,9	98,21	86,4	99,52	93,1	100	97,0	96,83	88,9	96,65	94,4	98,21
2008	88,7	99,44	90,3	99,00	91,1	100	96,7	98,33	85,4	100	86,5	99,44

- I.N. – birth index; I.A. of total cattle obtained in I.A.

After Suba K.-USAMV Cluj-2010-Doctoral Thesis

3. CONCLUSIONS

IA activity operating since 1997 as a private service.

To make genetic progress must increase the number of cows artificially inseminated, IA also authorize the young bulls, tested at 100 days with high breeding values (SG 125). This leads to accelerate genetic progress.

In countries with good results in IA this activity takes place in the Breeders associations but held that:

- Operators IA - grouped breeding organizations and IA ;
- Contract staff (veterinarians, engineers, others);
- Breeders ;
- Units of breeding and AI (Semtest units which are partners of those who made artificial insemination) ;

Activity of the IA is involved in this service - operators as well as breeding and AI units (Semtest) that can offer bundled services - semen frozen cryogenic agent, materials, distribution as well as technical support, consulting and training.

Cattle Breeders is the direct beneficiary.

Association is to improve the program coordinator, is not directly involved in the service of AI.

It is a private activity, the state is involved only part of the breeding program and in the monitoring (the inspection) rules by all the organizations involved.

IA operator is authorized by an accredited school (Dej, Ploiesti, etc..) And no longer need annual accreditation by ANARZ - OARZ.

The units of production - distribution of frozen semen (Semtest or deposits) is a partnership contract with those who do IA work and they manage the database of artificial insemination.

Participation Semtest units, the deposits of semen to achieve improvement program must be obvious, to have direct input, you can not be the only seller of semen without any responsibility.

REFERENCES

1. *Bogdan, A.T.* , 1981, Reproducția animalelor de fermă. Editura Scrisul Românesc, p.788.
2. *Bud, I., Velea, C., Bogdan, A., Mureşan Gh., Marcu, N.,* 1985, Unele aspecte ale comportamentului taurinelor de reproducție. Seminarul Tehnologia, Reproducția şi patologia animalelor de fermă. Inst. Agronomic, Cluj-Napoca.
3. *Mărginean Gh, Sonea, A., 1994,* Factorii de influență a estimării valorii de ameliorare pentru exterior. Simp. Șt. Naț. „Dezv. zootehniei – o certitudine pentru viitor" – Iași.
4. *Mărginean Gh, Stoica, A., Sonea, A., Tăpăloagă, P., 1995,* Cercetări cu privire la determinarea factorilor de influență asupra estimării valorii de ameliorare pentru exterior la taurine. Probleme actuale ale tehnologiei producerii producției la animale, Maxinovca, Republica Moldova.
5. *Velea, C., Mărgineanu, Gh., 2004,* Producția, reproducția şi ameliorarea taurinelor. Ed. Tehnică Agricolă București, vol III.
6. *Suba,I.K. 2010,* Cercetari privind sistemul de ameliorare si tehnologia de exploatare a taurinelor in conditiile geoclimatice ale judetului Mures-Sustinuta public U.S.A.M.V.-Cluj
7. *** *ANARZ* – Controlul oficial al producțiilor în România, 2000-2008.
8. *** Strategia dezvoltării agriculturii, industriei alimentare şi silviculturii, 2001-2006, MAAP București.

This work was cofinanced from the European Social Fund through Sectoral Operational Programme Human Resources Development 2007-2013, project number POSDRU/89/1.5/S/63258 "Postdoctoral school for zootechnical biodiversity and food biotehnology based on the eco-economy and the bio-economy required by eco-san-genesys".

VALUES OF THE MAIN HAEMATOLOGICAL PARAMETERS AT WILD BOARS HUNTED IN THE N – E PART OF ROMANIA

POSTOLACHE ALINA NARCISA, LAZĂR ROXANA,
BOIŞTEANU P. C, IVANCIA MIHAELA
University of Agricultural Sciences and Veterinary Medicine "Ion Ionescu de la Brad" Iasi
narcisa842003@gmail.com

Key words: haematological profile, wild boar

SUMMARY

The measures of the haematological parameters are arguments in determining the physiological and health status of this studied specie, while taking into consideration the characteristic aspects of the game.

To determine the haematological profile, the blood samples were collected from a total number of 19 wild boars (Sus scrofa ferus), apparently healthy, aged between 3 and 5 years old with a body weight that varied between 98 and 145 kg.

The values of the main haematological parameters analyzed: HCT (haematocrit), HGB (haemoglobin), MCH (mean corpuscular haemoglobin), MCHC (mean corpuscular haemoglobin concentration), MCV (mean corpuscular volume), RBC (total number of red blood cells), WBC (total number of white blood cells) and PLT (number of blood palettes) varied within an interval, specific and characteristic of this specie and habitat conditions from Romania.

In the contemporary world, promoting the game activity is a preoccupation with an expansiveness and continuing concern, both in terms of its preservation, protection and consumption of such meat. Both alternatives are directly dependent on health status, default and haematological profile of the animal.

This paper is part of a broader study aimed at characterizing the differences between a number of analyzed parameters in boar's vs. domestic pigs, which argues the quality of meat obtained from this two species and physiological status of the animals.

Thus, the main objective of this research was to determine haematological blood parameters of the animals; the parameters can be important in assessing the influence of habitat quality (climate, nutrition, population density), season and the game gender (*Sus scrofa ferus*) from the specific study area.

1. MATERIAL AND METHODS

As biological material we used a total number of 19 wild boars (*Sus scrofa ferus*), extracted by shooting from the hunting grounds, geographically located in the N - E part of Romania. In the hunting methods were used to have ruled out the existence of a major stress on the animals. Blood collection was performed from the aorta vein during the first 10 minutes post-mortem.

The measurements were made with the haematological analyzer – ABX Micros VET ABC. The examination of the blood cellular components was carried out on a biological material collected in vacuum tubes, with the help of Monovette – S system, anticoagulant substrate (EDTA); the sample volume required for a CBS (complete blood count) was 1 mL.

For the transport of the samples to laboratory for conducting the tests, it took 5 hours. The registered values were compared with data given in the literature.

Statistical data processing was done in Excel, using ANOVA unifactorial dispersion analysis. The model of compare included the effect of gender on differences between the haematological studied parameters.

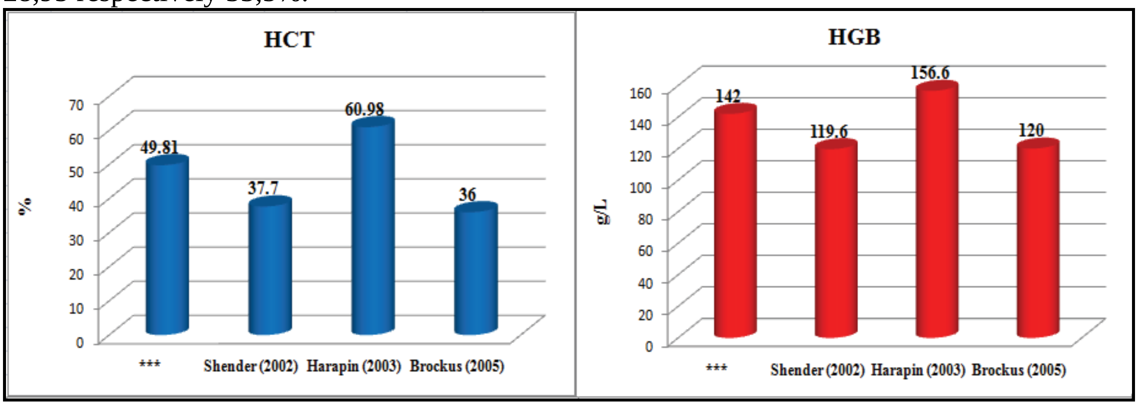
2. RESULTS AND DISCUSSIONS

The examination of the haematological blood parameters showed an insignificant variation between the sexes (P > 0,05).The obtained values for the erythrocyte, leukocyte and platelets series are presented in table 1 and their comparative representation in figures 1 – 4.

The values of haematological parameters showed their variation in a reference range, described in literature. By comparison with physiological values of wild boars that leaving in different areas, described by various authors, the values of haematological parameters had a oscillation in a large range, from one animal to another, those values describing the normal physiological status of animal health.

Overall, for all hematologic analyzed indices was observed the superiority of female to male values.

The values obtained for HCT, HGB (Figure 1), MCV and RBC (Figure 2), places these parameters of the erythrocyte series within the intermediary sphere of reference values, specific to this specie, while MCH and MCHC (Figure 3) quantitatively describe the lower limits of these parameters. The values obtained in this study for the last two mention indices are lower than those obtained by Brockus (2005) – 19,7 vs. 21 pg and 28,95 respectively 33,5%.



*** haematological values from current research

Figure 1. – Graphical representation of comparative values for HCT and HGB erythrocyte series at wild boars

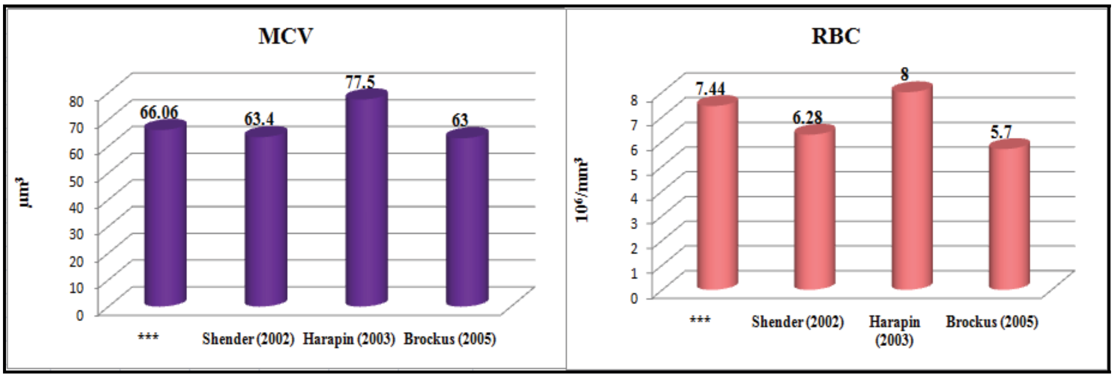
Table 1

Blood values in feral pigs (*Sus scrofa ferus*) harvested by shooting and domestic pigs, compared with those in literature

Studied parameter	*Sus scrofa ferus**** $\overline{x} \pm s_{\overline{x}}$ (Min. – Max.)		References: *Sus scrofa*** $\overline{X}$ (Min. – Max.)	References: *Sus domesticus** (Min. – Max.)	
	♂	♀	♂; ♀	♂; ♀ [c]	♂; ♀ [d]
HCT (%)	45,81±4,96 31,1 – 58,2	52,47±3,82 36,1 – 69,3	60,98 (55,4 – 69,4) [a] 37,7 (13,4 – 46) [b] 36 (22 – 50) [c]	–	36 – 43
HGB (g/L)	131,1±1,38 91 – 165	152,8±1,04 107 – 183	156,6 (123 – 183) [a] 119,6 (41 – 146) [b] 120 (78 – 162) [c]	100 – 170	90 – 130
MCH (pg)	18,75±0,39 17 – 19,9	19,4±0,30 18,3 – 21,1	19 (14,8 – 22,8) [b] 21 (18 – 24) [c]	18 – 22	17 - 24
MCHC (%)	28,71±0,29 27,6 – 29,6	29,2±0,493 26,4 – 30,7	31,2 (22,6 – 35,2) [b] 33,5 (31 – 36) [c]	34 – 380	29 – 34
MCV (μm^3)	65,5±0,95 62 – 68	66,62±0,73 64 – 70	77,5 (70 – 86) [a] 63,4 (36 – 79) [b] 63,0 (55 – 71) [c]	52 – 63	52 – 62
RBC ($10^6/mm^3$)	7,00±0,71 4,9 – 8,73	7,87±0,53 5,45 – 9,97	8 (6,87 – 9,03) [a] 6,28 (2,2 – 9,2) [b] 5,7 (3,6 – 7,8) [c]	5,1 – 8	5 – 7
WBC ($10^3/mm^3$)	8,7±1,79 3,1 – 15,4	10,01±1,4 4,5 – 14,3	15,7 (2,4 – 40,2) [b] 11,5 (5,2 – 17,9) [c] 9,79 (6,0 – 20,35) [a]	10,6 – 24,0	11 – 22
PLT ($10^3/mm^3$)	176,5±21,93 85 – 226	279,5±66,16 117 – 710	310 (204 – 518) [c]	–	200 – 500

*** = values for haematological parameters analyzed in the current research
** = reference values of haematological parameters specify by literature
* = reference range values of haematological parameters
a - Harapin (2003); **b** - Shender (2002); **c** - Brockus (2005): **d** – Merck (2006);

Harapin (2003) shows that slightly higher number of total erythrocytes, haemoglobin and haematocrit may indicate hem concentration, which is closely related to nutritional deficiencies from the diet and to the handling of feral animals, the default level of stress they were subjected before hunting.

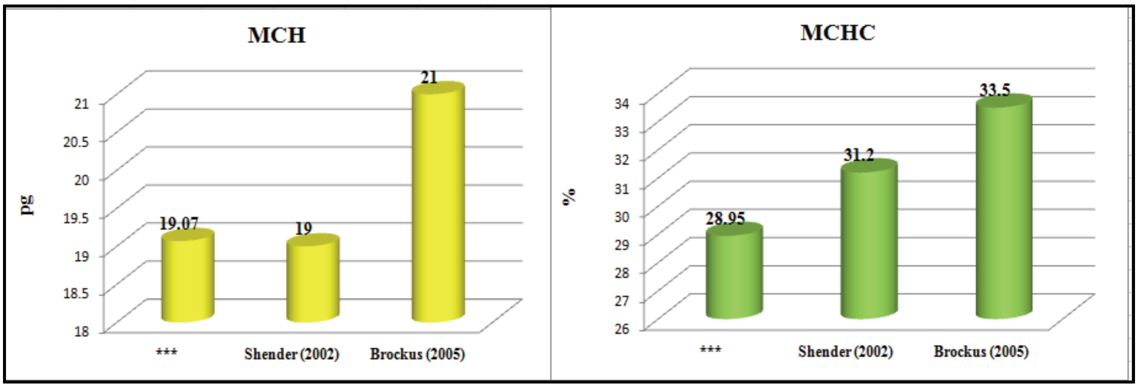


*** haematological values from current research

Figure 2 – Graphical representation of comparative values for MCV and RBC erythrocyte series at wild boars

The mean value for MCV (66.06 μm^3), attributed to blood samples collected from those 19 individuals wild boar, show a slight superiority to those raised by Shender (2002) and Brockus (2005), the difference between the average being about 3 μm^3.

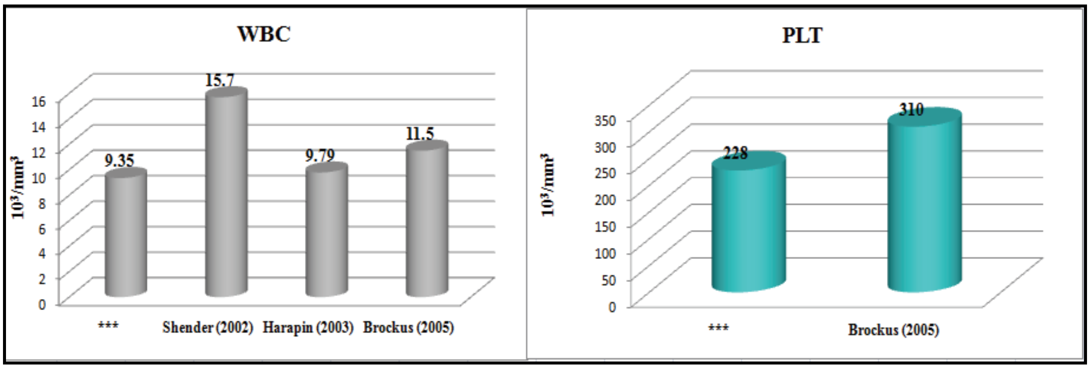
For RBC, the current average of 7.44 x 10^6/mm^3 is positioned at a difference of 0.56 x 10^6/mm^3 to the average value revealed by Harapin (2003).



*** haematological values from current research

Figure 3 - Graphical representation of comparative values for MCH and MCHC erythrocyte series at wild boar

The parameter from leukocyte series (WBC) and also the total number of blood platelets describe the intermediary and normal values of the physiological status, according to comparative literature.



*** haematological values from current research
Figure 4 – Graphical representation of comparative values for WBC and PLT at wild boar

3. CONCLUSIONS

Comparing the obtained haematological values with those described in the literature has revealed no major differences on quantitative variations for haematological indicators studied.

All data indicate the need for further research, more detailed, regarding the influence of the specific local habitat conditions on the physiological status of feral boars from N – E part of Romania

REFERENCES

1. *Brockus C. W., Mahaffey E. A., Bush S. E., KruppDespain W.,* **(**2005). Hematological and serum biochemical reference intervals for Vietnamese potbellied pigs (Sus scrofa). Comp. Clin. Path., vol. 13, pp. 162 – 165.
2. *Gono Semiadi , Raden Taufiq Purna Nugra***,** (2009). Some notes on biological aspects of captive javan warty pig (Sus verrucosus). Biodiversitas, vol. 10 (3), pp. 124 – 128., ISSN: 2085-4722
3. *Harapin I., bedrica L., Hahn V., Šoštarić B., Gračner D.,* (2003). Haematological and biochemical values in blood of wild boar (Sus scrofa ferus). Veterinarski Arhiv, vol. 73(6), pp. 333 – 343.
4. *Merck* (2006). The Merck Veterinary Manual. Merck & Co.,Inc. http://www.merckvetmanual.com/mvm/index.jsp?cfile=htm/bc/ref_00. htm. 10/02/2006. Diunduh 27 Juni 2008.
5. *Shender L. A., Botzler R. G., Luke George T.,* (2002). Analysis of serum and whole blood values in relation to helminth and ectoparasite infections of feral pigs in Texas. Journal of Wildlife Diseases, vol. 38(2), pp. 385 – 394.

THE IMPORTANCE OF SANITARY PREVENTION DURING OOCYTE COLLECTION CONCERNING THEIR QUALITY FOR SWINE EMBRYO *IN VITRO* PRODUCTION

ZĂHAN MARIUS, VASILE MICLEA, IULIAN ROMAN,
ILEANA MICLEA, ANDREA HETTIG, ADRIANA CRISTE

Key words: sanitation, oocytes, *in vitro* production, swine

SUMMARY

The aim of this study was to establish the influence of ovary and oocyte collection on the quality of follicular oocytes used for *in vitro* embryo production (IVP). In order to this, the preventive treatments were kanamycin adding to the transport medium and ovary disinfection using immersion in ethanol and repeated washing before oocytes collection. Considering that preventive sanitary measures may have important effects, depending on the oocyte collection method, we used two methods: repeated dissection of ovary cortical (slicing) and follicle aspiration. Our results indicated the importance of using kanamycin and ethanol ovary washing in reducing CFU/ml from oocyte collection medium. These results are significantly better in the case of follicle aspiration in comparison with the ovary slicing method.

According to Bielanski (1998), Nibart et al., (1998) and Thibier (2004), in the case of embryo *in vitro* production one of the main biohazard concerning embryos is the donor female and the collection method of gonads/gametes, followed by *in vitro* maturation (IVM), *in vitro* fertilization (IVF) and embryo *in vitro* development. In embryo *in vitro* production (IVP) the factors of paternal origin have at least the same importance as those of maternal origin (Brock, 1998). Therefore the decisions are obvious concerning gamete collection and preparation methods that influence not only the embryo development by molecular and cellular mechanisms, but also their sanitary quality ,being well known the fact that gametes may represent vectors in embryo contamination (Stringfellow and Wrathall, 1995; Guerin et al., 1997). Quality control measures in an IVP embryo program destined to embryo transfer are important components in the risk of spreading transmissible diseases (Schiewe et al., 1990; Wrathall, 1995; Cameron et al., 1989; Evans, 1998; Le Tallec et al., 2001).

1. MATERIAL AND METHODS

The ovaries were collected from prepubere gilts (90-100 kg) slaughtered at two local slaughter houses. Transportation medium of ovary was a saline solution (0.9% NaCl). Depending on the experimental trial (with or without sanitary treatments) the medium was supplied with 100 mg/l kanamycin too (Biochrom AG, A2512). For ovary disinfection we used ethylic alcohol of 70% followed by washing with phosphate buffer saline solution (PBS). Oocyte collection medium was TCM 199 (Tissue Culture Medium 199 with Hepes and Earle’s salt; SIGMA, M 0650). To this medium we added bovine serum albumin 0.4 mg/ml (Sigma, B 4287) and heparin 10 µl/ml (Braun, 500I.E./ml). The dilution of biological samples (collection and transport mediums) was made in buffered peptone water. We used nutritive agar as culture medium for micro-organisms. CFU dyeing was made with Crystal violet and Fuxin, acetone-alcohol and Lugol solution.

The ovaries were collected in the slaughter house and introduced in the transportation media according to the experimental plan. In order to prevent the influence factors concerning donor females, the right ovary (but not the left-) from each animal was subjected to sanitary treatment. Ovary transportation from the slaughter house to the lab was made in 2 hours in a 37^{o} C saline solution. At the lab, the ovaries were cleaned and according to the experimental plan, a few of them were subjected to a disinfection treatment. The ovaries were immersed in 70% Etilic alcohol for 10 seconds and were washed twice by sterile PBS for 10 seconds.

For the oocytes collection we used two methods. For the first method nonatretic follicles from 2 to 5 mm were aspirated using a 22 gauge needle attached to a 2 ml syringe. The second method was slicing, the ovarian cortical was repeatedly dissected at an approximate width of 2-3 mm, with a distance of 1-2 mm between them.

In order to determine the microbiological contamination quantitatively, the transportation medium was homogenized, then 10 ml of it was taken into a sterile recipient for further use at inoculation and decimal dilutions with buffered peptone water (decimal dilutions between 10^{-2} – 10^{-4}). The same procedure was applied in the case of oocyte collection medium. After insemination on agar, the Petri plates were incubated for 48-72 hours at 37^{o}C. The number of colony forming units is multiplied with the dilution factor, the result being presented in CFU/ml transport medium/collection. Studying morphologic and tinctorial characters of the micro-organisms in microbiological cultures, we made smears that were dried, fixed and coloured by Gram method.

For evaluating the efficiency of oocyte collection methods we took into consideration the total number of oocytes obtained per ovary as well as the number of quality oocytes resulted after selection for *in vitro* maturation. At microscopic analyses we had in view the general aspect of cumulus-oocyte-complex (COC), the zona pellucida and ovoplasm aspect. The results were statistically interpreted using GraphPadInStat soft.

2. RESULTS AND DISCUSSIONS

For each and every experimental trial we made 5 repetitions working on a total of **80** ovaries. The quantitative analyze results concerning the number of germs on the transport and collection media for the four experimental trials can be found in the table 1. The results have shown the fact that using kanamycin in the ovary transport medium reduces the average number of CFU/ml with approximately three times by Turkey-Kramer test; the differences being very important statistically speaking ($P<0.001$). Though it's difficult to establish the exact potential of microbiologic contamination of the ovaries in the transport medium, theoretically speaking and taking into consideration the experimental conditions from above (CFU average x medium volume / ovary number), we concluded that on every ovary from the transport medium develops approximately 238,000 CFU in the absence of kanamycin and 80,500 CFU in the case of its presence. Under these circumstances the preventive measures of microbial contamination of female biologic material may include the use of antibiotics and a high dilution factor in the case of ovary transport.

Table 1

Microbiological contamination of transport and collection media

Experimental trial			CFU/ml ($\bar{x} \pm s_{\bar{x}}$)*	
code	**treatments**	**Method**	**transport medium**	**collection medium**
E1	-	Aspiration	3812.6 ± 616.82	93.2 ± 3.68[ab]
E2	-	Slicing		246 ± 19.24
E3	+	Aspiration	1290.8 ± 59.11[a]	45.2 ± 4.22[b]
E4	+	Slicing		129.8 ± 22.15[a]

*The differences between any trials followed by at least one common letter are insignificant

Concerning the quantitative analyze of the number of germs found in the collection media, we can notice a difference between the technical trials that did not have preventive sanitary treatments (E1 and E2) and those that did have these treatments (E3 and E4). The values of microbial contamination were double in the absence of these treatments for both technical trials of oocyte collection in the comparison with the experimental trials where these procedures were present.

On the basis of cultural and morphological characteristic in the transport media of ovaries we identified bacteria from *Staphylococcus spp*., *Micrococcus spp*. and *Bacillus spp*., and in the oocyte collection media *Staphylococcus spp*., *Micrococcus spp*. and *Pseudomonas spp.*

The collection method has an important aspect too: follicle aspiration gives a number of CFU/medium for almost three times bigger than in the case of slicing; no matter if the preventive sanitary measures are present or not. In the problem of hygienic conditions used for oocyte collection, the follicle aspiration method is a preventive sanitary measure in the IVP process of the embryos.

In the case of preventive sanitary measures applied to the oocytes and the follicle aspiration method (E3) we noticed important differences (P<0.001) concerning the reducing of CFU number/ml collection medium, in comparison with the other 3 experimental trials.

The quality of collected oocytes mostly depends on the collection method, therefore in the case of aspiration method (experimental trials E1 and E3) we obtained percentages of 80.51 ± 2.42 ($\bar{X} \pm s_{\bar{X}}$) respectively 79.76 ± 1.89 ($\bar{X} \pm s_{\bar{X}}$), while after collection using repeated corticle dissection (experimental trials E2 and E4) the quality oocyte procentage was only of 42.65 ± 2.34 ($\bar{X} \pm s_{\bar{X}}$), respectively 41.24 ± 4.82 ($\bar{X} \pm s_{\bar{X}}$).

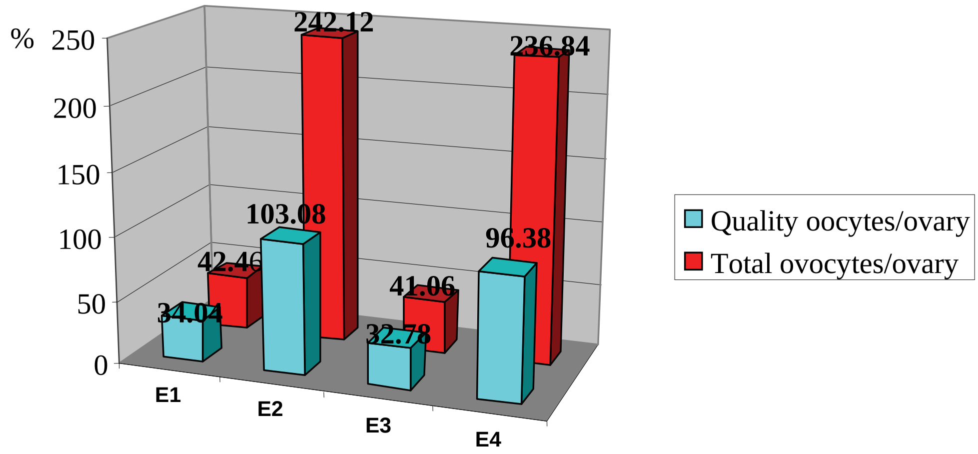


Fig. 1. Efficiency of ovary/oocyte collection rate

In the case of the collection method that uses repeated corticle dissection these values reveal the great number of oocytes that qualitatively do not correspond to a PIV embryo programme making the evaluation process difficult. Beside the great number of COC, the evaluation is more difficult due to the presence of a great quantity of cells in the collection medium and therefore the oocyte selection needs more time. This fact has negative effects on *in vitro* mauration succes by the increasing the action of stress factors during evaluation.

Correlating the microbiological results with the efficiancy of oocyte collection methods offers a compex and useful picture in approaching this stage of PIV at swine embrios. So one can see that using the collection method that repeatedly dissects the ovarian corticle it can be obtained a greater number of oocytes but in a high procentage qualitatively inferior and with an increased microbial contamination rate even when preventive sanitary treatments are applied. On the other hand, in the case of aspiratory collection by punction a smaller number of oocytes is obtained but the procentage of a superior quality is greater and the microbial contamination rate is decreased, a fact that reccomands the use of this method along with preventive sanitary measures.

3. CONCLUSIONS

The study of swine ovary extraction and oocyte collection conditions led to the following conclusions:

- preventive measures of microbial contamination at females may include the use of kanamicin in the medium and a high dilution factor for ovary transport;
- the use of kanamycin in ovary transport medium reduces at about three times the average number of CFU/ml the differences being very important from a statistic point of view ($P<0.001$);

- in both cases of oocyte collection method the average number of CFU/ml collection medium was twice smaller when the preventive sanitary treatments were applied on ovaries; applying sanitary treatments and using aspiratory punction collection methodreduces very significantly (P<0.001) the average number of CFU/ml collection medium in comparison with all the other three experimental trials;
- aspiratory punction technique represents a preventive sanitary measure too for embryo PIV process;
- between the aspiratory punction technique and repeated corticle dissection there were obtained very important differences (P<0.001) concerning collection rate in the case of total oocytes as well as in the case of quality ones;
- quality of collected oocytes mostly depends on the collection technique with values between 79.7 - 805% in the case of aspiratory punction method and only 41.2 – 42.6% in the case of repeated corticle dissection;
- correlating microbiological results with the efficiancy of oocyte collection methods indicates the fact that applying preventive sanitary measures and aspiratory punction method leads to obtaining a smaller number of oocytes with a high percentage of superior quality and a lower rate of microbial contamination.

Acknowledgements. This research was cofinanced by CNMP project no. 51-081/2007, by CNCSIS project no. 1081/2009 and by ESF project no. POSDRU/89/1.5/S/63258.

REFERENCES

1. *Bielanski A*., 1998, Potential for disease control or transmission by embryos produced in vitro: a review of current literature. In: Stringfellow DA, Seidel SM (eds), Manual of the International Embryo Transfer Society, 3rd edition. Savoy, IL: IETS, 45-53.
2. *Brock K.*, 1998, Quality control for materials of animal origin used in embryo production and transfer. In: Stringfellow DA, Seidel SM (eds), Manual of the International Transfer Society, 3rd edition. Savoy, IL: IETS, 135-140.
3. *Cameron R.D.A., M. Durack, R. Fogarty, D.K.H. Putra, J. McVeigh,* 1989, Practical experience with commercial embryo transfer in pigs. Australian Veterinary Journal 66(10):314-318.
4. *Evans B.*, 1998, Practical and ethical considerations for the international marketing of embryos. In: Stringfellow DA, Seidel SM (eds), Manual of the International Embryo Transfer Society, 3rd edition. Savoy, IL: IETS, 7-15.
5. *Guerin B., Nibart M., Marquant-Le Guienne B., Humblot P.,* 1997, Sanitary risks related to embryo transfer in domestic species. Theriogenology 47:33-42.
6. *Le Tallec B., C. Ponsart, Brigitte Marquuante-Le Guienne, B. Guerin*, 2001, Risks of transmissible diseases in relation to embryo transfer. Reprod. Nutr. Dev., 41, 439-450.
7. *Nibart M., Marquant-Le Guienne B., Humblot P.,* 1998, General sanitary procedures associated with in-vitro production of embryos. In: Stringfellow DA, Seidel SM (eds), Manual of the International Embryo Transfer Society, 3rd edition. Savoy, IL: IETS, 1998;67-77.
8. *Riddell K., D., Stringfellow,* 1998, The use of antibiotics in media for recovery, culture, and storage of embryos. In: Stringfellow DA, Seidel SM (eds), Manual of the International Embryo Transfer Society, 3rd edition. Savoy, IL: IETS, 85-91.
9. *Schiewe M.C., P.M. Schmidt, D.E. Wildt, W.F. Rall,* 1990, Quality Control Measures in an Embryo Research Program. Theriogenology, 33, 9-22.
10. *Stringfellow D.A., A.E. Wrathall,* 1995, Epidemiological implications of the production and transfer of IVF embryos. Theriogenology 43(1):89-96.

11. *Thibier M.,* 2004, Reproductive biotechnologies and risks of disease spreading. International Society for Animal Hygiene – Saint-Malo, 111-116.
12. *Wrathall A.E.,* 1995, Embryo transfer and disease transmission in livestock: A review of recent research. Theriogenology 43(1):81-88.

The 39th International Session of Scientific Communications of the Faculty of Animal Science, Bucharest, Romania
Scientific papers (seria D; vol. LIII) – Animal Science

RESEARCHES REGARDING THE REPRODUCTION ACTIVITY IN SWINE IN S.C. ILYA AGRO SRL

TĂPĂLOAGĂ PAUL RODIAN*, RĂDUCUȚĂ ION*, TĂPĂLOAGĂ DANA**, NEAGU IULIANA**, PARASCHIVESCU MARCEL THEODOR****, CHISA EUGEN***, IANCU ALEXANDRU*****, GOGA IONUT CONSTANTIN*****
Faculty of Animal Sciences Bucharest*, Faculty of Veterinary Medicine Bucharest**, Dragomireşti Vale Agroindustrial Highschool***, CSCBAS-INCE-Romanian Academy****, SC ILYA AGRO SRL*****

Key words: reproduction, swine, reproduction indices

SUMMARY

The present paper reveals the female reproduction activity, the reproduction indices, more exactly, obtained in sows and gilts reared in S.C. ILYA AGRO SRL unit. The observations were made upon 100 females, sows and gilts. There were calculated the number of insemination per one gestation, the length of pregnancy, the prolificacy, the suckling period, the service-period and the calving-interval. There were carried out statistical calculations and there were presented graphs and tables. The observations were made upon 100 females, sows and gilts. It was concluded upon the reproduction management in this unit.

Animal livestock supplying, their morph productive features and also the obtaining of some efficient yields from the economic point of view could be established only by the normal development of the reproduction activity. In our country, the field of pig rearing and capitalization is continuously raising, this being necessary more and more qualitative and quantitative productions. To obtain the wished results it is absolutely necessary the choosing of the reproducers and also the permanent monitoring of the reproduction activities.

1. MATERIAL AND METHOD

The biologic material researched in the present paper was represented by health animals with non infectious diseases, with a good status from the zoo technical point of view, raised in S.C. ILYAAGRO SRL. There were calculated the following reproduction indices:

- Number of insemination per one pregnancy;
- Length of pregnancy;
- prolificacy;
- suckling period;
- service-period;
- Calving-interval.

There were carried out statistical calculations and there were presented graphs and tables. The observations were made upon 100 females, sows and gilts.

2. RESULTS AND DISCUSSIONS

In table 1 it was shown the number of necessary inseminations per obtaining one pregnancy. It is noticed that there were used 1, 98 doses/pregnancy, at first pregnancy and 2, 31 doses/pregnancy at the second one. Starting with the third pregnancy, the doses consumption decreases to 1, 49 doses/pregnancy,, respective 1,10 doses/pregnancy, at the fourth pregnancy..

The average of the seminal material consumption for the all fourth pregnancies is 1, 70 doses/pregnancy. Starting with the second pregnancy, the sows in heat were more careful taken in observation, the insemination was made in the optimum moment so it leads to the decreasing of the seminal material consumption.

Table 1

Number of inseminations per one pregnancy

No.	Average and its error	Standard deviation	Variability coefficient
Pregnancy 1	1.98 +/- 0.15	1.53	77.47
Pregnancy 2	2.31 +/- 0.16	1.56	67.74
Pregnancy 3	1.49 +/- 0.58	1.16	78.08
Pregnancy 4	1.10 +/- 0.17	0.33	30.30
Average	1.70 +/- 0.26	1.14	69.39

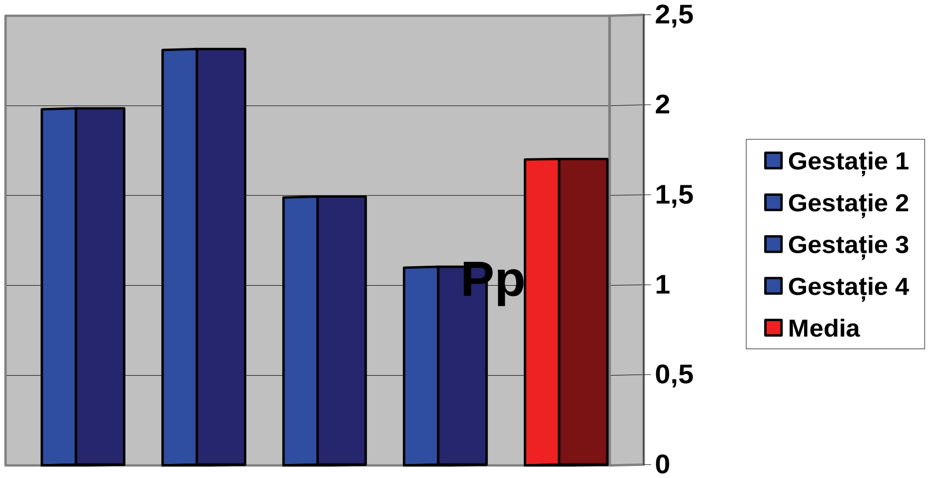


Fig. 1. Number of inseminations per one pregnancy

In table 2 it was presented the length of pregnancy on 100 sows, during four pregnancies. It may notice that the length of the first pregnancy is almost 114, 37 days. Analyzing the second pregnancy, it may notice the decreasing of the mean value at 113, 92 days and starting with the third pregnancy, it appears a continuous increasing to the fourth pregnancy 114, 22 and 114, 60 at the fourth pregnancy. The average value for all the analyzed pregnancies is 114,27 days, this value being considered a normal value for this index, so the analyzed livestock does not record reproductive problems.

Table 2

Average length of pregnancy

No.	Average and its error	Standard deviation	Variability coefficient
Pregnancy 1	114.37 + /- 0.13	1.32	1.16
Pregnancy 2	113.92 +/- 0.18	1.80	1.58
Pregnancy 3	114.22 +/- 0.00	0.13	0.12
Pregnancy 4	114.60 +/- 0.00	0.09	0.08
Average	114.27 +/- 0,07	0.83	0.73

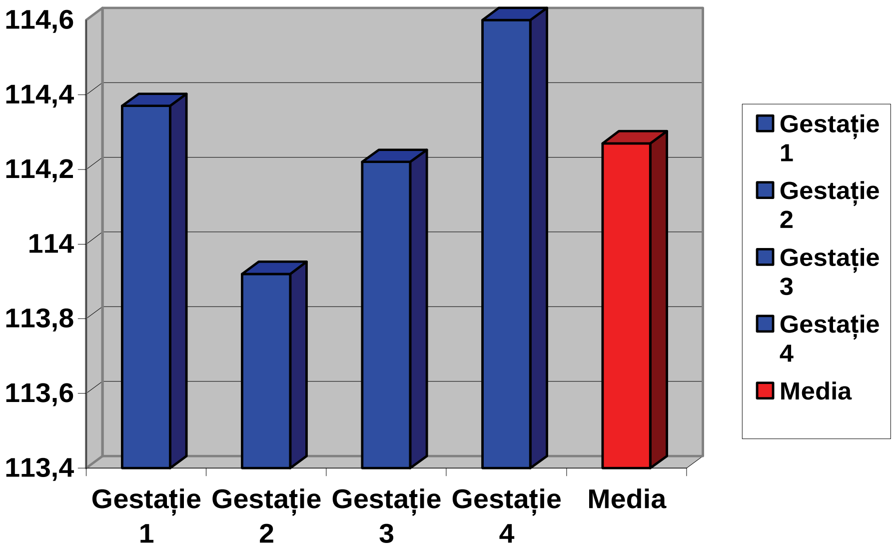


Fig. 2. Average length of pregnancy

The prolificacy is calculated as the ratio between the total number of individuals obtained at a calving and the total number of mothers. In table 3 it is presented the value of this index during the fourth pregnancies. The total number of piglets at the first calving is 9.23, and 10.55 at the second one. At the third pregnancy it is recorded an easy decreasing, it being 9.60, and at the fourth is 10.10. The average number of piglets obtained from the 100 sows during the four analyzed pregnancies is 9.87.

Table 3

Sows prolificacy

No.	Average and its error			Standard deviation	Variability coefficient
Pregnancy 1	9.23	+/-	0.14	1.45	15.69
Pregnancy 2	10.55	+/-	0.18	1.75	16.63
Pregnancy 3	9.60	+/-	0.17	1.66	17.27
Pregnancy 4	10.10	+/-	0.17	1.86	18.42
Average	9.87	+/-	0.28	1.68	17.00

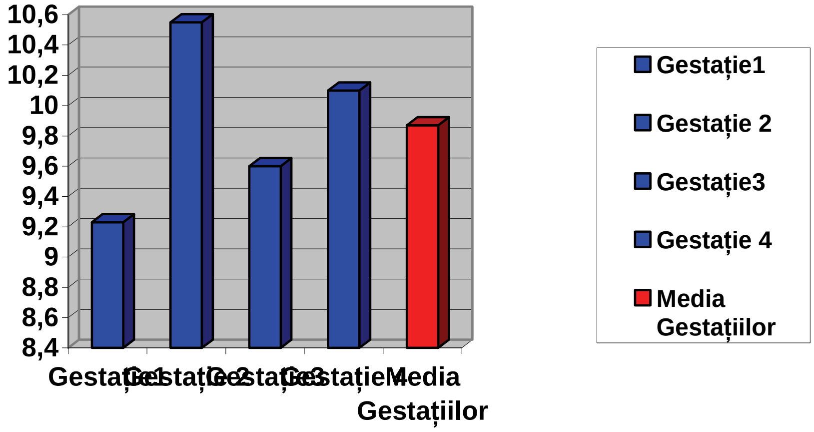


Fig. 3. Prolificacy

In table 4 it was analyzed the suckling period during the four pregnancies in 100 sows. It was noticed that after the first pregnancy, the suckling period is two days higher than the rest of the analyzed period, respective 29.52 days. Starting with the second pregnancy, this period decreases to 25.79 days and after this it increases to 27.02 at the third period and 28.56 days at the fourth one. The average value for the whole livestock is 27.72 days, the difference between the first and the second period being the forage.

In table 5 it was analyzed the length of the service-period in the 100 studied sows. It is noticed that at the first gestation, the length of the service-period is 35.15 days, at the second one it records the lowest value 31.49 days, at the third pregnancy it is recorded an average value of 36.30 days and at the last one it decreases at 35.08 days. The mean value of the service-period for the whole livestock is 34.58 days.

Table 4

The average length of the suckling period

No.	Average and its error			Standard deviation	Variability coefficient
Suckling period 1	29.52	+/-	0.60	5.99	20.31
Suckling period 2	25.79	+/-	0.40	4.05	15.69
Suckling period 3	27.02	+/-	0.06	1.92	7.11
Suckling period 4	28.56	+/-	0.05	1.27	4.46
Average value	27.72	+/-	0.27	3.30	11.89

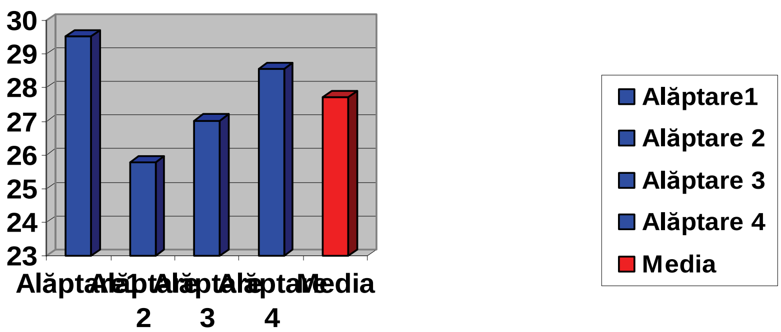


Fig. 4. The average length of the suckling period

Table 5

The average length of the service-period

No.	Average and its error			Standard deviation	Variability coefficient
Pregnancy 1	35.15	+/-	0.87	8.68	24.68
Pregnancy 2	31.49	+/-	0.55	5.50	17.47
Pregnancy 3	36.60	+/-	0.09	3.48	9.51
Pregnancy 4	35.08	+/-	0.06	2.02	5.76
Average	34.58	+/-	0.39	4.92	14.35

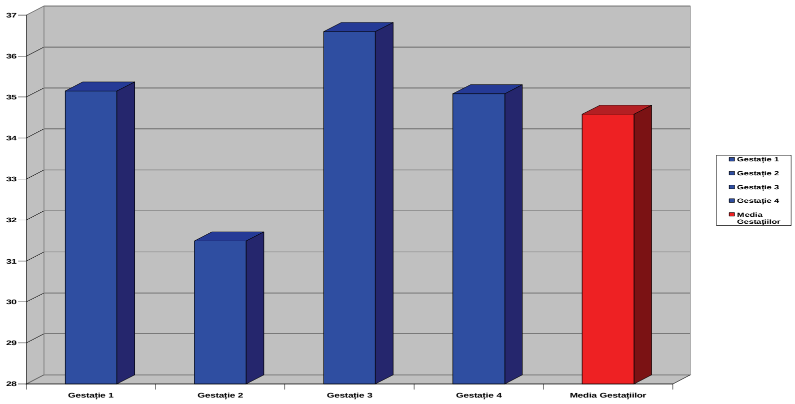


Fig. 5. The average length of the service-period

In table 6 it was presented the average length of calving interval, on the 100 studied sows and four pregnancies. It is noticed that the first interval has the highest value, respective 182.34 days, then it decreases to 162.63 days. In the third interval it is recorded the lowest value, 153.83 days and after this an increasing to 168.02 days. The average length of the service-period for the whole livestock is 166.70 days.

Table 6

The average length of calving interval

No.	Average and its error	Standard deviation	Variability coefficient
Interval 1	182.34 +/- 18.75	187.46	102.81
Interval 2	162.63 +/- 16.89	168.91	103.86
Interval 3	153.83 +/- 0.71	157.20	102.19
Interval 4	168.02 +/- 1.23	174.99	104.15
Average value	166.70 +/ 9.39	172.14	103.25

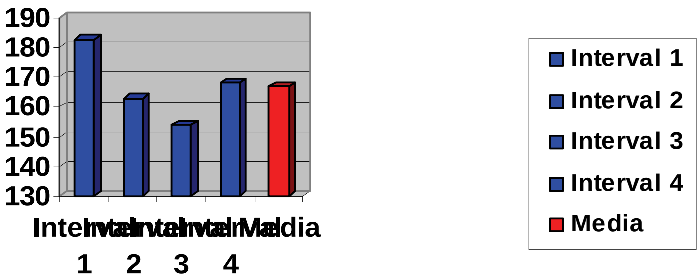


Fig. 6. The average length of calving interval

3. CONCLUSIONS

After the researches during all our studies it may conclude the following:

3.1. Regarding the number of inseminations per obtaining one pregnancy it was obtained a mean value of 1,7.

3.2. The length of the pregnancy is recorded as a mean value of 114,27 days, being a normal value, so the analyzed livestock have no reproductive disorders.

3.3. The mean value for the prolificacy was 9,87 piglets.

3.4. The suckling period had a mean value of 27,72 days, the differences between recordings were due to the administered forage.

3.5. The mean value for the 100 analyzed sows of the studied service- period was 34,58 days.

3.6. The mean value for the calving interval recorded during the four pregnancies was 166,70 days for the whole livestock.

REFERENCES

1. *Bogdan A.T. şi col.* - "Tratat de reproducție şi însămânțări artificiale", Ed. Tehnica Agricolă 1999;
2. *Dinu I.* şi col. - "Suinicultură", Ed. Coral Sanivet Bucuresti 2002.
3. *Feredean T.* - "Reproducția la porcine", Ed. Ceres, Bucureşti 1974;
4. *Liciu Gh., Roşca O.* - "Însămânțarea artificială la porcine", Ed. Ceres Bucureşti 1999;
5. *Roşca O.* - "Biotehnica reproducției la porcine prin însămânțare artificială, Ed. Ceres, Bucureşti 1994;
6. *Stoica Angela-Maria* - "Biologia şi patologia reproducției animalelor", Ed. Granada, Bucureşti 2003;
7. *Stoica Angela-Maria, Petroman Cornelia, Petroman I.* – "Rezultate practice privind valoarea unor indici de reproducție la scroafe", Ed. Mirton, Timişoara 1998;
8. *Stoica Angela-Maria, Şonea A., Tăpăloagă P. R., Drăguț Paula* - "Metode de intensivizare a reproducției la mamifere şi păsări"- Ed. Granada, Bucureşti 2003;
9. *Tăpăloagă P. R.* – "Eficiența economică a reproducerii suinelor prin montă şi însămânțâri artificiale", Ed. Granada, Bucureşti 2002;

THE BOVINE EMBRYOS OBTAINMENT BY IN VITRO FERTILIZATION AND THE MOPHOLOGICAL QUALITY EXAM

RADU VASILICA, STOICA MARIA ANGELA,
SIMA NICOLAE ALEXANDRU, MIHALCEA FLORIN

Key words: bovine, embryos, vitro fertilization

SUMMARY

The in vitro fecundation (IVF) as a modern biotechnological method is based on the physiological assimilation between male and female gametes, on the forming and evolution of the zygote (egg). This allows the increasing of the transferable embryos number from the receptor females, in fact the obtaining of more than one product in the one birth species (cattle and sheep).

IVF involves the following steps:

a) The strict selection of the bulls from which the raw semen was sampled, the analysis and interpretation of the main index in the sperm tables, from the bulls kept in the experiment using frozen semen, capacitating the spermatozoa in the properly culture medium.
b) The sampling of oocytes from cows, by mean from the female ovum, cows sacrificed in a slaughter house.
c) The process of combining the spermatozoa and oocytes in a fertilizing medium 24 hours in thermostat.
d) Preserving, separation and the introduction of the zygotes in a culture medium.

THE PROGRESS OF I.V.F. BIOTECHNOLOGY

Nowadays research on increasing the IVF efficiency and on in vitro producing (IVP) experiences synthetic culture mediums, freezing and defrost methods on intact morpho functional embryos; the ones obtained through surgical methods. As a result of the last moment methods, embryo technology manages to obtain embryos from the female categorized as in fertile or improper to reproduce, but selected by their ascendants genetically value. The used technique is called Ovum Pick-Up.

It is recommended that the number of the obtained embryos to increase by the techniques of nuclear transfer.

In this moment is recorded an evolution with an industrial rhythm of producing IVP, based on the OPU technique. This technique it can be applied in the cattle farms.

Since the reproduction in the mentioned farms is an intensive one it is known the fact that together with the Artificial Insemination method (super ovulation and embryo sampling of the donors in the same time with the receiver cows), is extended the modern IVF method with the characteristic phases: sampling, maturation and gametes(spermatozoa, oocytes) reuniting. This second method takes place in different culture mediums distinguished on phases. Stoica Angela and col. recommends periodic embryo quality evaluation from zygote to blastocist, in order to increase the number of transferable embryos.

1. MATHERIAL AND METHOD

The insurance of the male and female gametes for IVF involves the sampling of the bull semen with an artificial vagina, its transformation in order to obtain frozen semen, the elaboration and the processing of the sperm tables for selecting the best bulls, the processing of the frozen semen and its quality evaluation, the capacitation of the spermatozoa from the frozen semen in culture mediums and their development during the working methods and secondly the sampling of the oocytes from the cows sacrificed in the slaughter house, the oocytes cultivation in the maturation mediums. From the specific bibliography the medium must stimulate the mobility increase of spermatozoa provoking the acrosomic reaction (spermatozoa decapsulation). By this mean the TALP culture medium must be completed with oviductal monolayer cells with heparin add. The positive effect must be the increasement of Ca ions concentration and the intensification of the proteintyrosin phosphorilation process at the acrosome level. As maturation medium for the oocytes I used the classical TCM 199, completed with L-glutamine, Ca lactate, Na piruvate, fetal calf serum (FCS) and follicular stimulant hormone (FSH).

IVF can be possible by reuniting in not more than 24 hours, in conditions of thermostat (temperature 39°C, R.U. 100%, atmosphere 90% N_2, 5% CO_2, 5% O_2), in fecundation medium. It is also needed suspension of capacitated spermatozoa and mature oocytes (COC- cumulus oocytes complex). The fecundation medium is T.A.L.P. (Tyrode Albumine Lactate Pyruvate) and TCM 199+ C.O.B. (bovine oviduct cells).

The IVF success is recognized with the microscope by the presence of spermatozoa in the perivitelin space of the C.O.C., in the C.O.C. cytoplasm, the presence of the pronuclear male and female, the beginning of the egg segmentation. The zygotes resulted from the IVF process are repeatedly washed in TALP- HEPES with 10% F.C.S. add, then are put in Petri plates which contains BSP (bovine serum protein). In the end they are examined at stereomicroscope with 20-30x increase power, at 25°C, difuse light.

In the zygotes quality evaluation are important the following: the zona pellucida integrity, form and conture regularity, the integrity of the blastomere membrane, the blastomere uniformity by volume and colour. The Petri plates are kept at 39°C, R.U. 100%, atmosphere 90% N_2, 5% CO_2, 5% O_2, 5 days, stage of 6 cells – blastocist (age 6-7 days, 64-128 blastomeres), as transferable embryos.

2. RESULTS AND DISCUSSIONS

From the bovine ovum sampled in the slaughter house oocytes were extracted, introduced in TCM 199, PBS modified DULBECO, and after maturation was used for IVF in thermostat conditions. After 24 hours of incubation, were sampled and selected with the stereomicroscope a number of 949 fertilised C.O.C., from these obtaining 865 embryos with 2 blastomeres (cleavage), meaning 24.8% distributed in three culture mediums.

Depending on the culture mediums, from 276 embryos with 2 blastomeres in put in TCM 199, a number of 54 5 days embryos have developed (19.5%), from 303 embryos with 2 blastomeres in TCM 199+ C.O.B. resulted a number of 71 5days embryos (23.4%), from 286 embryos put in SOF medium have developed 90 embryos (31.5%).

All in all SOF medium offered better conditions for the embryos development compared with TCM 199 + COB, both reported to the witness medium – TCM 199.

3. CONCLUSIONS

From the data exposed we have the main conclusions:

1. In the cattle farms with intensive reproduction process it is applied the IVF traditional method combined with the I.A.
2. In the IVF are used distinguished culture mediums for the spermatozoa capacitation (TALP with COB and heparin), for the oocytes maturation (TCM 199 with 20% FCS), for the zygotes washing (TALP- HEPES medium), for the zygotes culture (TCM 199 with COB and SOF).
3. In the culture medium for the spermatozoa capacitation, the presence of the COB monolayer and the heparin add stimulates the increasing of the Ca^{++} ions in the spermatozoa nucleus and intensifies the proteintisosyn phosphorilation with the main role in the spermatozoa decapsulation.
4. IVF through the capacitated spermatozoa reunion and through the maturated oocytes in thermostat conditions, must evolve in 18-24 hours, 39°C, R.U. 100%, atmosphere 90% N_2, 5% CO_2, 5% O_2.
5. IVF is confirmed by one of the criteria noticed in the microscope: the presence of the spermatozoa in the perivitelin area and in the COC citoplasm, the presence of the male and female pronucleus, the egg segmentation (cleavage).
6. The morphological exam of the zygotes certifies the quality by: zona pellucida integrity, form regularity (sphere, compact), the integrity of the blastomere membrane, blastomere uniformity by volume, colour.
7. In the evolution of the embryos, from the stage of zygote to blastocist, are registered abnormalities like: degenerated zygotes, the zona pellucida broken, cu air spaces, ununiform blastomeres, dark sides, multiple air spaces.
8. Optimum stages in order to IVF proceedings, likewise the in vivo fecundation are: compact morula(6 days- age), early blastocist (6-7 days- age).

Table 1

Name and registration number	Breed	Fertilized oocytes number	Number of zygotes	Zygotes culture mediums									Total		
				TCM 199			TCM 199+ C.O.B.			S.O.F.					
				Cleavage	**Days**	%	**Cleavage**	**Days**	%	**Cleavage**	**Days**	%	**Cleavage**	**Days**	%
SICOS 51779	BR	330	306	97	23	23.7	101	31	30.7	108	39	36.1	306	93	30.4
HOFBERG 51715	BG	304	271	87	14	16.1	94	16	17	90	21	23.3	271	51	18.8
RALPI 51795	BG	315	288	92	17	18.5	108	24	22.2	88	30	34.1	288	71	24.6
TOTAL		949	865	276	54	19.5	303	71	23.4	286	90	31.5	865	215	24.8

Bovine embryos development depending on the selected bulls and also to the zygotes culture mediums

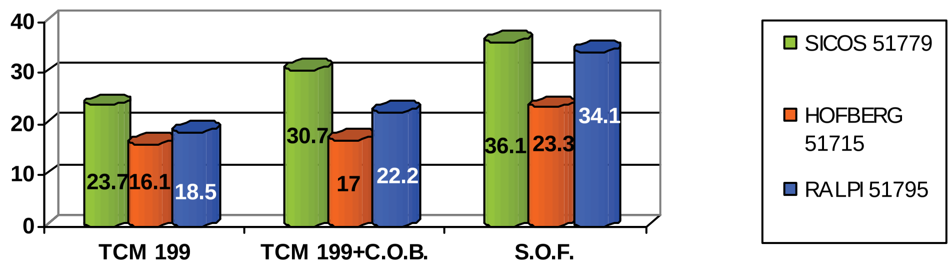


Fig. 1 - The results of the embryo development according to the zygotes culture mediums and the bull′s frozen semen

REFERENCES

1. *Ball P.J.H. and Peters A. R.* – „Reproduction in cattle*"*, 3rd edition, Ed. Blackwell Publishing, Great Britain, 2004.
2. *Berehoiu Tamba Radiana, Constantin, N.,* – "Particularităţi metabolice ale spermatozoizilor la animalele de fermă", vol. 1, Ed. Monitor, pag. 48-76, 2000.
3. *Bogdan A. T.* - "Ştiinţe Zootehnice" (curs universitar); Ed. Bioterra Bucureşti, pag. 126-128, 2001.
4. *Bols, P. Vandenheede, J. Van Soom, A. De Kruif.* 1994- „O.P.U. in the cow , a new needle guidance system" 10e Reun A.E.T.E. Lyon 9-11 Sept. 152.
5. *Bruggerhoff K., Zakhartchenko V., Wenigerkind H.,Reichenbach Hd., Prelle K., Schernthaner W., Alberia R., Kuchenhoff H., Stojkovic M., Brem G., Hiendleder S., Wolf E.,* 2002. „Bovine somatic cell nuclear transfer using recipient oocites recovered by ovum pick-up, effect of material lineage of oocite donors" Biol. Reprod 66; 367 -373.
6. *Carabă, I. V.* (2009): "Manipularea in vitro a embrionilor de mamifere", Teză de doctorat, UŞAMV Timişoara.
7. *Gandhi, A.P.* si col. 2000, „A single medium supports development of bovine embryos through maturation, fertilization, and culture" Human Reproduction, vol. 15, nr.2, 395-401.
8. *Gualtieri R. et al*. 2005 „Intracellular calcium and proteintyrosine phosphorylation during the release of bovine sperm adhering to the Fallopian tube epithelium in vitro" Journal of Reprod. Fertil., 1. USA.
9. *Hahn. J., et al.* 1983 „Uber die Entwicklung und Beurteilung von Rinderembryonen gewonnen aus superovulierten Spendertieren" Deutsche Tierarztliche Wochenschrift, 90, 10, 420-424, Hanover, Aisch, Deutschland.
10. *Ivan Alexandra,* 2009: ,,Estimarea viabilitatii embrionilor de mamifere dupa criterii morfologice si teste de colorare", Teză de doctorat, UŞAMV Timişoara
11. *Jura J.*, et al. 1993 "Production of bovine blastocysts from DNA microinjected, in vitro matured and fertilized oocytes" Animal Science Papers and Reports, vol. 11, nr. 2, 111-116, Warszawa, Poland.
12. *Parrish J.J. et al*., 1988 – "Capacitation of bovine sperm by heparin", Biology of Reproduction, 38, 1171-1180, USA.
13. *Sirard, M.A.* si colab., 1992 – "Le developpement des embryons bovins en culture in vitro", Le Medecin Veterinaire du Quebec, vol.22, nr.1, 7-10, Canada .
14. *Stoica, Angela, Sonea, Al., Tapaloaga, P., Dragut, Paula,* 2003 – "Metode de intensivizare a reproductiei la mamifere si pasari", Ed. Granada, Bucuresti.
15. *Talevi, R., Gualtieri, R.,* 2004 – "In-vivo vs. in-vitro fertilisation", European Journal of Obstretrics and Gynecology, 115, 568-571.

BIOTECHNOLOGICAL INNOVATION AND HUSBANDRY DIVERSITY IN THE DEVELOPMENT ANIMAL PRODUCTION BIOENGENEERING USING ARTIFICIAL INSEMINATION AND EMBRYOTRANSFER

ALEXANDRU T. BOGDAN[1), ANGELA STOICA[2), ALEXANDRU SONEA[2),
PAUL TAPALOAGA[2), MONICA MARIN[2), IUDITH IPATE[1), GEORGE TOBA [1),
DENIS DIACONESCU[3), SORIN CHELMU[4), MARCEL TH. PARASCHIVESCU[1),
DANA POPA[2), NICOLETA ISFAN[2), AMALIA STRATEANU[1)
[1) Romanian Academy, National Institute for Economical Research (INCE)-Center for Agroforestry Biodiversity Study and Research (CSCBA)- Postdoctoral School for Livestock Biodiversity and Food Biotechnology, Bucharest, Romania; cscbas@yahoo.com, [2) University of Agricultural Sciences and Veterinary Medicine, Bucharest, Romania, [3) GNIR Holding S.A., Bucharest, Romania, [4) Agriculture and Rural Development Ministery

Keywords: biotechnology, artificial insemination, embryotransfer, innovation, diversity of animal production, bioengeneerig.

SUMMARY

An increasing attention has been payed to scientific research activity by world economies in the last decade, especially as regards innovation, one of its essential section, along with basic and applied scientific research and technology transfer. Each economical activity involves some inputs (human, financial informational, technological, material, etc). A continuous, significant material resources decreasing, concomitantly with human population occures, therefore much attention to technological and biotechnological inputs should pe paid.

Present report proposed to approach biotechnological resource issue, to border it within global economical system, as well as some aspects on innovation activity and its economical effects, having considered that we live within an obviously high tech society.

Scientific report in biotechnologyand their applications in agricultural practice have fully demonstrated the mutual and indissoluble link between reproduction and livestock production in terms of growth and leadership on fertility, birth rate and prolificacy animals, which directly affect people’s quality of life through ever-increasing needs animal protein. Biotechnologies for use in all animal species, but they unevenly supported. The most advanced application of artificial insemination and embryotransfer progress was made in cattle on which the species has reached perfection and embryotransfer has been applied widely in animals with high genetic value, according to official data from National Agency for Reproduction and Animal Science Breeding and Romanian Society for Embryotransfer.

Current issues and challenges, generated by current and future demografic events requires innovative approaches, able to relate adjacent areas: husbandry nutrition and feed, animal breeding and yielding techniques, biophysics, biochemistry, human and husbandry physiology, genetics and biotechniques. The involvement in a continuous innovative process is the only one way to achieve the above mentioned objectives. Innovation designs a process (innovating action), since innovating is the result of innovation act. As the opinion that innovation includes the process itsef as well as its result exists, (facing both incoming and outcoming shape), namely a term polysemy occures. Innovations means the implementation of a new production or delivery approach, significantly improved, including inmost techniques methods an equipment improvements [Therefore: Innovation = *Idea (invention) +Marketing*]. If new innovative outputs (techniques, methods) marketing fails, innovative idea has no economical effectivenes. Innovation must be able to become invention by capturing economical value. Innovation shall contribute to „user" performance, while invention may not be applied into practice. Innovation outcome will have significant effects on: yield level and quality or reducing production and markerting income.

DOCUMENTATION SOURCES AND INNOVATIVE CONCEPTS

Biotechnological innovation is an imperative requirement when: *natural environment change* (natural resource shortage/depletion, environment degradation, elimate change) and *social environment change* (demografic growth and consequently food requirements, society development -knowledge based society, globalisation. The role of innovating is to put into practice quality improved products, high quality services, new production techniques, more efficient and pure (ecological), improved models of managemental systems, new methods of human resources, etc.

In this context, the approached issue ghathers within a compendium all the above mentioned notions, as a capital driving of competitiveness within animal production innovation and diversification ways engineering (fig 1).

Husbandry diversity is generated by:- animal species: cattle, pigs, poultry, sheeps and goats, bees, fish, etc; animal feeding; feed producing techniques; animal products yielding techniques:milk and dairy products, meat and meat products, eggs, honey and honey products. *Bioengineering* – interdisciplinary field based on the transfer of theoretical and methodological principles between biology and techniques science. *Biotechnology*- all the methods and techniques within biological industrial productive or biogenetics process designed to improve continuously human live standard. It represents a in interdisciplinary branch of the scientific progress and emerged as a confluence between biology, technique and chemistry science. *Bioindustry*- part of food sector involving living animals, strongly correlated to: marketing, consumers, animal feed industry and transport. Food industry attracts an endless chain of technological end technical changes, designed to meet population qualitative and quantitative requirements. *Biodiversity* – namely diversity from biological point of view. *Artificial insemination and embryotransfer*, as promoting factors of diversity, are the key elements of biotehnological innovation support and husbandry diversity.

Scientific research in the biotechnniques, as well as agriculture practice, entirely demonstratet the strong and mutual relation between animal breeding and husbandry production, as a result of increasing of controlled animal fertility, natality, prolificacy and, consequently, by meeting increasing human requirements of animal proteine, developing living standard. Animal breeding presents a large number of biological, technological and economical aspects influencing animal yielding level. By its theoretical an practical content, breeding technology has a particular contribution to continuous increasing and improvement of modern high yielding husbandry [2].

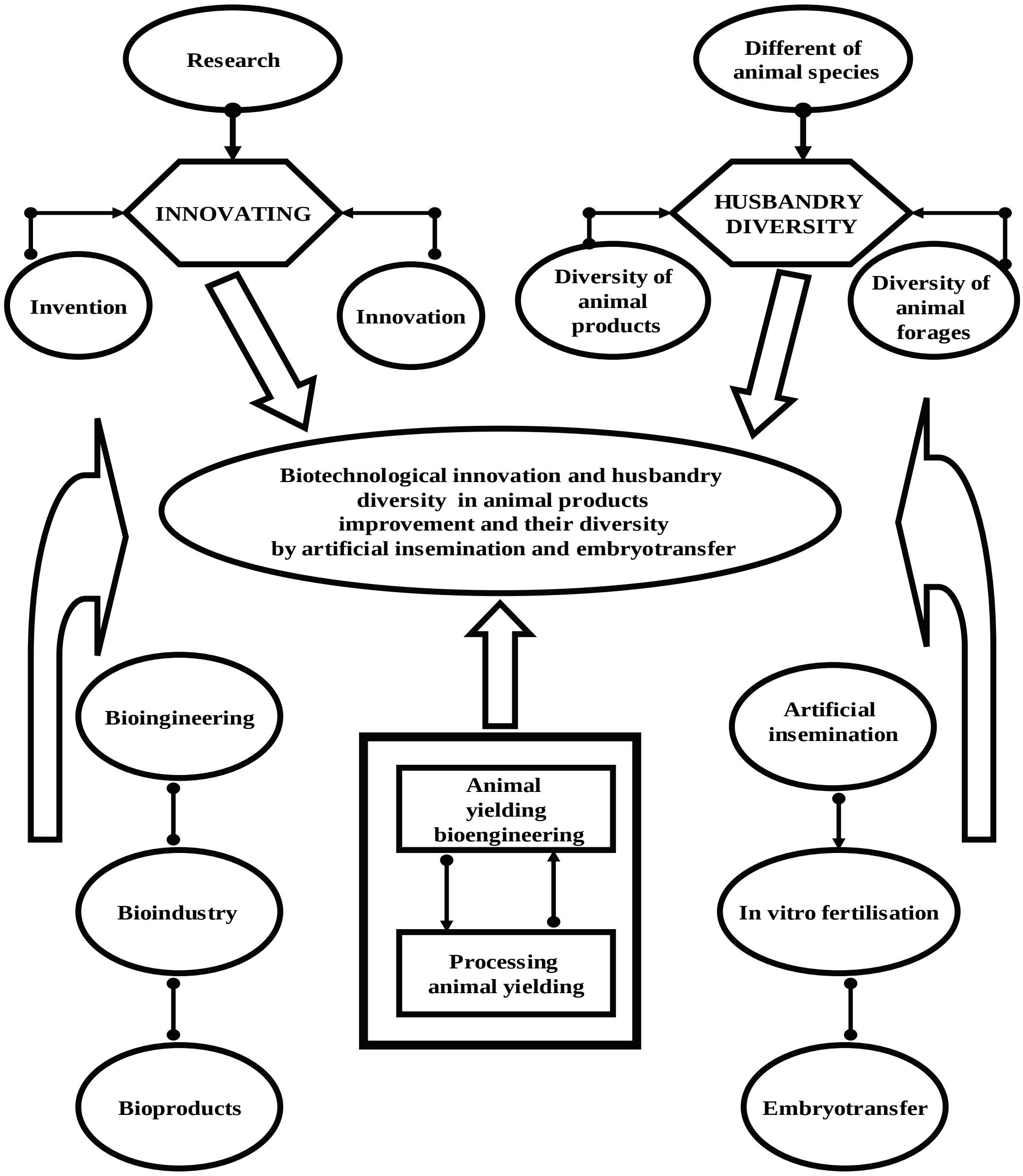


Fig. 1. Biotechnological innovation in animal husbandry yield (orig.)

Semen quantitative and especially qualitative aspects has a key role in intensive breeding. Controlled change of husbandry genetic structure towards a desired way is a dynamic and decisive aproach in animal production. Each method designed to improve yield of milk, eggs, wool, weight gain, shortening unproductive time and increase disease resistance has an important role. Optimistically, genetists have in mind cloned transgenic dairy herds, producing a high content of human health protecting compounds. Breeding techniques are able to improve husbandry yieldings. Some biotechniques were allready experienced on humans, generating more ethical issues than progress. Therefore, to avoid harmful mutational process within the next human generations, availability of theese techniques should be reduced. The most current breeding biotechniques are: artificial insemination and embryo transfer.

From animal science point of view, artificial insemination is a modern method used to control breeding proces, an important tool designed to optimise reproduction and improve husbandry populations to their maximum reproductive capacity, permanently depending of the morphological and physiological integrity of genital apparatus, and of „breeding condition", with normaly metabolic and endocrine profiles.

Importance and advantages for animal science: a) the main objective of artificial insemination is the genetical improvment of selected populations, by intensive and optimal using of high breeding value sires, with BLUP metods and genomics tests. Improving sires are used for an incomparable larger nubers of inseminations than in natural, uncontrolled breeding. b)sires breeding value is estimated according to acomplex criterion, in order to provide a partial evaluation marks; as the number of sires is considerably reduced, selective breeding according to genetic value is more exigent. On this purpose, in Romania, as well as in the world, ***"progeny-test"*** is used. In order to ensure genetic progress in succesive generations, only highly impoving sires are used for breeding. c) frozen semen is available for international trading and the acces to world genetic progress, since specialized companies work efficiently in advanced counties such Germany, USA, Austria, France, etc. d) artificial insemination has a beneficial effecton husbandry health status, as there is no direct contact between genitors, sexual transmisible diseases (brucellosis, vibriosis) does not occure.

Embryotransfer (E.T.) is a breeding technique able to achieve gestation in a receptor female using ovule from a donor one. Technically, several components are included in the process: donor selection, hormonal stimulation to obtine supraovulation, fertilization, embryos sampling and the transfer (fresh or frozen) to synchronized donors. Embryo transfer is a biotechnique as common as IA in wich the operator are able to control the mating. Biotechnologies has the role to ensure high quality, prosper husbandry sector. ***In Romania***, since ET biotechnology emerged, several experiments have been conducted in farm animals. This procedure has ben continuously improved and simplified following the breeders interes (fig. 2).

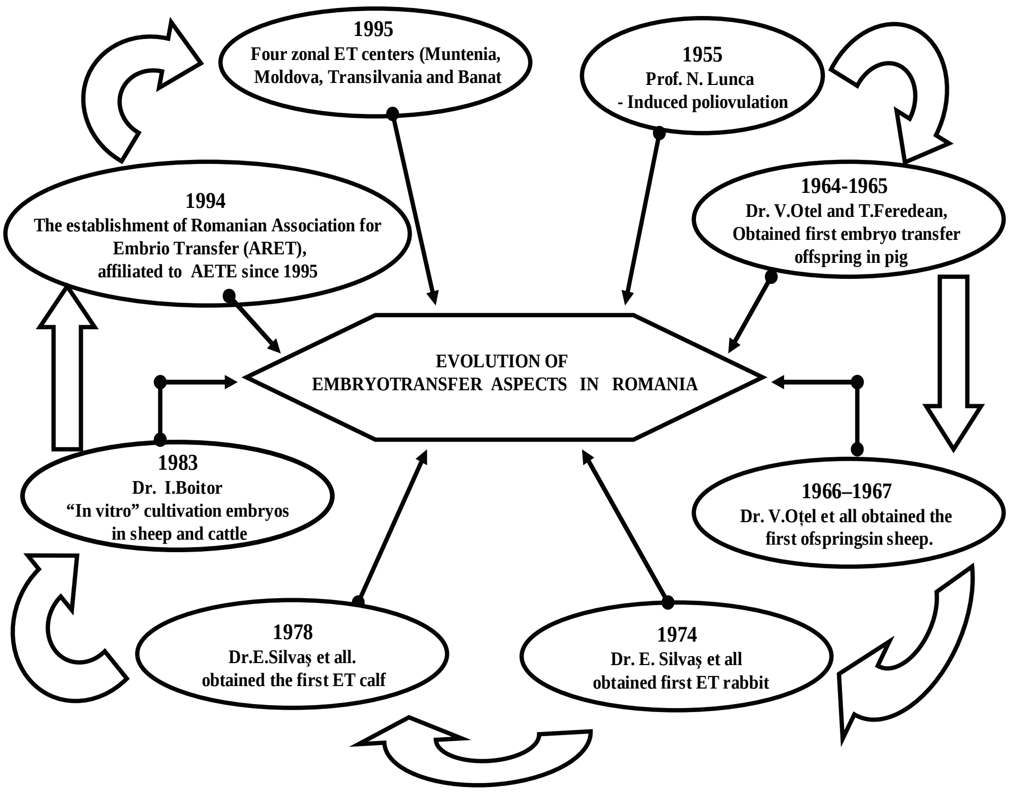


Fig.2. Evolution of embryotransfer aspects in Romania (orig.)

Scientific research in the field, based on EU recognized priorities contributed essentially to theese developments [9]:

A. Knowing development: involves the developing of knowing, innovating based economy. Strengthening the knowledge and innovation process as driving elements of new developments is an important part of knowing development. Improving performance in scientific research area, promoting innovation and knowledge transfer, putting the new innovative ideas are putted into practice is a must. In order to promote the excellence and smart specialization, reforming research-development systems improving cooperation between universities, research environment and beneficial are necessary. In this context, knowledge inputs are a priority, including fiscal an other financial tools, able to promote private investments in research-development sector.

Scientifically researches concerning the reproductive modern biotechnologies must be transposing the results in the practice field, for assure farm animals yields increasing (table 1).

Table 1

Past and projected trends in consumption of meat and milk in developing and developed countries (World Agriculture towards 2030-2050, Interim report, 2006)

ANNUAL PER CAPITA CONSUMPTION				**TOTAL CONSUMPTION**	
		Meat (kg)	**Milk (kg)**	**Meat (Mt)**	**Milk (Mt)**
Developing	**1990**	18	38	73	152
	2015	32	55	184	323
	2030	38	67	252	452
	2050	44	78	326	585
Developed	**1990**	80	200	100	251
	2015	83	203	112	273
	2030	89	209	121	284
	2050	94	216	126	295

.

B. Sustainable development means to promote a more efficient economy in terms of inputs using more ecological and competitive (fig.3).

In the next future, on November, 2010, Scientific Report will be published, in wich new significace role of scientific research will be described, allowing viable towards current global economical financial crisys outing.

The relations between humans and the animals they use as food have changed in time. In acest context, the present paper connects Nicolas Georgescu-Roeger's world-wide-known paradigm of improving the agricultural efficiency to Lester Brown's more recent Eco-Economy –Building an Economy fo the Earth paradigm. In 2010, during the international symposium, *"PROSPECTS FOR THE 3rd MILLENNIUM AGRICULTURE" (U.S.A.M.V. CLUJ –NAPOCA, Aula Magna),* A.T. Bogdan presented the scientifically paper "Prospects of **Agrifood Green Power** in 2050 and Forecasting for 2100 with Sustainable Solutions Based on **Ecobioeconomics *new Paradigm*",** where underline the important role of relationship between the following fields: economy, biology, technology, scientifically research (fig.4)

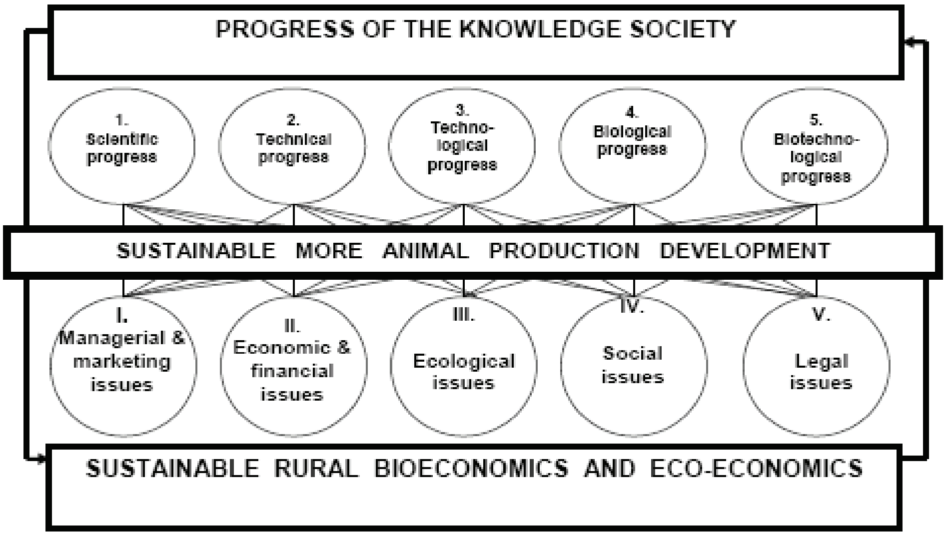


Fig 3. Sustainable animal production based on rural bioeconomics and ecoeconomics (orig.)

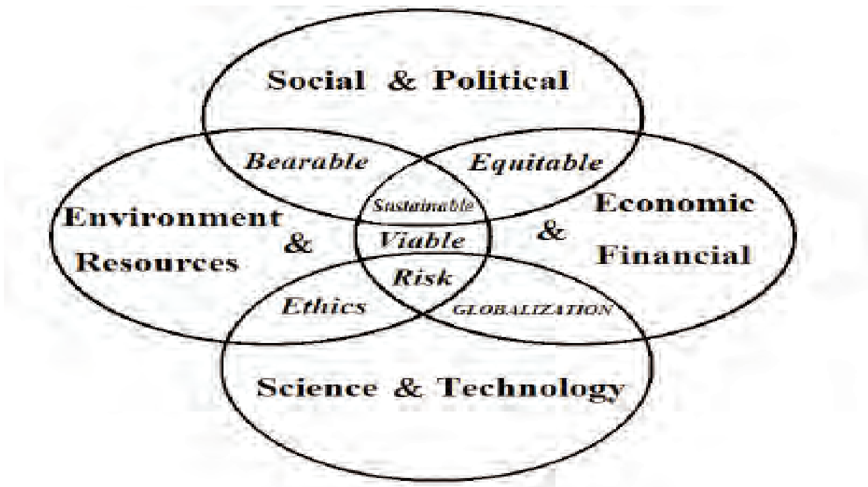


Fig. 4. Modification of Lester Brown`s diagram for eco-economics paradigm, considering globalization and economic-financial crisis, with Sustenable Solutions Based on Ecobioeconomics new Paradig (modification by our working group)

Nowadays a sustainable economy must become rural, based on ***Agrifood Biodiversity, Bioeconomy and Ecoeconomy scientifically applied to the rural economy***, in the ontext of a sustainable rural development, the possibility exists to issue the following tentative terms for consideration in the future: a) **Bioeconomic sustainable development** of the ***rural areas***; b) **Eco-Economic sustainable development** of the

agrifood production; c) **Eco-Bioeconomic sustainable development** of the ***agrifood green power***.

To improve competitiveness is necessary to put into practice the most innovative solutions in hubandry sector, and the enlargement of breeding techniques application is one of them. Breeding biotechnologies (artificial insemination and embryo transfer) has a relevant effect on national bioeconomy, involving theoretical and practical aspects of artificial selection, mating, improvement of productive and reproductive traits, in order to increase animal yieldings cocomitantly with lowest labour and money inputs. The results obtined by research activity in the husbandry should meet the requirements of animal products market (table 2).

Table 2

Prospects consumption (kg/capita/year) of farm animal food in developing countries

Item	**2010**	**2025**	**2050**	**2075**	**2100**	
					Quantity (UM)	**% from 2010**
0	1	2	3	4	5	6
1. Region – Latin America						
Total meat (beef, pork, sheep, goat, poultry)	49	54	63	73	81	165%
Eggs	9	11	14	17	20	222%
Milk	96	103	114	126	136	141%
2. Region - Developing including China and control planned Asian countries						
Total meat (beef, pork, sheep, goat,poultry)	25	30	34	38	41	164%
Eggs	6	8	10	13	13	216%
Milk	41	53	69	78	82	200%
3. Region – Eastern Asia						
Total meat (beef, pork, sheep, goat, poultry)	22	28	39	50	59	268%
Eggs	6	8	12	15	18	300%
Milk	14	21	30	40	48	342%
4. Region – Southern Asia						
Total meat (beef, sheep, goat,poultry)	6	7	8	10	12	200%
Eggs	2	3	5	7	8	400%
Milk	61	85	123	137	137	224%
5. Region – Northern Africa						
Total meat (beef, sheep, goat,poultry)	19	24	31	39	42	221%
Eggs	5	8	12	17	17	340%
Milk	66	69	75	82	89	134%
6. Region – Sub-Saharan Africa						
Total meat (beef, pork, sheep, goat,poultry)	10	13	17	22	26	260%
Eggs	2	3	4	6	7	350%
Milk	26	32	39	48	55	211%

**(Simplified and added calculations by our working group after FAO database, A.F. Bouwman, Land and Water Bulletin 6, 1997)*

In order to provide a higher amount of farm animal food (presented as the annual dynamics in the table), the most innovative biotechnologies are necessary to be practiced. Increasing the amount of consumed farm animal food to an extent as close as possible to human physiological requirements, contributes to improvement of live standard.

Breeding biotechnologies ensure production increasing and consequently husbandry size, depending onanimal food comsum and human population dynamics (table 3).

Table 3

Prospects on population (mil) in developing countries for the 2010 – 2100 periods

Region	2010	2025	2050	2075	2100	
					Quantity (UM)	% from 2010
Latin America	596	701	829	856	883	148%
Developing including China and CP Asian countries	5619	6802	8327	8917	9569	170%
East Asia	472	540	625	659	696	147%
South Asia	1676	2011	2436	2570	2712	161%
North Africa	173	209	256	292	333	192%
Sub-Saharan Africa	834	1207	1784	2036	2323	278%

**(Simplified by our working group after FAO database,A.F. Bouwman, Land and Water Bulletin 6, 1997)*

Global population increase, as presented in table 3 generates some opportunities as well as competitive acces to capitalize husbandry specialists innovative intelligence.

C. Embedding favourable development consists in promoting an economy characterized by high employment rate able to ensure a strong social and territorial cohesion. To achieve all these purposes, interconnection between national economical branches, to improve services sector, massive investments in research and technology sector and proper employment are necessary. Having considered the above mentioned conclusions (demographic shot, involving animal products increase) the improvement of educational system quality, able to provide high qualified experts, able to contribute and find solutions for challenges subjecting European and global society is strongly required (fig.5).

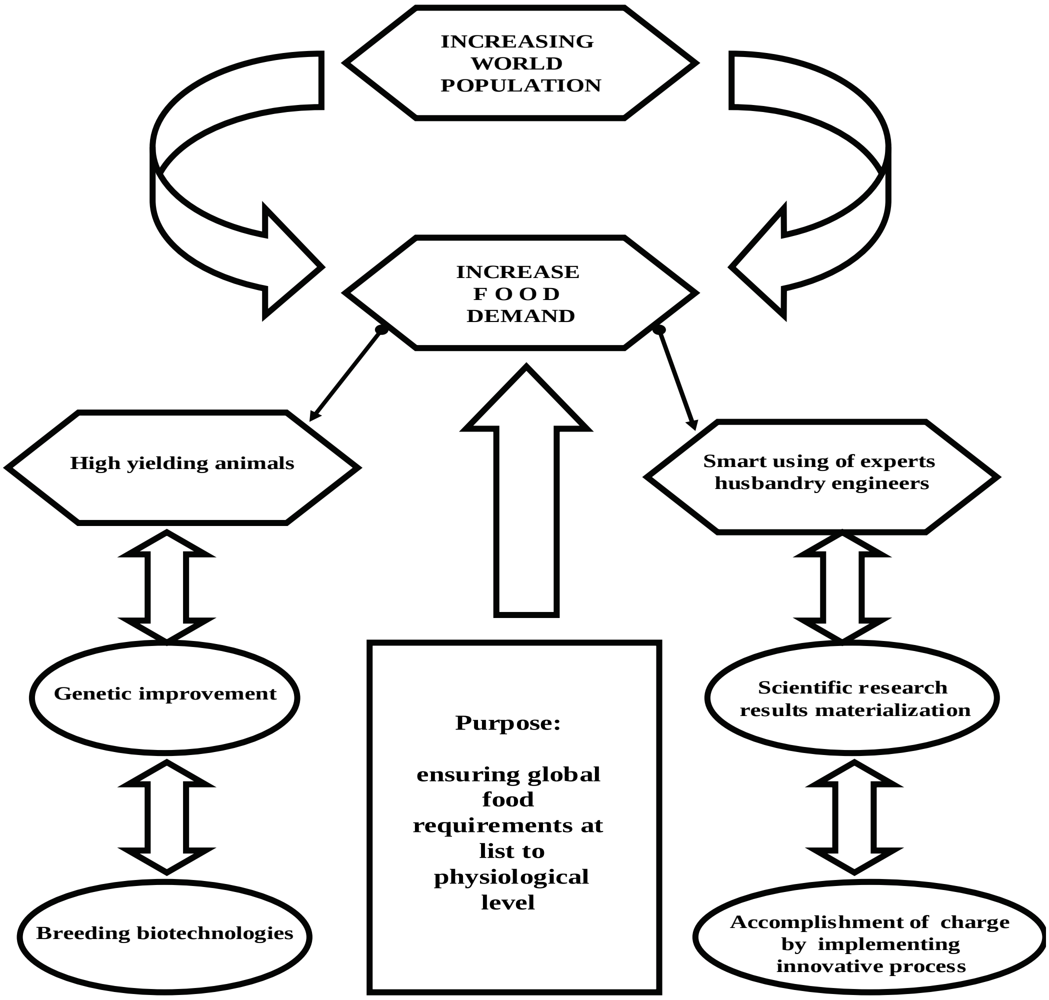


Fig. 5. The impact of human population dynamic on scientific research sector (orig)

Once again, innovative aspect of breeding biotechnologies is revealed and considered as modern ways designed to use methods, procedures, equipments and/or new or significantly improved competence. The most important aspect for biotechnological process is to proceed in economically profitable conditions, providing market required „ products" (meet a social requirement) and generate profit for the user.

CONCLUSIONS

1. Complex issues and chalenge generated by current and next demographic growth requires innovative teqniques able to inter correlate adjacent fields.

2. Necessity for biotechnological innovation and husbandry diversity is required by natural and social environmental change, including environment protection and animal wellfare.

3. Biotechnologies means the main driving element for increasing competitiveness in innovation and diversity of husbandry engeneering, by increasing the level and quality of husbandry yield.

4. From theoretical and practical point of view breeding biotechnology has a particular contribution to continuous enlargement and modern, high yielding husbandry improvement .

5. Knowledge economy development requires the improvement of scientific research activity, promotion of innovation and knowledge transfer and implementation of innovative ideas so that new products and services should be materialized, for a smart growth.

6. Since embryotransfer biotechnology emerged, several experiments have been conducted in farm animals. This procedure has ben continuously improved and simplified following the breeders interes, with obvious economic advantages.

7. Results of scientific research must entirely accomplish market requirements on animal products market, with food safety and security.

8. Maintained human population increase along with living standard improvement requires higher amounts of food, resulded by breeding high yielding husbandry, as an effect of materialization of scientific results.

9. Nowadays a sustainable economy must become rural, based on Agrifood Biodiversity, Bioeconomy and Ecoeconomy scientifically applied to the rural economy, in the ontext of a sustainable rural development.

REFERENCES

1. *Alexandratos N*. (ed.). (1995). World Agriculture: Towards 2010. An FAO Study. Food and Agriculture Organization of the United Nations, Rome / Wiley and Sons, Chichester.
2. *Agricultural Organization of the United Nation* (2006), World agriculture towards 2030-2050, Interim report – Globale perspective studies Unit Food and, Rome.
3. *Anderson, K*., 2009, “Policies Affecting Agricultural Incentives in Developing Countries”, paper prepared for FAO
4. *Bogdan, A.T.* (2007), (Cap. 3.6.3 Zootehnical diversity, page 264-278), In: Bavaru A., S. Godeanu, Gallia Butnaru, A.T. Bogdan “Biodiversity and nature protection (Romanian)”. Ed. Romanian Academy
5. *Bogdan, A.T., Dorina Bogdan, I. Groza, M. Paraschivescu, Toba G. F, S. Chelmu , L.D. Diaconescu, Amalia–Gianina Străteanu, I. Scurdu, M. Th., Paraschivescu* (2009), “More animal production in agrifood green power development, a new paradigm of concepts regarding sustainable rural bioeconomics and eco-economics” Bulletin UASVM, nr. 66(1-2)/2009 -Veterinary Medicine**,** Print ISSN 1843-5270; Electronic ISSN 1843-5386.
6. *Bogdan, A.T. et all,*(2009), More animal production in agrifood green power development, a new paradigm of concepts regarding sustainable rural bioeconomics and eco-economics, Bulletin UASVM, nr.66 (1-2)/2009, Veterinary Medicine, Bucharest.

7. *Bogdan, A.T. et all*,(2010) Prospects for Development of Livestock Production between 2010–2100 based on Integrated Rural Bioeconomics and Ecoeconomics, Bulletin UASVM Animal Science and Biotechnologies, 67(1-2)/2010, Cluj-Napoca.
8. *Bogdan, A.T. et all*,(2010) Prospects of Agrifood Green Power in 2050 and Forecasting for 2100 with Sustainable Solutions Based on Ecobioeconomics new Paradigm, Bulletin UASVM Animal Science and Biotechnologies, 67(1-2)/2010, Cluj-Napoca.
9. *Bouwman A.F*, (1997), Long - term scenarios of livestock – crop – land use land interactions in developing countries, FAO, Land and Water Bulletin 6, Roma.
10. *Covrig M*, 2008, Inovare şi transfer tehnologic, Note de curs.
11. *FAO* (2006). World Agriculture: towards 2030/2050, Interim report, ttp://www.fao.org/
12. *Ipate Iudith, A.T. Bogdan, Amalia Strateanu, G.Tobă, M.Th.Paraschivescu, M.Enache*, 2009, Cercetari privind trasabilitatea în ecositeme zootehnice a unor produse de origine animală în condiţiile social-economice din România. Simpozionul "Bazele bioeconomice şi ecoeconomice ale biodiversităţii agrozootehnice pentru dezvoltare rurală durabilă în România şi Republica Moldova" 6 noiembrie, Academia Romana, CSCBAS.
13. *Monica Marin, Laura Urdes, Elena Pogurschi, Dumitru Dragotoiu (2010),* Research concerning the influence of the reducing level of the compound feed on the performances of the pigs for fattening, Scientific papers, Animal sciences and Biotechnologies, 43 (1), Timişoara.
14. *Paraschivescu M.Th.,2010*, Ferma MOET cu circuit deschis - Concept nou de management al reproducţiei vacilor de lapte. Ed. Granada
15. *Rosegrant, M.W., J. Huang, A. Sinha, H. Ahammad, C. Ringler, T. Zhu, T.B. Sulser, S. Msangi, and M. Batka* (2008). Exploring lternative Futures for Agricultural Knowledge, Science, and Technology (AKST). ACIAR Project Report ADP/2004/045, International Food Policy Research Institute, Washington, D.C.
16. *Skees J. R., P. Hazell and M. J. Miranda* (1999). "New Approaches to Crop Yield Insurance in developing Countries". EPTD Discussion Paper n. 55. Environment and Production Technology Division, IFPRI, Washington, D.C.
17. *Skully, D.*, (2009). "OECD policy and distortionary effects: A review of the evidence", paper prepared for FAO.
18. *Schmidhuber, J*. (2006). Impact of an Increased Biomass Use on Agricultural Markets,Prices and Food Security: a Longer-Term Perspective, paper for International Symposium of Notre Europe, Paris, 27-29 November, 2006 (http://www.fao.org/es/esd/pastgstudies.html).
19. *Tăpăloagă P., Tăpăloagă Dana, Mitrănescu Elena, Chesa, E., (2010),* Comparative researches concerning two reproductive systems in swine breeding, Bulletin UASVM Animal Science and Biotechnologies, 65/2010, Cluj-Napoca
20. *Tobă G.F., S. Chelmu, A.T.Bogdan, R. Moraru, M. Th. Paraschivescu, Iudith Ipate, M. Matiuţi, Amalia Gianina Străteanu, L.D. Diaconescu, M. Enache***,** 2009, Contribution to the vulnerability issue in farm animal biodiversity : the case of Transylvanian Pinzgauer breed in Hatseg Land, Bulletin U.S.A.M.V. Cluj-Napoca, vol. 66.
21. ***Dex- on-line
22. ***European Comission , 2010, Communication – Europe 2020: "O strategie europeană pentru o creştere inteligentă, ecologică şi favorabilă incluziunii", Bruxel

The 39th International Session of Scientific Communications of the Faculty of Animal Science, Bucharest, Romania
Scientific papers (seria D; vol. LIII) – Animal Science

STUDY ON THE ECONOMIC EFFICIENCY OF ROMANIA'S HONEY FOREIGN TRADE

AGATHA POPESCU
University of Agricultural Sciences and Veterinary Medicine, Bucharest, Romania

Key words: honey, foreign trade, Romania, economic efficiency

SUMMARY

The paper analyzed the economic efficiency of Romania's honey foreign trade during the period 2000-2007.The following specific indicators were used: trade balance, export/production ratio, share of honey export and import in agri-food export and import and in total export and import, honey export/import ratio, import/consumption ratio, export and import/inhabitant, honey food balance, marketed honey by beneficiaries and honey suppliers , average export and import price, export and import geographical orientation index and honey gross exchange index. As a conclusion, honey foreign foreign trade is a good deal for Romania which is a net exporter contributing in a positive way to the payment balance. Honey foreign trade is of high efficiency, but Romania should intensify its exports in the European market in order to diminish its stocks , to look for a higher export price and continue to reduce honey import.

Foreign trade is justified by the need of goods exchange with other countries and it is a form of contribution to the development of economic relationships among various countries from different continents [1,2]. It must be an efficient commercial activity for any country in order to support the payment balance. This depends on many factors such as: variety of marketed goods, offer/demand ratio, consumers need on various markets, market price etc. [3]. Economic efficiency of foreign trade is measured by specific indicators whose part is to express the efficiency of the external relationships and put into evidence the directions and dimensions of the marketed goods, the purchasing power of a country within its out border connections and the benefits of the geographical distribution of delivered or imported commodities [3].

Europe is an important honey producer and exporter in the world and Romania plays an essential role in the European and international honey trade. The increase of economic efficiency of honey foreign trade is a goal for Romania, because honey is the only agrifood product which confers our country the characteristic of net exporter which means that exports are higher than imports with a deep impact upon the payment balance. In this context, this study aims to present the actual statement of economic efficiency of Romania's honey foreign trade in order to establish the possibilities to improve the out border sales and bring more currency in the country [3,4].

1. MATERIAL AND METHOD

In order to analyze the efficiency of foreign trade, the specific system of indicators was used as well as the data collected from FAOStat during the period 2000-2007 .The following indicators have been determined and calculated : honey foreign trade balance, honey export/production ratio, share of honey export and import in agri-food export and import and in total export an import, honey export/import ratio, import/consumption ratio, export and import/inhabitant, honey food balance, marketed honey by beneficiaries and honey suppliers, average export and import price, export and import geographical orientation index and honey gross exchange index. The data have been processed by usual statistical methods specific to such an analyze. The comparison method was used in order to emphasize the evolution of each indicator mentioned above from a year to another.

2. RESULTS AND DISCUSSIONS

Honey Foreign Trade Balance is a positive one for Romania as export is higher than import, meaning that our country is a net honey exporter. The amount of exported honey decreased by about 17 % from 7.510 thousand tons in the year 2000 to 6.254 thousand tons in the year 2007. The amount of imported honey is very small as long as Romania is a strong honey producer and exporter in Europe. Honey import has followed a decreasing trend from 0.099 thousand tons imported in 2000 to 0.018 thousand tons imported in 2007. If we take into consideration the value of honey foreign trade, we may notice the positive increasing trend of honey export, from 7,727 thousand USD in the year 2000 to 11,247 thousand USD in 2007. Also, the value of hone import increased from 171 thousand USD to 772 thousand USD in the same period of time. As a result, the honey trade balance increased by 38.63 % (Table 1).

Table 1

Romania's Honey Foreign Trade Balance, 2000-2007

	MU	2000	2005	2007	20007/2000 %
Honey Export	1,000 tons	7.510	6.636	6.254	83.27
Honey Import	1,000 tons	0.099	0.020	0.018	18.18
Honey Balance	1,000 tons	+7.411	+6.616	+6.236	84.14
Honey Export	1,000 USD	7,727	12,523	11,247	145.55
Honey Import	1,000 USD	171	43	772	451.46
Honey Balance	1,000 USD	+7,556	+12,480	+10,475	138.63

Honey Export/Production Ratio .As honey production increased by 71.79 % from 11.700 thousand tons in 2000 to 20.100 thousand tons in 2007 and the amount of exported honey decreased by 17 %, export/production ratio decreased by 51.53 % from 64.18 % in 2000 to 31.11 % in 2007 (Table 2).

Table 2

Honey Export/ Honey Production Ratio, 2000-2007

	MU	2000	2005	2007	20007/2000 %
Honey Export	1,000 tons	7.510	6.636	6.254	83.27
Honey Production	1,000 tons	11.700	19.400	20.100	171.79
Export/Production Ratio	%	64.18	34.20	31.11	48.47

The Weight of Honey Export in Romania's Agri-Food Export and Total Export. Honey is an agricultural product well appreciated abroad and that is why its share in Romania's agri-food export increased by 62.22%, from 0.45 % in the year 2000 to 0.73 % in the year 2007.Despite that, the share of honey export in Romania's total export decreased by 43 % (Table 3).

Table 3

The Share of Honey Export in Romania's Agri-Food Export and Total Export and the Share of Honey Import in Romania's Agri-Food Import and Total Import, 2000-2007 (1,000 Tons)

	MU	2000	2005	2007	20007/2000 %
Romania's Total Export	1,000 USD	14,316,710	28,263,850	37,527,230	262.12
Romania's Agri-Food Export	1,000 USD	1,692,910	2109,470	1,539,240	90.92
Share of Honey Export in:					
-Total Export	%	0.054	0.044	0.031	57.40
-Agri-Food Export	%	0.45	0.59	0.73	162.22
Romania's Total Import	1,000 USD	18,078,450	41,361,360	65,178,940	360.53
Romania's Agri-Food Import	1,000 USD	2,005,330	3,577,590	4,884,420	230.90
Share of Honey Import in:					
-Total Import	%	0.00094	0.00010	0.00118	125.53
-Agri-Food Import	%	0.0085	0.0012	0.0158	185.88

The Weight of Honey Import in Romania's Agri-Food Import and Total Import. In 2007, the share of honey import in agri-food import increased by 85.88 %, meaning that honey has become an important good among the imported agricultural products which is a negative aspect. Also, honey import/total import ratio increased by 25.53 %, which reflects that imported honey, besides other goods, affects domestic producers and payment balance. However , the negative influence is very small (Table 3).

Honey Export/Import Ratio. Taking into account the amount of exported and imported honey, export/import ratio was 4.58 times higher in 2007 compared to 2000, meaning that export exceeds import. Taking into consideration the value of exported and imported honey, export/import ratio decreased, so that, in 2007, for one USD paid for imported honey, Romania got 14.56 USD for exported honey instead of 45.18 USD in the year 2000. However, this ratio still assures economic efficiency in honey payment balance (Table 4).

Honey Export and Import/Inhabitant. According to the trend registered in honey export and import and Romanian population during the analyzed period, we noticed that the value of exported honey/inhabitant increased by 52.94% and also the value of imported honey per capita increased by 371.05% in 2007 compared to the year 2000 (Table 4).

Table 4

Romania's Honey Export/Import Ratio and Honey Export and Import/Inhabitant

	MU	2000	2005	2007	20007/2000 %
Honey Export	1,000 Tons	7.510	6.6.36	6.254	83.27
Honey Import	1,000 Tons	0.099	0.020	0.018	18.18
Export/Import Ratio	%	7,585.85	33,180.00	34,744.44	458.01
Population	1,000 capita	2,435	21,624	21,538	96.00
Export/Inhabitant	Kg/capita	0.33	0.31	0.29	87.87
Import/Inhabitant	Kg/capita	0.0044	0.00092	0.00083	18.86
Honey Export	1,000 USD	7,727	12,523	11,247	145.55
Honey Import	1,000 USD	171	43	772	451.46
Export/Import Ratio	%	45.18	291.23	14.56	32,22
Export/Inhabitant	USD/capita	0.34	0.58	0.52	152.94
Import/Inhabitant	USD/capita	0.0076	0.0019	0.0358	471.05

Honey Import/Consumption Ratio. Taking into account both the evolution of honey import and consumption in Romania, we may affirm that import/consumption ratio decreased by about 90 % , from 4.20 % in the year 2000 to 0.45 % in 2007, which reflects an increased honey trade efficiency (Table 5).

Table 5

Honey Import/Consumption Ratio

	MU	2000	2005	2007	20007/2000 %
Honey Import	1,000 Tons	0.099	0.020	0.018	18.18
Honey Consumption	1,000 Tons	2.349	3.873	4.032	171.64
Import/Consumption Ratio	%	4.20	0.52	0.45	10.68

Honey Food Balance. A continuous increase of internal consumption, a decrease by 82 % amount of imported honey which are positive aspects with a good impact upon local producers, but also a slide decrease of the amount of exported honey by 17% and an increase of stocks by 400% were noticed during the period 2000-2007.

Table 6

Honey Food Balance (1,000 Tons)

	2000	2005	2007	2007/2000 %
Production	11.700	19.400	20.100	171.79
Import	0.099	0.020	0.018	18.18
Stocks	1.94	8911	9.832	506.80
Export	7.510	6.636	6.254	83.27
Consumption	2.349	3.873	4.032	171.64

This negative aspect shows that Romania should promote honey in the international market in a better way in order to diminish the stored amounts and stimulate sales abroad (Table 6).

Romanian Honey's beneficiaries abroad. About 98.24% of exported honey is delivered in the European countries, the main buyers being, in order: Germany (51.02%), United Kingdom (14.42%), Italy (11.34%), Hungary (7.03%), Poland (5.44%) and Belgium (3.78%). Also, Romania sells honey in other countries such as: Japan, U.S.A, Canada, Singapore (Table 7).

Table 7

Distribution of Romania's Honey Export by country (Tons)

Beneficiary	2000		2005		2005/2000 %
	Tons	%	Tons	%	
European countries , of which :	***7,441***	***99.02***	***6,522***	***98.24***	***87.64***
Austria	190	2.52	94	1.41	49.47
Belgium	57	0.75	251	3.78	440.35
Denmark	-	-	6	0.09	-
France	77	1.02	-	-	-
Germany	5,051	67.25	3,386	51.02	67.03
Greece	282	3.78	-	-	-
Italy	676	9.00	753	11.34	111.39
Holland	-	-	165	2.48	-
Poland	19	0.25	361	5.44	-
Rep. Moldova	-	-	2	0.03	-
United Kingdom	338	4.50	957	14.42	281.36
Slovakia	-	-	20	0.30	-
Slovenia	3	0.03	-	-	-
Sweden	13	0.17	-	-	-
Spain	430	5.72	60	0.90	13.95
Hungary	305	4.06	467	7.03	153.11
Other countries:	***69***	***0.98***	***114***	***1.76***	***165.21***
Canada	-	-	3	0.05	-
Japan	17	0.21	99	1.49	582.35
Singapore	-	-	3	0.05	-
USA	-	-	9	0.17	-
Total Honey Export	**7,510**	**100.00**	**6,636**	**100.00**	**88.36**

Romania's Honey Suppliers are represented by a few European countries: Rep. of Moldova (80%), Slovakia (15%) and Austria (5%) as shown in Table 8.

The Index of Geographical orientation for Export and Import. Export Geographical Orientation Index is 0.12 and shows a high stability of Romanian exports due to a favorable international context. Import Geographical Orientation Index is 0.79 and reflects a high instability of Romania's honey imports. In fact. Romania does not need to import honey as long as it is producing enough for covering domestic market and for exporting the remaining amount.

Honey Average Export and Import Price. The export price(FOB) increased by 37.24 % from 1,375 USD/Ton in 2000 to 1,887 USD/Ton in 2007, while the import price increased by 34.68 % from 1,730 USD/Ton in 2000 to 2,330 USD/Ton in 2007. Therefore, the export price/import price ratio is not a favorable one for Romania, because it sells at a lower price than the one at it buys. The ratio is 0.81 in 2007 compared to 0.79 in the year 2000. This means that in 2007, Romania loses 0.29 USD per every tone of honey (imported or exported). However, we must not under evaluate the slow decreasing trend of this ratio (Table 9).

Table 8

Distribution of Romania's Honey Import by Supplier (Tons)

Supplier	2000		2005		2005/2000 %
	Tons	%	Tons	%	
Austria	**-**	**-**	1	***5.00***	**-**
Germany	2	2.02	-	-	-
Greece	2	2.02	-	-	-
Mexico	75	75.75	-	-	-
Rep. Moldova	19	19.20	16	80.00	84.21
Slovakia	-	-	3	15.00	-
Hungary	1	1.0	-	-	-
Total Honey Import	99	100.00	20	100.00	20.20

Table 9

Honey Average Export and Import Price

	2000	2005	2007	2007/2000 %
Honey Average Export Price (USD/Ton)	1,375	1,282	1,887	137.24
Honey Average Import Price (USD/Ton)	1,730	2,150	2,330	134.68
Export Price/Import Price Ratio	0.79	0.60	0.81	102.53

Honey Gross Exchange Index, calculated based on the data from Table 9, is 440% for the year 2007 and 104.71% for the year 2005 and shows that honey has a high purchasing power because the return exchange rate is higher for export than for import if the assessment is done in terms of the year 2000 honey price.

3. CONCLUSIONS

1. Honey foreign trade is an efficient activity contributing in a positive way to Romania's payment balance.
2. Romania is a net exporter, meaning a high economic efficiency of honey foreign trade. This is a reason to promote more intensively its high quality honey in order to develop exports mainly in the European market and to diminish stocks.
3. It should mainly look at those markets which assures a higher export price, to continue diminishing import as long as production covers internal market and deliver the remaining out borders.

REFERENCES

1.*Işan V.*, 2004, International Commercial Tranzactions, Iaşi, Economic Publishing House , Bucharest

2.*Rusu C., Popescu Agatha,Tepoi Magda, Zichil V., , Rusu M., Hossu T., Veres Daniela Lavinia, Dragoi Raiuca Petronela, Abrudean Roxana, Pascal F.C.*, 2002, Home and Foreign Trade , Dacia Publishing House, Cluj-Napoca

3.Popescu Agatha, 2006, Aspects and trends of honey market in Europe, Scientific Papers the 35th International Scientific Session of Communication, Series D, Vol.L, Animal Science, p.251-256

4.*Popescu Agatha*, 2010, Home and Foreign Trade, Dominor Publishing House , Bucharest

5.FAOStat.org

The 39th International Session of Scientific Communications of the Faculty of Animal Science, Bucharest, Romania
Scientific papers (seria D; vol. LIII) – Animal Science

CONSIDERATIONS ON ROMANIA'S POSITION IN THE EUROPEAN AND WORLD HONEY TRADE

AGATHA POPESCU
University of Agricultural Sciences and Veterinary Medicine, Bucharest, Romania

Key words: honey, trade, Romania, position, Euopean and world level

SUMMARY

The paper presents Romania's position in the European and World Honey production and trade during the period 2000-2007 based on the data provided by FAO Stat. In Europe, Romania comes on the 7th position by honey production , on the 13th position by honey yield, on the 4th position as honey exporter, on the 20th position as importer, on the 5th position by honey export value and on the 21st position by honey import value. The number of beehives, honey production and yield, honey quantitative export and import, the value of honey export and import as well as average honey export and import price have been used as main indicators for establishing Romania's position at European and world level. As a conclusion, Romania is among the main honey producers and exporters in Europe but it should still pay attention to honey yield and quality and to promote more intensively its high quality honey on various foreign market.

Romanian honey is a high value bee product very well appreciated by consumers in the foreign market [1,2]. This is an important reason to analyze Romania's present position among honey producers, exporters and importers in Europe and at world level in order to identify the ways to increase exports and bring more foreign currency in the payment balance and also to stimulate breeders to develop beekeeping as an important income source [3].

1. MATERIAL AND METHOD

The data collected from FAO Stat for the period 2000-007 have been used in order to characterized Romania's position in the European and world honey trade by means of the following indicators : number of beehives, honey yield and production, amount of exported and imported honey, value of honey export and import, average honey export and import price. The data have been processed by usual statistical methods specific to such an analyze. The comparison method was used in order to emphasize the evolution of each indicator mentioned above from a year to another.

2. RESULTS AND DISCUSSIONS

Honey Production. Romania's production increased by 71.79% from 11.7 thousand tons in the year 2000 to 20.1 thousand tons in the year 2007. This was due both to the number of bee colonies but also to honey yield. Despite that the honey yield registered a slide decrease from 19.22 kg/beehive in 2000 to 18.56 kg/beehive in 2007, the number of bee colonies increased rapidly from 611,237 bee hives in 2000 to 1,085,905 in the year 2007.

The increasing trend of honey production in Romania is similar to the one in Europe where honey is more and more produced in different countries grace to its nutritive and energetic value, its peculiar benefit upon human health and food. During the analyzed period, honey production increased in Europe by 10.76 %, from 289.8 thousand tons in 2000 to 321 thousand tons in 2007. This was due to the increased honey yield from 15.98 kg/beehive in 2000 to 16.94 kg/beehive in 2007, but also due to the increased number of colonies from 18,136 thousand beehives to 18,951 thousand beehives in the studied period.

In the year 2007, Romania comes on the 7th position by the number of beehives after Ukraine (3,456 thousand beehives), Russia (3,155 thousand beehives), Spain (2,500 thousand beehives), Poland (1,450 thousand beehives), Greece (1,315 thousand beehives), France (1,015 thousand beehives). It also comes on the 7th position in Europe concerning honey production after Ukraine (80 thousand tons), Russia (56 thousand tons), Spain (31,25 thousand tons), Germany (20,5 thousand tons), France (16 thousand tons), Greece (15,9 thousand tons). Concerning honey yield, Romania comes on the 13th position in Europe after Belgium (71 kg/beehive), Sweden (62 kg/beehive), Finland (55 kg/beehive), Hungary (28 kg/beehive), Slovakia (23 kg/beehive), Moldova (23 kg/beehive), Ukraine (23 kg/beehive), Austria (22 kg/beehive), Germany (2 kg /beehive), Portugal (20 kg/beehive), Estonia (18 kg/beehive) , Russia (18 kg/beehive).

Romania’s honey production represented 4.03% of Europe’s honey production registered in the year 2000 and 6.26% in 2007, reflecting the increasing importance of our country as honey producer among the European states.

This is a good point for Romania because at world level, honey production decreased by about 15%, from 1,255.2 thousand tons in 2000 to 1,073 thousand tons in 2007. In the year 2007, Romania’s honey production represented 1.87% of the world honey production compared to 0.93% in the year 2000. Based on its honey production record, Romania comes on the 23rd position in the word in the year 2007 (Table 1).

Table 1

Honey Production, 2000-2007 (1,000 Tons)

	2000	2005	2007	20007/2000 %
World	1,255.2	1,410.4	1,073.0	85.48
Europe	289.8	342.6	321.0	110.76
Romania	11.7	19.4	20.1	171.79
Romania’s Share (%) in :				
-Europe	4.03	5.66	6.26	-
-World	0.93	1.38	1.87	-

Honey Export (Tons) .Romania’s honey export decreased by 16.73% from 7,510 tons in 2000 to 6,254 tons in 2007, compared to the increasing trend both at European and world level. The European honey export increased by 33.07% from 82,923 tons in 2000 to 110,348 tons in 2007, while the world honey export increased by 9.60% from 373,616 tons in 2000 to 409,497 tons in 2007. As a result, the share of Romania’s honey export in the European honey export decreased from 9.05% in 2000 to 5.67% in 2007 and in the world honey export from 2.01% to 1.53% in the same period of time.

Among the European countries, Romania comes on the 4th position concerning honey export after Hungary (23,8 tons), Germany (23,7 tons) and Spain (13,8 tons) as mentioned in Table 2.

Table 2

Honey Export, 2000-2007 (1,000 Tons)

	2000	2005	2007	20007/2000 %
World	373,616	424,398	409,497	109.60
Europe	82,923	89,494	110,348	133.07
Romania	7,510	6,636	6,254	83.27
Romania's Share (%) in :				
-Europe	9.05	7.41	5.67	-
-World	2.01	1.56	1.53	-

Romania is among the most important honey producers and exporters both at European and world level.

The export share in honey production was 64.18% in 2000 and decreased to 29.65% in 2007, being considered a very high weight compared to other countries.

Despite this aspect, the share of Romania's honey export in the European honey export increased from 28.61% in the year 2000 to 34.37% in 2007. Also, the weight of Romania's honey export in the world honey export increased from 29.76% in 2000 to 38.16% in 2007. This is a positive aspect for Romania's image among honey producers in Europe and at international level , meaning that Romanian honey is well appreciated by consumers.

Honey Import (Tons).Romania doesn't look to be a strong honey importer because it is an important honey producer. Its honey import decreased by 82%, from 99 tons in 2000 to 18 tons in 2007. This decreasing trend is completely different compared to the European and world honey imports which have increased by 8.68%, respectively, by 13.16% during the analyzed period of time. As a result, the weight of Romania's honey import is very small, just about 0.0076% in the European honey import and 0.0042% of the world honey import in the year 2007.

Table 3

Honey Import, 2000-2007 (1,000 Tons)

	2000	2005	2007	20007/2000 %
World	372,194	424,417	421,200	1113.16
Europe	208,784	228,918	226,908	108.68
Romania	99	20	18	18.18
Romania's Share (%) in :				
-Europe	0.047	0.0087	0.0079	-
-World	0.026	0.0047	0.0042	-

Concerning the amount of imported honey, in 2007, Romania comes on the 20th position after Germany, United Kingdom, France, Spain, Italy, Belgium, Holland, Austria, Denmark, Slovakia, Poland, Greece, Sweden, Ireland, Czech Rep., Portugal, Hungary, Finland and Slovenia.

Honey Export (1,000 USD).The value of Romania's honey export increased by 45.55 % from 7,727 thousand USD in 2000 to 11,247 thousand USD in 2007. It happened a similar trend with the value of honey export in Europe and at world level. The value of the European honey export increased by 2.36 times during the period 2000-2007, from 149,563 thousand USD in the first studied year to 353,406 thousand USD in the last one. The value of the world honey export increased by 98.86%, from 453,839 thousand USD in 2000 to 902,524 thousand USD in 2007. Therefore, the more accelerated increasing rhythm of the value of the European export compared to the value of world export reflects that Europe has become a more and more important honey exporter at international level.

The share of Romania's honey export, in terms of thousand USD, decreased from 5.16% in 2000 to 3.18% in 2007, because of honey export price.

At world level, the weight of Romania's honey export, in terms of thousand USD, registered a similar trend, decreasing from 1.70% in 2000 to 1.24% in 2007.

Table 4

Honey Export, 2000-2007 (1,000 USD)

	2000	2005	2007	20007/2000 %
World	453,839	913,143	902,524	198.86
Europe	149,563	450,957	353,406	236.29
Romania	7,727	12,523	11,247	145.55
Romania's Share (%) in :				
-Europe	5.16	2.77	3.18	-
-World	1.70	1.37	1.24	-

Taking into account the value of honey export, Romania comes on the 5th position in Europe after Germany (85,318 thousand USD), Hungary (64,859 thousand USD), Spain (41,667 thousand USD) and France (25,997 thousand USD).

Honey Import (1,000 USD).In terms of thousand USD, the value of Romania's honey import was 4.51 times higher in 2007 compared to the year 2000 and this was due to the increased honey import price. But, during the period 2000-2007, the value of honey import varied from a year to another with a minimum level in the year 2005, when Romania imported 20 tons of honey at the average price of 1,282 USD/Ton.

Table 5

Honey Import, 2000-2007 (1,000 USD)

	2000	2005	2007	20007/2000 %
World	440,824	737,357	912,431	206.98
Europe	249,563	450,957	547,849	219.52
Romania	171	43	772	451.46
Romania's Share (%) in :				
-Europe	0.068	0.0095	0.140	-
-World	0.038	0.0058	0.084	-

The share of Romania's honey import registered an increasing trend in the European honey import from 0.068% in 2000 to 0.140% in 2007 and also at world level, its share increased from 0.038 in 2000 to 0.084% in 2007. However, the share of Romania's honey import is very small both at European and world level as mentioned before.

In 2007, concerning the value of honey import, Romania comes on the 21st position in Europe after Germany, United Kingdom, France, Italy, Holland, Spain, Belgium, Austria, Denmark, Sweden, Poland, Greece, Slovakia, Ireland, Czech Rep., Portugal, Finland, Hungary , Slovenia and Luxembourg.

Honey Export Price (FOB-USD/Ton).In case of Romania, honey export price increased by 37.23% from 1,375 USD/Ton in 2000 to 1,887 USD/Ton in 2007. At European level, honey export price varied from a period to another, but generally speaking, it also registered a substantial increase by 77.56 5 during he period 2000-2007. In 2007, the world honey price was 1.81 times higher than in 2000, reflecting the highest increase and meaning that countries from other continents have contributed with higher prices to the average expert price at international level.

Making the comparison between the export honey price got by Romania and the average European price, we could say that Romanian honey has been exported at a lower price and this remark is also available compared to the average honey price at world level.

Table 6

Average Export Price, FOB-USD/Ton

	2000	2005	2007	20007/2000 %
World	1,214.72	2,151.62	2,203.98	181.43
Europe	1,803.64	5,08.96	3,202.65	177.56
Romania	1,375.00	1,282.00	1,887.00	137.23
Romania's Share (%) in :				
-Europe	76.23	25.44	58.91	-
-World	113.19	59.58	85.61	-

Based on honey export price registered in 2007, Romania comes on the 22nd position after: Luxemburg, Estonia Cyprus, Greece, Ireland, Slovenia, United Kingdom, France, Austria, Denmark, Italy, Poland, Letonia, Sweden, Germany, Lithuania, Belgium, Spain, Holland, Finland and Hungary.

Honey Import Price (CIS-USD/Ton) registered an increasing trend in Romania but also at European and world level. Romania's import honey price increased by 24.85% from 1,730 USD/Ton in 2000 to 2,330 USD/Ton in 2007.

Comparing Romania's import price with the average import price at European and world level, we could say that Romania imported honey at a higher price than the European and world price.

In 2007, based on import price , Romania comes on the 19th position in Europe after Luxemburg, Malta, Finland, Letonia, Cyprus, Estonia, Greece, Ireland, Austria, Portugal, Lithuania, Holland, Denmark, Poland, Czech Rep., France, Hungary and Belgium.

Table 7

Average Import Price, CIS-USD/Ton

	2000	2005	2007	20007/2000 %
World	1,184.39	1,737.34	2,166.26	182.90
Europe	1,795.32	1,969.95	2,414.41	201.98
Romania	1,730.00	2,150.00	2,330.00	124.85
Romania's Share (%) in :				
-Europe	144.98	109.13	96.50	-
-World	146.07	123.75	107.55	-

3. CONCLUSIONS

1. During the period 2000-2007, honey production increased in Romania especially because of the increased number of bee hives /apiary and less due to honey yield.

2. At European level, Romania is among the most important honey producers after Russia, Spain, Germany, France and Greece.

3. It is also a very important honey exporter after Hungary, Germany and Spain, bringing its contribution to the European exports.

4. Honey imports do not represent an important aspect of Romania's honey trade.

5. At European level, in the year 2007, Romania comes on the 7th position concerning the number of beehives and honey production, on the 13th position related to honey yield, on the 4th position referring to the amount of exported honey, on the 20th position related to the amount of imported honey, on the 5th position related to honey export value , on the 21st position referring to honey import value , on the 22nd position linked to honey export price and on the 21st position related to honey import price.

6. Romania is one of the most important honey producers and exporters in Europe. But it should pay more attention to honey yield in order to increase more rapidly its production. It also should stimulate its export by promoting Romanian honey on various markets, emphasizing on its special quality determined by the large variety of flora compared to honey produced by other countries.

REFERENCES

1.*Popescu Agatha*, 2006,Aspects and trends in the world honey market. Scientific Papers the 35th International Scientific Session of Communication, Series D, Vol.L, Animal Science, p.245-250

2.*Popescu Agatha*, 2006, Aspects and trends of honey market in Europe, Scientific Papers the 35th International Scientific Session of Communication, Series D, Vol.L, Animal Science, p.251-256

2.*Popescu Agatha*, 2010, Home and Foreign Trade, Dominor Publishing House , Bucharest

3.www.beekeeping.com

4.www.icdapicultura.ro

5.FAOStat.org

6.Romania's Statistical Yearbook, 2008

The 39th International Session of Scientific Communications of the Faculty of Animal Science, Bucharest, Romania
Scientific papers (seria D; vol. LIII) – Animal Science

EGYPTIAN CAMELS (REPRODUCTION&PRODUCTION&DISTRIBUTION)

IBRAHIM MOSTAFA A.R.
Department of Animal Production, Faculty of Agriculture,
Kafrelsheikh University Egypt

Key words: camels, Egypt, distribution, production

SUMMARY

Egypt has a total area of about one million square kilometer of which only 3% are used for agricultural production. The population is increasing at an annual rate of 2.5% and is expected to reach 85 million by the year 2010. The per capita consumption of animal products is very low, approximately 18g / day. Mean animal per capita consumption is 9.8 Kg of red meat, 50 Kg of milk, 7 Kg of white meat, 5.1 Kg of fish and 4.2 Kg of eggs. The annual growth rate of animal production has remained around 4.2% from the total animal breeds in Egypt. Over the recent years, the demand for meat has grown and imports of meat have increased. Animal production in Egypt represents about 30% of total agricultural production. The majority of farms are family farms. They are less than one hector with mixed livestock and crop production. There are 129,200 camels in Egypt. Total number of camels in Egypt differs from year to year, but it increased in the last 10 years according to FAO statistics and some Egyptian Organizations as Ministry of Agriculture and Veterinary Service Organization. The number of camels / 1000 heads was 0.17, 0.57, 1.9 and 87.65 heads in the urban, lower, upper desert governorates of Egypt and private farms, respectively. The statistics that shows the size of camel's meat production (in quantity) and numbers of animals are conflicting according to the source information. Camels average meat production / year during the year 1987-1991 was about 0.4% from the total meat produced in Egypt. The number of camels slaughtered was 20000 heads (National Agricultural Research Project,1993), while League of Arab States (1994) reported that the camel meat produced was 29000, 30000 and 32890 Tons during the year's 1991,1992 and 1993, respectively. Veterinary Service Organization (2002) statistics showed that the number of slaughtered camels in Egypt during the year 2000 and 2006 were 109960 and 127836 heads, respectively. Moreover, the numbers of camel females who were able to give birth last year were 40000. It is of interest to note that meat production from camels was higher than that produced from each of goats and ducks during the years 1999 and 2006. In Egypt, a good daily milk production of the she camel of 10-15 Kg per day was obtained (Shalash, 1979) giving a yield of approximately 3000-4000 Kg per lactation. The average length of lactation in camel is 12 months, but it may vary from 9 to 18 months. The daily milk yield varied according to the number of milking per day. Camels in the 4th parity showed the highest mean daily average yield. It may also be beneficial to increase of camel's meat by increasing the number of camels produced locally and improving camel reproduction and fertility. Development of an artificial insemination system, in combination with successful synchronization of estrus and induction of ovulation are all necessary for applying selection program and for more rapid genetic improvement in Egyptian camels.

1. Numbers and distribution

1.1. Numbers

Total number of camels in Egypt differ from year to year, but it increased in the last 10 years according to FAO statistics and some Egyptian Organizations as Ministry of Agriculture and Veterinary Service Organization.

Table 1

Number of camels (Heads) in Egypt from 1980 to 2006

Years	FAO	Ministry of Agriculture
2009	129000	126000
2006	127000	129290
2003	120000	127500
2002	135000	127079
2001	134000	150255
2000	141000	140747

1.2. Distribution

Distribution of camels in Egypt differ from governorate to the other. The camels number increased in desert governorates (Red Sea, Marsa Matroh, North Sinai, South Sinai and Wadi EL-Gadid governorates). The number of camels /1000 capita was 0.17, 0.57, 1.9 and 87.65 heads in the urban, lower, upper and desert governorates of / Egypt, respectively. These values were calculated according to the number of population in these areas. Urban Governorates **(Cairo, Alexandria, Port- Said and Suez),** Desert Governorates **(Red Sea, El-Wadi El-Gidid, Matrouh, North Sinai and South Sinai), (Bekele, and Zeleke (2000).**

2. Meat production

Table 2

Camel's meat production is as about 6.91 % from total red meat produced in Egypt, during 2006

Years	Ton / l000 heads				Total red meat	Camels (Tons / 1000 heads)	Camels (% of total red meat)
	Cattle	Buffalo	Sheep	Goats			
2009	4.9	4.2	1.21	0.58	11.1	0.79	7.3
2006	5.6	4.6	1.33	0.62	10.6	0.71	7.5
2002	3.51	4.36	1.07	0.47	9.41	0.65	6.91
2001	3.57	4.39	1.09	0.47	9.52	0.75	7.88
2000	3.77	4.24	1.08	0.48	9.57	0.58	6.06

Camels average meat production / year during the year's 1987-1991 was about 0.4 % from the total meat produced in Egypt. The umber of camels slaughtered was 20000 heads. The camel meat produced was 29900, 30000 and 32890 Tons during the year's 1991, 1992 and 1993. Veterinary Service Organization (2006) statistics showed that the number of slaughtered camels in Egypt during 2000 and *2006*, were 109960 and 127836 heads, respectively. It is of interest to note that meat produced from camels was higher than that produced from each of goats and ducks during the last years 1999 to 2006.

3. Milk production

In Egypt, a good daily milk production of the she camel of 10-15 kg was obtained giving a yield of approximately 3000 - 4000 kg per lactation. Daily yields of 22 kg have been recorded. Daily production was only 4 kg, with a total production of 1500 kg with grazing in the deserts Meat of young camels is comparable in taste and texture to beef. The dressing percentage of the carcass varies between 48 and 60%. The carcass % of camels is similar to carcass % of grazing cows and buffaloes. Camels younger than 5 years have less protein, fat and ash than in the older camels.. Young camel's meat may be more preferable to consumers due to the decrease of fat jevels in camel's meats than other animal. It may be beneficial to increase of camels meat by increasing The number of camels produced locally.

4. Camel reproduction

Camel grows slowly, reaching puberty at a later age than other livestock species. Sexual maturity was probably reached at 3-5 years. The gestation period is about (12-13 months) with the result that the age at first calving is generally 5-7 years. Camel birth weight ranges between 30 and 36 Kg. Male calves weight is slightly heavier than in females. The camel has a longer breeding life than other domestic species, and fecundity increase with age declining only with the onset senility.

The low reproductive performance is one of the most important factors affecting camel productivity. Factors contributing to low fertility in camels are many and complex, for example: the advanced age at puberty (3-4 years) and hence late age at first calving, the limited libido of males and hence limited breeding opportunities, the relatively short breeding season e.g., in Egypt the breeding season of dromedary camels is restricted to about three months (from late November to early March), The long gestation period of 13 months and late postpartum estrus. In addition. Poor pastoral management systems prevail in regions where camels are raised adversely affecting camel reproduction and productivity. The parasitic orchitis due to trypanosomaisis was the most harmful disease of camels. Also Brucellosis was proved to cause chronic epididmo-orchitis, leading to persistence and spread of lowering reproductive potentials of these camels.

Studies carried out on slaughter material indicated that the female dromedaries are polyestrous breeders with marked fluctuation in ovarian activity during the breeding season. Ovulation to camels is non-spontaneous i.e., they are induced ovulators which means they normally only ovulate when mated. Graffian follicles develop in one or both ovaries reaching a mature size of between 1.3-1.7 cm in diameter. This mature follicle stage lasts about 4-6 days in general and in the absence of mating or ovulation-inducing treatment, this mature follicle will regress and another follicle will start to develop. Development of an artificial insemination system, in combination with successful synchronization of estrus and induction of ovulation, are all necessary for applying selection programs and for more rapid genetic improvement in Egyptian camels. Previous studies have shown that an alpaca dummy could be used to collect semen from alpacas and therefore, a camel dummy was designed and constructed for easy and reliable semen collection from camels as designed by El- Hassanein Camel Dummy.

References

1. ***Animal Welfare Information Center (2003).*** Information resources on old world camels Arabian and Bactrian 2003.USDA,ARS,NAL.
2. ***El-Gasim,E.M. and El-Hag, G.A. (1992*****).** Carcass characteristics of the Arabian camel.Camel Newsletter. 9:20-24
3. ***El-Hassanein E. (2003).*** An invention for easy semen collection from dromedary camels. International Veterinary Information Service, New York, USA.
4. ***FAO (2004).*** JOR FOOD AND AGRICULTURAL COMMODITIES AND PRODUCERS. http:/www.Fao.org.agriculture data base htm
5. ***Gahlot, T.K (1998).*** Future of camels. Third annual meeting for animal production under arid condition. (Camel production and perspectives). Organized by: Faculty of Agricultural Sciences United Arab Emirates University. May 2-3. Al-Ain.
6. ***Ibrahim, M.A (2006)*** camels, horses and donkeys production and reproduction. Orvwo Publishing company.

DYNAMICS OF AMINO ACID COMPOSITION OF POLLEN

DABIJA TATIANA
The State Agrarian University of Moldova

Key words: families of bees, collecting pollen, pollen, amino acids.

SUMMARY

The major components of pollen are proteins and amino acids, lipids (fats, oils or their derivatives) and sugars. There are present all essential amino acids for human nutrition (fenilalanine, leucine, valine, isoleucine, arginine, histidine, lysine, methionine, threonine and tryptophan), proline is most abundant. At the bees families in April were installed at the bottom of the beehive the pollen collectors. Daily after 18 o'clock pollen was collected. From pollen collected during the month there were taken samples, which were dried at a temperature of 65. Dry pollen was crushed and then determined the amount of amino acids in each sample. Of total amino acids in pollen, the largest share is glutamic acid from 16.503 to 26.158 mg / g, proline 15.280 to 22.543 mg / g and asparagic acid 11.529 to 16.734 mg / g (Table 1). In small amounts were detected methionine from 0.495 to 1.614 mg / g and tryptophan from 1.281 to 2.962. The quantity of amino acids varies throughout the year and depends on the existing honey, a figure seen from the data that the maximum amount of amino acids in the pollen was collected from the lime, in June - 162 243 mg / g. Contains pollen from sunflower constituted approx. 121.100 mg / g of amino acids. Fruit tree pollen contains 143. 523 mg / g amino acids.

INTRODUCTION

Biological quality of hive products is closely related to how families are treated bees. Environmental quality plays a very determined role, the effect is depending on the activity of bees and their metabolism at the making moment. Ecological quality of hive products also depends on the conditions under which they are harvested, handled and preserved properly.

Pollen is the only source of fat and protein for larvae because of their amount of nectar is trivial.

Pollen is a very valuable biological product, because of its components and is food and basic protein and vitamins to bees, providing them the necessary mineral salts. The chemical composition of pollen varies greatly according to origin, geographical area, age and how to harvest and storage time and conditions (Mărghitaş L., 1997).

Pollen of some plant species is richer in protein than others. Among the most valuable species is pollen from fruit trees and clover. High biological value of pollen resulting from large and varied content in essential amino acids, essential for life, amino acids that can not be produced by bees, which is why it is necessary to administer their in food.

The chemical composition of pollen is highly variable, depending on the species from which flower comes.

In general, freshly harvested pollen contains 19-22% water and 78-82% solids, of which 19-40% sugars, 0.19 to 15% fat, 7-35% protein (amino acids - 10%) 1-7% ash. There are in the pollen many minerals, hormonal substances, enzymes and many vitamins, which confers high biological value of pollen. Is to note that of the 22 amino acids, 20 are present in pollen.

Mănişor Maria (1991), presents chemical composition of pollen from one species to another as quantitatively, the following elements: water and solids, of which 13-45% protein substances, sugars, fats, vitamins, minerals , pulp, an antibiotic, a growth factor, yeast (invertase, zaharaze, catalase). Biological efficiency and nutritional value of pollen species are closely related to honey and it comes directly proportional to protein content. Thus, pollen from conifers have much lower biological value compared to willow pollen, fruit, pumpkin, clover, sainfoin, rape.

Major components of pollen are proteins and amino acids, lipids (fats, oils or their derivatives) and sugars. There are present all essential amino acids for human nutrition (fenilalanine, leucine, valine, isoleucine, arginine, histidine, lysine, methionine, threonine and tryptophan), proline is the most abundant.

Ursu N. (1998), after the research says that, pollen humidity is 20-24% and after drying them it does not exceed 12.5%, pH 4.4. Pollen contains 30% protein. In it have been identified 32 amino acids, it was 5-6 times more than in beef and virtually no different from products such as egg powder, casein, royal jelly. Pollen contains 2-14% fat, 26% sugar, 9% - cellulose, 15% starch, a source rich in vitamins, especially those in group B and E.

Nicolau Nadia (1989) presents that pollen as a food of plant origin of which protein contains all essential amino acids in relatively equivalent to amounts of other plant and unbalanced proportions.

After Besliu M., Nistor al., (1992), Младенов С., (1984), the chemical composition of pollen depends on plant species. Pollen contains albuminoidal substances 7.05 to 29.5%, from 0.94 to 11.5% fat, 18.9 to 42% sugars, 0.7 to 16.0% water, and 0.9 to 6.4% ash.

Minerals in pollen are very precious; some amino acids are components of other phospholipids and others of the coenzymes. Most of them serve bee during metamorphosis in formation of its shell chitin (Mărghitaş L. 1997).

In pollen are present of essential most amino acids: asparagine, proline, alanine, methionine, gantamine, serine, aminobutiric acid, arginine, cystine, etc.. (Calalb M.2007).

Moise Adela, Mărghitaş L., Dezmirean D., (2004), say that bees play as good biological indicators because they indicate the environmental chemical load by launching two signals: high mortality (in case of pollution by pesticides) and residues in their body or their products (in case of pollution by pesticides or other pollutants such as heavy metals).

In researches of Русакова Т., Бурмистрова Л., et al (2006) was demonstrated that environmental pollution with toxic elements directly influence the quality of pollen and propolis.

Вахонина Т., Бодрова Р., (1979) studied the chemical composition, physico-chemical indices of pollen and other properties to be standardized. Evaluating the quality of pollen were studied following indicators: humidity, iodine, the amount of nitrogen, crude protein, albumin, amino acids, minerals, crude, calcium, phosphorus, carotene, ascorbic acid, also organoleptic indices.

Researches goal is to study the dynamics of amino acid composition of pollen collected during active season.

MATERIAL AND METHOD

To achieve the objectives put, the object of investigations have served families of bees from the apiary didactic - experimental of The State Agrarian University of Moldova.

At the bees families in April were installed at the bottom of bee heave the pollen collectors. Daily after 18 o'clock pollen was collected.

From pollen collected during the month there were taken samples, which were dried at a temperature of 65.

Dry pollen was crushed and then determined the amount of amino acids in each sample.

Findings of amino acids was performed by the method of Плешков Б.П. (1976), using amino acid analyzer (AAA-T-339) and the laboratory of Sanodiagnostic and Sanopronostic at Institute of Physiology and Sanocreatology of Academy of Sciences of Moldova (ASM).

The data were processed by statistical variation method, using Microsoft Office computer programs (Microsoft Excel).

RESULTS AND DISCUSSIONS

Of total amino acids in pollen, the largest share of glutamic acid from 16.503 to 26.158 mg / g, proline 15.280 to 22.543 mg / g and asparagic acid 11.529 to 16.734 mg / g (Table 1). Small amounts were detected of methionine from 0.495 to 1.614 mg / g and tryptophan from 1.281 to 2.962.

Table 1

Dynamics of amino acids found in pollen collected during the active season, mg/g, year 2009

Group of amino acids	Amino acids	Pollen*				
		April	May	June	July	August
Monoamino-monocarbonics	Alanine	9,368	7,902	9,507	6,740	8,846
	Valine	8,223	7,708	8,686	5,737	6,754
	Glicine	7,909	6,711	8,538	6,430	6,901
	Leucine	12,193	11,001	12,995	9,619	11,067
	Isoleucine	6,043	5,621	5,827	4,582	5,584
	Serine	7,518	6,995	8,055	5,321	7,468
	Threonine	4,516	4,380	4,230	3,087	3,703
Sulphuric	Methionine	1,614	0,495	1,811	0,702	0,949
Cyclic - aromatized	Fenilalanine	7,526	6,713	8,040	6,368	6,873
	Tirosyne	3,995	3,701	4,651	3,431	3,997
Heterocyclic	Histidine	4,258	3,557	6,096	6,917	4,365
	Proline	15,280	17,828	19,708	22,543	22,255
Monoaminodi-carbonic	Asparagic acid	16,734	15,817	18,419	11,529	13,201
	Glutaminic acid	21,495	21,003	26,158	16,503	19,790
Diaminomono-carbonic	Arginine	6,273	5,613	8,964	1,284	5,436
	Lisyne	5,608	5,056	6,708	6,707	6,495
	Cistine	2,008	1,464	2,454	2,319	2,785
	Tryptophan	2,962	2,247	1,396	1,281	1,311

Samples collected were dried at T-65°C.

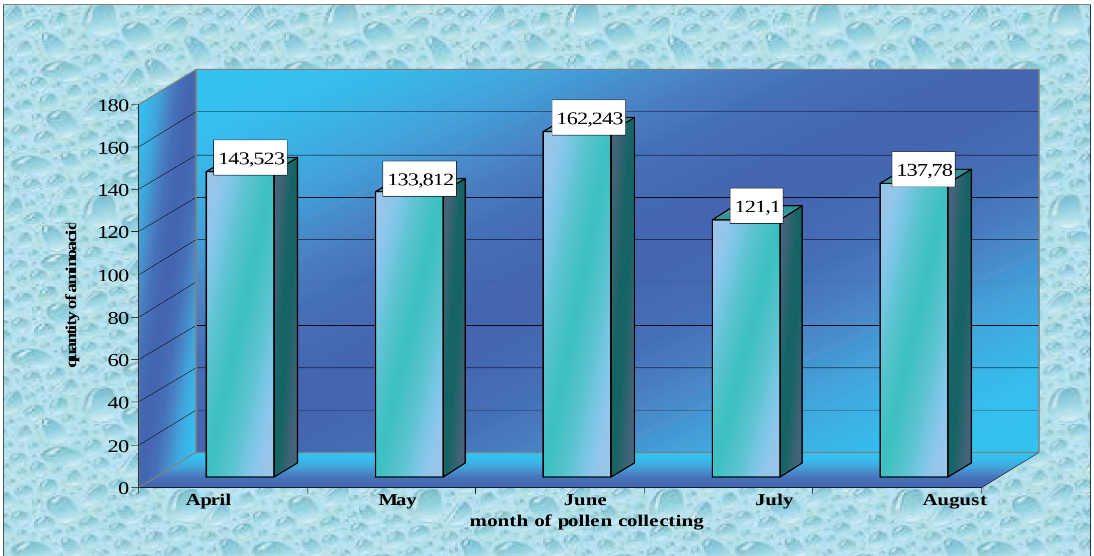


Figura 1. Quantity of aminoacids in pollen, mg/g, 2009

Table 2

Dynamics of amino acids found in pollen collected during the active season,% of total, 2009 year

Group of amino acids	Amino acids	Pollen*				
		April	May	June	July	August
Monoamino-monocarbonics	Alanine	6,527	5,905	5,860	5,656	6,420
	Valine	5,729	5,760	5,353	4,737	4,902
	Glicine	5,510	5,015	5,262	5,310	5,010
	Leucine	8,495	8,221	8,009	7,943	8,032
	Izoleucine	4,210	4,200	3,592	3,783	4,052
	Serine	5,238	5,995	4,964	4,393	5,420
	Threonine	3,146	3,273	2,607	2,549	2,688
Sulphuric	Methionine	1,124	0,370	1,116	0,580	0,689
Cyclic - aromatized	Fenilalanine	5,243	5,016	4,955	5,258	4,988
	Tirosine	2,783	2,765	2,866	2,833	2,901
Heterocyclic	Histidine	2,966	2,658	3,757	5,712	3,170
	Proline	10,646	13,323	12,147	18,615	16,152
Monoaminodi-carbonic	Asparagic acid	11,659	11,820	11,352	9,520	9,581
	Glutaminic acid	14,976	15,695	16,122	13,627	14,363
Diaminomono-carbonic	Arginine	4,379	4,194	5,525	1,915	3,945
	Lisyne	3,907	3,778	4,134	5,538	4,714
	Cistine	1,399	1,094	1,512	1,915	2,021
	Tryptophan	2,063	1,679	0,860	1,057	0,951
Total quantity of amino acids	-	100,0	100,0	100,0	100,0	100,0

Samples collected were dried at T-65°C.

The quantity of amino acids varies throughout the year and depends on the existing honey, a figure seen from the data 1 says that the maximum amount of amino acids in the pollen was collected from the lime, in June - 162 243 mg / g. Contains pollen from sunflower constituted approx. 121.100 mg / g of amino acids. Fruit tree pollen contains 143 523 mg / g amino acids.

Analyzing table 2, it is possible to confirm that the total amount of amino acids in pollen collected during the active season, it is about glutamic acid 13.63 to 16.12%, proline 10.65 to 18.61% and asparagic acid from 9.52 to 11.82%.

There was detected small amounts of methionine and tryptophan, respectively, from 0.37 to 1.12% and 0.86 to 2.06% of total amino acids.

CONCLUSIONS

1. For more efficient use of the biological potential of bee families is proposed in addition to honey production and the production of secondary products and the first of pollen.

2. In the pollen deposited during active season the total amount of amino acids was 121.1 to 162.243 mg / g.

3. The amount of biologically active substances (amino acid) in pollen is not identical and largely depends on the season and plant species on which it was collected.

REFERENCES

1. *Beşliu M., Nistor Al.* Creșterea albinelor. Ed. Apimondia, Bucureşti. 1992, p. 99.
2. *Calalb M. et.al.* Afaceri apicole. Chişinău, 2007, p. 173.
3. *Mănişor Maria.* Baza meliferă. Bucureşti. 1991, p.16.
4. *Moise Adela, Mărghitaş L. et.al.* Studiul privind utilizarea albinelor ca bioindicatori ai calității mediului înconjurător.// Simpozion Internațional „Apicultura în contextul noilor cerințe europene"//. Timişoara, 2007, p. 160.
5. *Nicolau Nadia.* Produsele stupului, hrană, sănătate, frumusețe. Ed. Apimondia, România, 1989. p. 48.
6. *Ursu N.* Polenul și păstura. Revista Pomicultura, Viticultura şi Vinificația în Moldova. Chişinău, N.1. 1998, p. 29.
7. *Вахонина Т., Бодрова Р.* О характеристике пыльцы. Пчеловодство. 1979, nr. 2-3, с. 14.
8. *Младенов С.* Мед и медолечение. Кишинев «Штиинца», 1984, с. 184.
9. *Русакова Т., Бурмистрова Л., Репнокова Л.* Экологическая безопасность продуктов пчеловодства // Апитерапия сегодня. Сб. 12. Рыбное. 2006, с. 284.

The 39th International Session of Scientific Communications of the Faculty of Animal Science, Bucharest, Romania
Scientific papers (seria D; vol. LIII) – Animal Science

THE MAGNETIC FIELD USED IN INCUBATION TECHNOLOGY OF HEN AND QUAIL EGGS

SCRIPNIC ELENA, I.U. SCRIPNIC, MODVALA SUZANA
The State Agrarian University of Moldova

Key word: magnetic field, hen eggs, quail eggs, hatchability

SUMMARY

In recent years, was found that factors such as ultraviolet and visible rays, laser irradiation, air ionization, magnetic field and their combination can stimulate the metabolic processes in biological objects, for example, improve the quality of hatching eggs, output and viability of young birds.

For eggs sanitation processing are used different modes with different intensities of irradiation. It was formed two experimental groups and one control group in hens' eggs and two experimental and one control in quail eggs.

Incubation results showed that maximum hatchability of hen eggs were obtained in experimental groups and it were 95.1% and 92.6% also compared with the control group increased by 5.5% and 3.0%. The experience developed with quail eggs in the same experimental groups the hatchability were 93.5% and 93.7% or 3.3% and 3.5% higher compared with control.

Maximum effect in experiments with chicken eggs proved to be covered by continuous irradiation mode with a duration of 10 min., and in the experience with quail eggs maximum effect was in the experimental group where was used fractionated irradiation mode with a duration of 10 min.

INTRODUCTION

Getting high productive and reproductive indices in poultry exploitation may be possible only by using modern technologies.

One of the important stages of the production technology of poultry products is incubation of the eggs. Achieve high productivity index is influenced by a number of factors and measures are undertaken in hatchery process. The common method of sanitation what is used till now is formaldehyde fumes. Formaldehyde has a negative influence on staff health and poultry health. Ultraviolet rays, ozone and magnetic field can serve as alternative methods.

At mid of last century Russian scientist M.V.Travkin (1971) has determined that all biological objects are influenced by magnetic fields. M.V. Travkin studied the magnetic field effect from the cell to the animals and birds.

Based on literature data, it is necessary to note that the magnetic field effect depends on the season, time of day, atmospheric pressure and intensity of earth's geomagnetic field.

Purposeful complex influence of physical factors on the biological object, synchronized with the biologically active frequencies, taking into account the structural features of the object will effectively solve some problems. Wide range of applications of electromagnetic energy fluctuations in agricultural production processes are due to several reasons, namely: high-quality impacts, flexibility and precision process control, and most importantly - the electromagnetic field has a specific and curative properties (Ахмедов, В 2003; Кузин, Н.Н,, Пушкарский, В.В. 2000).

In veterinary practice, is increasingly used a variety of electromagnetic radiation in a wide range from radio waves to gamma radiation. One of the most promising areas is the use of millimetre (mm) waves, which include a wave with a length of 1 to 10 mm and a frequency of 30 to 300 GHz. Biological effects of millimetre waves on living organisms due to a number of theories that are based on the basic biophysical effects of the impact of low-intensity millimetre radiation (excitation of acoustoelectric oscillations in the plasma membranes of cells - Fröhlich oscillations, mechanism of hydration of the protein under the action of MM-radiation, the mechanism of formation of water memory;), they are characterized by a no thermal information action (Devyatkov, N. Galante, M., Betsky, O.V, 1994).

Vaccination in ovo index improved hatchability and had no effect on embrio mortality. Magnetic field and the vaccination in ovo increased the synchronization of hatching (Neidziolka, Jerzy; Marchin, Lis; Barbara Szymonpwicz, 2001).

Using magnetic field technology was successful in hatching of goose eggs. Determining the mechanism of the magnetic field, however, remains complicated, but based on the mechanism of action of ultraviolet rays on eggs, namely by decreasing the number of microorganisms on the egg shell and increase the mineral content of vitamins in the egg caused the study on indices of magnetic field chicken and quail hatching eggs.

MATERIAL AND METHOD

Scientific studies have been conducted within the project 07/ind. of Academy of Sciences of Republic of Moldova. Studies on the effect of magnetic field on the hatching indices of eggs were conducted in the incubation station of reproductive centre and at the quail farm.

Biological object of study served hen eggs of meat breed and quails eggs. The magnetic field was generated by unit UEM-3. For processing were used different modes with different intensities of irradiation. It was formed two experimental groups and one control group of hen’s eggs and for quail’s eggs. The number of eggs in all groups was – 600 hen’s eggs and 150quails eggs. Incubation trays with eggs were treated with the magnetic field directly before placing in the incubator. For testing were used the following modes:

- continuous;
- fractional;
- impulsive 16GHz.

Each mode was used for irradiation for 10 minutes.

Incubation of the eggs was carried out by the generally accepted mode incubation (Orlov, B, 1987).

At the end of incubation, were conducted chickens sampling and their distribution between the qualities.

At the end of incubation, each egg was broken, and set the date for destruction of embryos, establishing the critical phase of the incubation period.

RESULTS AND DISCUSSIONS

After conducting experiments, were determined the indices of eggs hatching. The first index examined was the level of embryonic mortality in different phases of the incubation period of hen eggs, namely to determine the percentage of dead embryos in the early hours of incubation at 3-7 days and 19-20 days. Table 1 shows the results of biological controls.

Table 1

Mortality in embryonic chicken eggs developed during the period,%

Group	Fertilized eggs	Eggs with dead embryos, %						Total dead embryos	
		in first hours		3-7 days		19- 21 days			
		eggs	%	eggs	%	eggs	%	eggs	%
Control	547	9	1,6	11	2,0	37	6,8	57	10,4
Ex ICont. 10 min.	536	5	0,9	3	0,6	18	3,4	26	4,9
Ex.II Impul.10 min.(16 GHz)	525	5	1,0	8	1,5	26	4,9	39	7,4

The data presented showed that the maximum mortality was recorded during the first hours of incubation in the control group, so that in the experimental groups were lower compared to 0.7% and 0.6%. In the second phase have been critical of the maximum level of mortality in the control group, as well it was maximum in the control group by examining the results obtained at the end of incubation.

The maximum level of mortality throughout the incubation period was recorded in the control group - 10.4% or more compared to the experimental group I and II by 5.5% and 3.0%.

Experiments performed with quail eggs as embryonic mortality was examined at different stages in the tab. 2.

Table 2

Embryo mortality in quail eggs, %

Group	Fertilized eggs	Eggs with dead embryos, %						Total dead embryos	
		in the first hours		6-14 days		dead at hatching			
		eggs	%	eggs	%	eggs	%	eggs	%
Conrtrol	133	2	1,5	3	2,3	8	6,0	13	9,8
Ex I Cont – 10	124	3	2,4	-	-	5	4,0	8	6,4
Ex II Frac. - 10	127	1	0,8	1	0,8	6	4,7	8	6,3

The data in Table 2 show that the maximum level of embryonic mortality over the whole incubation period was recorded in the control group and it was higher compared with the experimental by 3.4% and 3.5%. The maximum mortality was recorded in the control group at the end of the incubation period being 6.0% compared with the experimental group I, continuous (10 min.) - 4.0% and in the experimental group II, fractional mode (10 min.) - 4.7%.

Another index studied in experiments carried out with hen eggs was getting graded the chickens. The results are presented in Table 3.

Table 3

Chickens received on the quality classes, %

Group	Total chicken	Grading			
		I		II şi III	
		heads	%	heads	%
Control	490	386	78,8	104	21,2
Ex I Cont. – 10/	510	402	78,8	108	21,2
Ex II 16GHz -10 /	486	380	78,2	106	21,8

Quality of chickens produced by class I in the control group and group exp. I continuously (10 min) was obtained 78.2% and 0.6% less in group exp. II 16GHz regime (10 min.).

Among the major indices were studied and eggs hatchability. The results are presented in table. 4.

Table 4

Results of chicken and quail hatching eggs

Group	Hens eggs					Group	Quail eggs				
	Total eggs		obtained chickens heads	Hatchability from total	Hatchability from fertilized		Total eggs		obtained chickens heads	Hatchability from total	Hatchability from fertilized
	placed in incubation	fertilized					placed in incubation	fertilized			
Control	600	547	490	81,6	89,6	Control	150	133	120	80,0	90,2
Ex .I Cont.10/	600	536	510	85,0	95,1	ExICon. 10/	150	124	116	77,3	93,5
Ex II16GHz 10/	600	525	486	81,0	92,6	ExII frac. 10/	150	127	119	79,3	93,7

Incubation results showed that maximum hatchability of hens eggs were obtained in experimental groups constituted and it were 95.1% and 92.6% and compared with the control group increased by 5.5% and 3.0%. The experience developed with quail eggs showed that in experimental groups the hatchability was 93.5% and 93.7% or 3.3% and 3.5% or higher compared with controls. Maximum effect in experiments with chicken eggs proved to be covered by continuous irradiation period of 10 min., and experience with quail eggs maximum effect had fractionated irradiation regime with a duration of 10 min. The experiments were continued and there were performed the microbiological tests.

Table 5

Microbiological indices of chicken and quail eggs

Groups	DN indices to test method	Indices	Hen eggs		Quail eggs	
			Content according to DN	Actual content	Content according to DN	Actual content
Control	Gost 10444 15-97 Gost 30518 -97 Gost 30519-97	NMMAFA, UFC/g ,max coliforme bacteria in 0,1 g Salmonella in 25 g	$5x\ 10^3$ not allo	$3,4x10^2$ not detec	$5x\ 10^3$ not allo	$2,2x10^3$ not detec.
Ex I	Gost 10444 15-97 Gost 30518 -97 Gost 30519-97	NMMAFA, UFC/g ,max coliforme bacteria in 0,1 g Salmonella in 25 g	$5x\ 10^3$ not allo.	$<1x10^1$ not detec.	$5\ x\ 10^3$ not allo.	$2,0x10^3$ not detec.
Ex II	Gost 10444 15-97 Gost 30518 -97 Gost 30519-97	NMMAFA, UFC/g ,max coliforme bacteria in 0,1 g Salmonella in 25 g	$5x\ 10^3$ not allo.	$5x10^1$ not detec.	$5x\ 10^3$ not allo.	$1,5x10^3$ not detec.

Microbiological analysis showed that the minimum content of organisms was detected in experimental groups, which were made up of hatchability indices. No pathogenic bacteria were detected in any one of the lots.

CONCLUSIONS

1. Effect of magnetic field was proved by obtaining the maximum level of hens and quails eggs hatchability. In the experimental group with continuous mode, 10 min., hatchability of hen eggs was 95.1% or by 5.5% were increased compared with control. The experience made with quail eggs was recorded in both experimental groups with the control group difference of 3.3% and 3.5%.

2. Microbiological experiments showed that the microbial load was the minimum on the eggs shell activated with magnetic field, that favoured obtaining maximum indices in the experimental groups compared with results from control groups.

3. Maximum effect in experiences occurred in hens egg incubation had continuous mode of activation with magnetic field activation during 10 min., and maximum effect was obtained in the quails eggs incubation using fractional mode of activation with the magnetic field duration activation of 10 min.

REFERENCES

1. 1. *Ахмедов, В.* Электромагнитные излучения в технологических процессах птицеводства. – Птицеводство. № 3, 2003. – стр. 5-8;
2. 2. *Девятков, Н., Галант, М., Бецкий, О.* Особенности медико – биологического применения милимитровых волн. – М.: ИРЭ РАН, 1994 стр.30-32;

3. 3.*Кузин, Н.Н,, Пушкарский, В.В.* Основание устройства для стимуляции развития эмбрионов птиц электромагнитными полем. - Кубанский Государственный Аграрный Университет. № 381, 2000. – стр. 83-96, 255;
4. *Орлов, А.К.* Биологический контроль в инкубации. – Москва. Рассельхозидат, 1987. – стр. 223;
5. 5.*Травкин М.П.* Жизнь и магнитное поле. Белград 1971 стр. 82-120;
6. 6. *Niedziolka, Jerzy; Marcin, Lis; Barbara, Szymonowicz* Влияние магнитного поля в период инкубации на процесс вылупления цыплят, вакцинированных in ovo против болезни. – Folia Univ. Agr. Steth Zoot.

The 39th International Session of Scientific Communications of the Faculty of Animal Science, Bucharest, Romania
Scientific papers (seria D; vol. LIII) – Animal Science

STUDY OF AMINO ACIDS IN LEAVES OF NECTAR-POLLENOUS PLANTS, BEE PRODUCTS AND BEES BODY

EREMIA N., DABIJA T., DODON I., EREMIA I.
The State Agrarian University of Moldova

Key words: bee, pollen, pasture, honey, leaves of nectar-pollenous plants, amino acids.

SUMMARY

Since the quality and biological value of bees' products depend on the chemical composition and taking into consideration environmental conditions, the purpose of research is to study the composition of amino acids in leaves of nectar-pollenous plants, pollen, bee bread, honey and bee body all it has theoretical and practical interest.

Research of amino acids was performed on amino acid analyzer (AAA-T 339) in the laboratory of Sanopronostic and Sanodiagnostic of the Institute of Physiology and Sanacreatology of Academy of Sciences of Moldova.

It was found that leaves of nectar-pollenous plants contained 154 092 mg / g amino acids in pollen - 139 692 mg / g, in honey - 0.851 mg / g, in the body of the bee - 445 785 mg / kg.

From the total weight of amino acids in honey the most part has proline - 27.26%, in pollen - glutamine acid - 15.03% and proline - 13.98%, in the leaves of the honey plants - glutamine acid - 17.03% and bee body - 16.72%.

INTRODUCTION

Quality and value of bee products largely depend on the chemical composition of plant species, collection areas, maintenance conditions, families of bees, etc.

Culacov V.N., Rusacova T.M. (2003) stated that environmental pollution with harmful substances emitted by industrial enterprises and vehicles, care in itself dangerous toxic pollution of bee products. Collecting nectar and pollen from plants attacked by these factors, the bees become a dangerous source of pollution of bee products.

Amino acids play an important role in the synthesis of proteins, hormones, vitamins and other substances. Over several years we have studied the amino acid content in the body of bee and bee products.

It was established that the dynamics of amino acids in the body of bees is linked to age and change of metabolic processes. The maximum amount of free amino acids was detected in larval body at 1-3 days, and those related - during bee hatching from the cell (Eremia N., 1994).

Indispensable amino acids in pollen collected by hand is 45.31 (poplar) - 50.63% (maple) of the total, sainfoin and willow to 48.67 and 49.14% accordingly. As shown, the sainfoin and willow pollen is a valuable source of indispensable amino acids (Eremia N., 2009).

It was found that the major amount of bound amino acids contained in pollen collected by bees from flowers of pear 20330.0 mg /%, slightly less in cherry - 14489.2 mg /%. Pollen collected from cherry, are richer in asparagic acid, arginine, valine and threonine, and from the apple - in threonine (Eremia N.G., Usu N.A., Eremia N.M., 1993).

Since quality and biological value of bee products depend on the chemical composition and taking into account ecological, research purpose is to study the composition of amino acids in leaves of nectaro-pollenous plants, pollen, pasture, working bees and honey body all it has theoretical and practical interest.

MATERIAL AND METHOD

To achieve the put objectives, the object of investigations have served families of bees from the didactic experimental apiary of Faculty of Animal Husbandry and Biotechnology, State Agrarian University of Moldova.

During the year there were taken samples of bees, honey, pollen and leaves of nectaro-pollenous plants for determining the mass of dry, initial water content at a temperature of 65. Zootechnical analysis were performed by the methods applied by Petuhova E.A. (1981), Razumov V.A. (1982).

Findings of amino acids were performed by the method of Плешков Б.П. (1976) using amino acid analyzer (AAA-T-339) and the laboratory of Sanopronostic and Sanodiagnostic of the Institute of Physiology and Sanacreatology of Academy of Sciences of Moldova. Data were processed by statistical variations method using computer programs Microsoft Office (Microsoft Excel).

RESULTS AND DISCUSSIONS

Research results showed that initial water in leaves of nectar–pollenous plant is 60.61%, in the pollen and pasture - 9.94 to 10.51% and in the bees body - 61.96%. Hygroscopic water in pollen is 4.83% in the pasture - 2.21% and in the body of bees - 2.13%.

The total amount of amino acids in leavesof nectar –pollenous plants is -154 092 mg / g in the pollen brought ghemotoacele worker bees - 139 692 mg / g (Table 1). Pollen preservation and transformation process of amino acids in pasture quantity decreased by 6.619 mg / g.

Honey is a carbohydrate product but it contains amino acids, the total amount was 0.851 mg / g. It was found that bee body during the rest of winter preparation is containing 445 785 mg / g amino acids.

It was established that from all appreciated amino acids, the largest amount occupy monoaminomonocarbonic group (alanine, valine, glycine, leucine, isoleucine, serine, threonine) - 43.23% in leaves of nectaro-pollenous plants, in pollen and pasture - 36.62% and 36.53% , in honey - 29.85% and in the bees body - 47.24 %.

Monoaminodicarbonici amino group (asparagic acid, glutamine) in the studied samples is 24.09% (honey) - 27.29% (in leaves of nectaro-pollenous plants) of the total.

In the honey heterocilic amino group (histidine, proline) is 29.14%, in pollen 17.58% and in pasture - 15.82%, and in the body of bees - 7.01%. Aromatized cyclic-amino group (phenylalanine, tyrosine) is a lower percentage in honey - 3.88% in body of bees - 6.83% and leaves of nectaro-pollinous plants, pollen and pasture - 7.92-8 56%.

In the leaves of nectar-pollenous plant largest share has glutamine acid - 17.03% and asparagic acid - 10.26% of the total (Table 2).

Table 1

Content of amino acids found in leaves of plant, honey, pollen, pasture, honey and bee body, mg / g

Group of amino acids	Amino acids	Leaves of nectar pollenous plants*	Pollen*	Pasture*	Honey	Bee body*
Monoaminomono carbonic	Alanine Valine Glicine Leucine Izoleucine Serine Threonine	14,169 9,672 11,233 14,134 5,963 7,016 4,433	8,473 7,422 7,298 11,375 5,531 7,071 3,983	8,672 6,975 6,676 10,798 5,078 6,526 3,885	0,045 0,035 0,042 0,042 0,024 0,051 0,015	42,822 22,707 35,061 42,806 19,297 24,245 23,659
Sulphuric	Methionine	1,601	1,114	0,779	0,005	4,808
Cyclic - aromatized	Fenilalanine Tirozine	8,208 4,989	7,104 3,955	6,705 4,045	0,028 0,005	13,232 17,200
Heterociclic	Histidine Proline	3,492 11,986	5,039 19,523	4,286 16,770	0,016 0,232	9,897 21,334
Monoaminodi-carbonic	Asparagic acid Glutaminic acid	15,810 26,242	15,140 20,990	15,551 19,625	0,095 0,110	39,369 74,552
Diaminomono-carbonic	Arginine Lysine	5,165 8,010	5,514 6,115	6,307 5,877	0,049 0,036	22,616 22,838
	Cystine Tryptophan	1,715 0,254	2,206 1,839	3,245 1,273	0,007 0,014	7,080 2,262
The total quantity of amino acids		**154,092**	**139,692**	**133,073**	**0,851**	**445,785**

Samples collected were dried at T-65^{o}C

In pollen and pasture highest weight have three amino acids: glutamine acid from 14.75 to 15.03%, asparagic acid from 10.84 to 11.69% and proline 12.6 to 13.98%. But the composition of honey has the highest weight of proline - 27.26%, glutamine acid - 12.93% and asparagic acid - 11.16%.A lower weight has methionine (0.59 to 1.04%), tryptophan (0.16 to 1.64%), cystine (0.82 to 2.44) and tyrosine (0.59 to 3.24%). The bee body has a major share of glutamine acid - 16.72%, alanine - 9.61%, leucine - 9.60% and asparagic acid - 8.83%.

Table 2

Dynamics of amino acids found leaves of honey plant, pollen, pasture, honey and bee body,% of total

Group of amino acids	Amino acids	Leaves of nectar pollenous plants *	Pollen*	Pasture*	Honey
Monoaminomono carbonic	Alanine Valine Glicine Leucine Isoleucine Serine Threonine	9,20 6,28 7,29 9,17 3,87 4,55 2,88	6,07 5,31 5,22 8,14 3,96 5,06 2,85	6,52 5,24 5,02 8,11 3,82 4,90 2,92	5,29 4,11 4,94 4,94 2,82 5,99 1,76
Sulphuric	Methionine	1,04	0,80	0,59	0,59
Cyclic - aromatized	Fenilalanin Thirozine	5,33 3,24	5,09 2,83	5,04 3,04	3,29 0,59
Heterociclic	Histidine Proline	2,27 7,78	3,61 13,98	3,22 12,60	1,88 27,26
Monoaminodi - carbonic	Asparagic acid Glutaminic acid	10,26 17,03	10,84 15,03	11,69 14,75	11,16 12,93
Diaminomono-carbonic	Arginine Lizine	3,35 5,20	3,95 4,37	4,74 4,41	5,76 4,23
	Cistine Tryptophan	1,10 0,16	1,58 1,31	2,44 0,96	0,82 1,64
The total quantity of amino acids	-	**100,0**	**100,0**	**100,0**	**100,0**

Samples collected were dried at T-65^{o}C

CONCLUSIONS

1. There was found in leaves of nectar-pollenous plants contained 154 092 mg / g amino acids in pollen - 139.692 mg / g, in honey - 0.851 mg / g, in bee body - 445 785 mg / kg.
2. Of total amount amino acids the highest weight in honey has proline - 27.26%, in pollen - glutamine acid 15.03% and proline - 13.98% , in leaves of honey plants - glutamine acid - 17.03% and bee body - 16.72%.

REFERENCES

1. Eremia N. Apicultura. Chiºsnău, 2009, 332 p.

THE SILK RESOURCES MANAGEMENT – RAW MATERIALS PROCESSING INTO A HANDICRAFT TEXTILE CREATIVE WORKSHOP OF A REPRODUCTION SERICULTURAL FAMILY FARM

VIORICA SLADESCU[1], ALEXANDRA MATEI[2]
[1]National University of Arts Bucharest – Textiles Arts Department, Romania
[2]Commercial Society SERICAROM-Research department Bucharest, Romania

Key words: sericiculture, management, silk

SUMMARY

The paper presents a management system of the sericultural activities in family farms based on the principle of integration between the main activities, respective the production of reproductive biological material, with the processing of the waste products and the production byproducts obtained from the main activity. Having the goal of enhancing the profitableness of the activities of producing silkworm in a small production unit – the family farm – the project promotes continuation of processing byproducts and waste like unreeling cocoons and aurelias pupas.

The crafts shop for processing the unreeling cocoons was conceived and built up by a multidisciplinary of 9 researchers. The Staff represents the 5th partner of the INTEGRATED PRODUCTION AND DURABLE MANAGEMENT OF A REPRODUCTION SERICULTURAL FAMILY FARM project which took place in the laboratories of the Textile arts & design laboratory of the National University of Arts, Bucharest. The research was based on the study of traditional sericulture in the Romanian village, the huge variety of handcrafted textile products produced by the rural farms from silk cocoons, the advanced knowledge of textile technologies, the vast experience resulting from years of research in the field of Romanian sericulture and last but not least the creativity of the textile artists, designers and textile technologies specialists.

1. MATERIAL AND METHOD

The yearly production capacity of the family farm is approximately 400 kg cocoons of which a part are unreeling cocoons after the sorting and butterfly becoming processes. These waste products are destined to be processed in a crafts shop within an auxiliary and temporary activity. By processing the natural silk waste by-products can be created which can increase the profitableness of the farm and create winter activities, when farming is impossible. The methods and techniques of the applied research are specific for obtaining some products out of natural silk useful in clothing and interior design.

RAW MATERIAL	PRIMARY	Raw silk unreeling cocoons
	SECONDARY	Threads of other textile fibers (wool, linen, cotton, mohair, viscose)
TYPES OF TECHNOLOGY	FLEXIBLE AND COMPLEX MANUAL	Technological process of fiber preparation Technological process of spinning Technological process of Technological process of modeling Technological process of weaving Technological process of plait assemblage

		Technological process of finishing Technological process of packaging	
TERMS OF PRODUCTION	SPACE NECESSARY FOR DEVELOPMENT	25m2 maximum for full working capacity	
		7m2 minimum for equipment storage only	
	UTILITIES	Electricity, running water, sewage, sanitation	
	EMPLOYMENT	Seasonal and Flexible 1 or 2 persons, textile technician. Graduation of intensive study or practical training course in a specialized shop is mandatory. In the cold season work is done in the crafts shop. In the warm season work is done at the farm developing silk worm.	
		Permanent 1 or 2 persons, textile technician. Graduation of intensive study or practical training course in a specialized shop is mandatory. Presenting possibilities of expanding of the farm through enhancing production or diversification of the craft shop's production.	
	EQUIPMENT	Equipment	
		Machines	
		Tools	
		Materials and others	
TEXTILE PROTOTYPE	HANDWORK USEFULNESS	Fashion design	Fabrics, Accessories, Textile Jewellery
	AESTETHIC FEATURE	Interior design	Decorative panels
	RAW MATERIAL	Threads of natural silk	Weavings, cloths, knittings and small tapestries
PRODUCTION MANAGEMENT	SPENDING, INCOME AND FINANCIAL RESULTS ESTIMATES RESULTING FROM PROCESSING UNREELING COCOONS WITH HANDICRAFTS TECHNOLOGIES		
	ASESSING PROFITS COMPARATIVELY FOR 50 kg. SPUN SILK COCOONS AND HENDICRAFT CREATVE TEXTILE INDUSTRIES / HANDWORKS SMALL SERIES AND UNIQUE.		

The applied research program has 5 stages which started in November 2005 in the National University of Arts, Bucharest laboratories. The workgroup formulated the documentary frame, determined the design theme, elaborated 265 sketches, drawings, data sheet and textile design projects.

The selection of the projects was based on criteria of aesthetics, creativity and economic rentability values. 50 diverse projects were selected to be produced as experimental models in the university laboratory.

The group experimented with textile techniques and technologies with creative applications in the processes of: cleaning, removal of the gum, all stages dyeing, (cocoon, fiber and thread), fluffing, spinning, weaving in the two variants (haute-lisse/vertical loom and basse-lisse/horizontal loom), whitening, moulding and assemblages (sewing, knotting and lamination), finish, packing and labeling.

The selection of the five technologies was based on criteria of accessibility, flexibility and productivity by the means of manual and ecological handicraft manufacturing.

The general technological process from raw material to the final product binds in a coherent manner the functional techniques and technologies in the natural silk processing shop. The technologies are described in the manual of the textile shop. The testing, sampling, standardization, quantity and quality checking, comparative analysis, the correlation between the processing techniques had the role of perfecting a production unit adequate to the specific activity in a sericulture farm.

The selection of the ten prototypes with documentation and technical data set forms the core of a flexible weaving and textile objects production. The two main aspects of the textile product: the utility and the aesthetics of it, which have to be merged in a harmonious fashion, define the value of the ten prototypes. The types of products are:

A. Raw materials and materials.
B. Clothing and fashion design accessories
C. Interior decorations
D. Unique creations in fiber arts

In July 2007 the crafts shop for processing unreeling cocoons received internal certification. In the next stage of the project took place the presentation and demonstration of the new weavings and textile objects to the public and potentially interested silk worm breeders.

All the equipment for the certified shop was funded by the research project, was transported and installed in a family farm with a mulberry tree plantation which was in the second year sericultural exploitation. The selection of this particular family farm was based on the experience in weaving the family members hold. The family farm is legally binded by a 5 year contract.

The project is ending in September 2008 when the first natural silk textile products entirely processed in the crafts shop of the Constantin and Cristina Niculescu family from Stoenesti, Valcea will be completed.

2. RESULTS AND DISCUSSIONS

In the context of information and ideas exchange the CEEX 40/2005 project facilitated, the applied research referred to in this paper has reached its goal of correlating simple processing techniques with the possibility of realizing a type of product design which utilizes in a creative way the uniqueness of manually labored textile objects.

Combining the inventory of the traditional Romanian village crafts shop with the new technological developments and the creativity of the researchers we have succeeded in creating a handicrafts unit viable in the context of the economic changes and transitions in the Romanian contemporary village. This textile shop aspires becoming an example of contemporary cultural creativity which can develop on the base of agricultural specific activities. The very modern aesthetic and utility qualities of the products design is correlated with the hand-made technology, the ethno tradition and the ecological characteristics demanded by the modern textile free market.

The method of entry on the free market for the handicraft textile products is of present interest and can constitute the basis for a future project with the goal of supporting the producers to obtain quality certificates, copyright, and creating a certified brand complying to commercial regulations.

3. CONCLUSIONS

The certified handicrafts workshop is currently in its first year of operation, undergoing tests and implementing technologies. The development of the shop is carefully monitored by professionals with the goal of becoming an economic and cultural factor with a large contribution in the primary objective of the project which constitutes the scientific substantiation of the family sericulture farm in the context of integrated production and management.

REFERENCES

- Albulescu I., Popescu Crişan – Operațiile finisajului textil, Editura Tehnică, Bucureşti, 1976.
- Beaulieu Michèle – Les tissus d'art, Ed. PUF, collection „Que sais-je?“ nr. 566, Paris, 1953.
- Bucurenci E., I. Bucurenci – Utilaje şi tehnologii de finisare a produselor textile, Cap. I, II, III (A, B, C, D, E, F, G, H), V, VI, VII, VIII,IX, XII, Editura Didactică şi Pedagogică, Bucureşti, 1978.
- Cascanian Sirag Haiguhi, Zaharia Iosub – Covoare manuale din noduri, Editura Tehnică, Bucureşti, 1965.
- Cassartelli E. – L'arte de disporre gli ornamenti sulle stoffe, Milano, 1910.
- Clouzot Henri – Histoire de la manufacture de Jouy et de la toile imprimée en France, vol. 1–2, Paris et Bruxelles G. Van Oest, 1928.
- Cox Raymond – Les soieries d'art depuis des origines jusqu'à nos jours. Hachette, Paris, 1914A.
- Enăchescu-Cantemir (Alexandrina) – Portul popular românesc, Ed. Scrisul românesc, Craiova. Enciclopédie contemporaine des métiers d'art – Le tissage, 1977.
- Fairchild's Dictionary of Textiles – Edited by Dr. Isabel B. Wingate, Professor of Retail Management N.Y. University, Fairchild Publication, Inc., New York, 1970.
- Flemming E., – Les tissus, Ed. Morancé, Paris, 1957.
- Focşa Maria – Scoarțe populare româneşti din colecția Muzeului de artă populară al României, 1970.
- Giudici, Oscarre – Tessuti di lana e di cotone. Analisi e fabricazione, Milano, 1925.
- Gruber A. – Ancien régime-Premier Empire, 1785–1805, L'art textile et la toilette, Riggisberg, Fondation Abegg, avril-novembre, 1989.
- Heutte R. – Les étoffes d'ameublement, Ed. Vial-Dourdan, 1980.
- Harlan Volker – Ce este arta, Discutie –Atelier ci Beuys
  Ifrim Savel – Ce ştim despre mătase, Ed. Tehnică, Bucureşti, 1985.
- Işfănoni Doina – Interferențe dintre magic şi estetic, Ed. Enciclopedică, Bucureşti, 2002.
- Ionescu Muscel Iosif – Fibrele textile la sfârşit de mileniu, Editura Tehnică, Bucureşti, 1990.

- Ionescu Muscel Iosif, Semerad Rădulescu – Structura şi proprietăţile fibrelor textile, Editura Tehnică, Bucureşti, 1970.
- Ionescu Muscel Iosif, Elena Precupeţu – Fibrele textile – Materii prime pentru confecţii, Cap. I–XI, Editura Didactică şi Pedagogică, Bucureşti, 1965.
- Luc Joly – Structure, IDEA, Elveţia, 1975.
- Lipovetski G. – L'empire de l' éphémère, Ed. Gallimard, 1987.
- Marchiş A., M. Macovei, T. Mureşan, Ionescu I. – Structura şi proiectarea ţesăturilor, Editura Tehnică, Bucureşti, 1964.
- Migeon Gaston – Les arts du tissu, Ed. Renouard, Paris, 1929.
- Mihai Mănescu – Curs pentru masterat; Semn primar, semnificare, semn plastic; Ordine şi dezordine; Retorică şi candoare în limbajul plastic, Biblioteca Universităţii Naţionale de Artă, Bucureşti, 2002.
- Meller Susan and Joost Elffers – Textile Design, New York, 1991.
- Pacchioni Anna – La seta nella moda attraverso i secoli, Edizioni Del Milione, Milano, 1952.
- Paşcanu Corneliu – Lâna, materia primă milenară, Ed. Tehnică, Bucureşti, 1982.
- Pellegrin N. – Les vêtements de la liberté (1780–1800), Ed. Alinéa, 1989.
- Ing. Gr. Penciu, ing. N. Macovei – Tehnologia ţeserii şi calcule în ţesătorie, Cap. II, IV (A, B), V, (A, B), VI, VII (A, B, C), VIII (A, B), IX (A, B), X (A, B, C, D), XI (A, B), XII, Editura Didactică şi Pedagogică, Bucureşti, 1978.
- Pinchetti, Pietro – Manuale del compositore de tessuti. Guida alla formazione delle armature per ogni specie di stoffe, Milano, 1910.
- Rădulescu S., N. Vlăduţ, D. Simionescu, A. Dodu – Prelucrarea fibrelor chimice în amestec Editura Tehnică, Bucureşti, 1966.
- Rothstein N. – L'étoffe de l'élégance, Ed. Thames et Hudson, Paris, 1990.
- Scott Philippa – The Book of Silk, Thames & Hudson Ltd, London 1993.
- Santangelo Antonino – Art italien. Le tissu du XII-ème au XVIII-ème siècle, Paris, 1960.
- Toussaint-Samat M. – Histoire technique et morale du vêtement, Ed. Bordas, Paris, 1990.
- Tuchscherer J. H. – Étoffes merveilleuses du musée historique des tissus de Lyon, Tome 1, Soiries françaises au XVII-ème et XVIII-ème siècle, Tome 1, Ed. Gakken – Japon, 1976.
- Vurpărean Andrei, Kurt Frühn – Fabricarea mecanică a covoarelor, Editura Tehnică, Bucureşti, 1971.

STUDIES ON PHYSICOCHEMICAL AND NUTRITIONAL ATTRIBUTES OF RAW MILK FOR CHEESE-BUFFALO

LIVIA VIDU, GH. GEORGESCU, I. VAN, ALINA UDROIU, R. POPA, DANA POPA

Key words: milk, buffalo cows, cheese, fat, protein, cholesterol

SUMMARY

Raw material is milk dairy products for 1000 as part of human nutrition, whose value depends on the nutritional and biological components in milk. Thus, lactose is able to be fermented by the action of lactic acid bacteria starter cultures for dairy products to obtain acidophilous. Another important component of casein cheese with a major role in getting this property with the clot, and the milk goes from liquid to gel state under the action of coagulating enzymes present in rennet or weak acids. Buffalo milk has a very high fat content 7.8% (7.5 to 8.2%) and lactose 4.9% (4.8% to 5%), which increases milk yield in dairy fat (cream, butter) and print a sweetish taste, good protein content 4.25% (4.0 to 4.3%), milk is rich in casein (85%), which favors obtaining a high efficiency cheese production.

FAO data show the weight fractions of casein (26% α casein, 51% β casein and 23% γ casein, whereas k casein is not detected). Lactoglobulin and albumin have a share of the factions as follows: 2% alpha-lactalbumin, beta- lactoglobulin 39%, 2% serum albumin and immunoglobulins 20%, the energy (calorie) is the largest (1145 kcal / kg), but the variation is insignificant.

In comparison with buffalo milk, cow milk following differences appear:
-dry-matter content is higher on average by 5%, fat 4.0%, 0.9% protein, 63% and energy value of mineral salts 0.01%, which is rich in Ca and P and poorer in Na and Cl;
-carotene content is lower, which makes fat milk and milk products to be less valued by consumers, except for whipped cream;
-fat cells are higher by 25-50% and the fat in buffalo milk melting and freezing points is reduced, causing a soft butter, not appreciated by consumers, although it has a pleasant aroma.

Buffalo milk compared to that obtained in sheep are similar in terms of dry matter content and is richer in protein but low in fat and more, by 11%.

1. MATERIAL AND METHOD

The present study was conducted in the county of Brasov, in villages Cincu and Dragus. The village Dragus samples were collected from 18 buffaloes, and the common Cincu samples were collected from 17 buffaloes. Samples were collected between August-September and most of the analysis was done with portable device ECOMILK. The main parameters that were determined were: fat content, protein content, lactose content, density and freezing point.

2. RESULTS AND DISCUSSIONS

The diverse chemical composition, milk can be considered a genuine nutritional factors. The nutritional value is conferred primarily by the major components, without excluding other components such as vitamins and enzyme.

Among the major components, milk proteins are important facets in this regard. The consumption of milk, consumers have an important contribution of amino acids, phosphorus and calcium. The nutritional value of milk proteins is usually assessed based on three indicators: nitrogen balance, digestibility and biological value (**Renaud, J.,** 1992). The nutritional value of milk is the ability to meet energy requirements in the body in plastic and stimulators role substances and to positively influence the health of the consumer. The nutritional value is the amount of energy and organic milk. The energy is developed on milk energy, when burning fat, carbohydrates and proteins in the human body. Biological value is given by proteins, minerals, vitamins, enzymes and antibodies in milk.

Studies in different countries (Italy, India, Egypt, Romania) have revealed that buffalo milk is low in cholesterol (8 mg), compared with 14 mg of cows milk,10 mg of goats milk and 11 mg in sheeps milk.

Calcium content of buffalo milk examined by us has averaged 194, 3 g, 74.3 g more than in cows milk.

The samples analyzed in the two localities studied were observed following:
-had a body fat percentage averaged 7,71% in the milk of buffaloes in village Dragus and 7,79% at the village Cincu. This fat percentage values are higher than those found by the buffalos in Bulgaria (7.04%) and Egypt (6.5-7.0%) (Borghese A., 2005). The Murrah breed, which holds the world record in milk production, the average is 7.2% fat;
- protein-content had averages of 4.75 to 4.81%, higher values existing in Turkey buffaloes milk (4.2-4.6%) but similar to those found in the races of India (tab. 1, 2).

Protein and fat content in milk, and milk total amount of special importance for processing milk into cheese. Thus, ANASB (Italian Buffalo Breeders Association) for mozzarella have developed an index to be able to calculate the amount of cheese:

Mozzarella (kg) =Milk (kg) x (3,5 x % proteins+1,23 x % fat -0.88) /100 (Borghese A., 2005)
-lactose in milk had average values ranging between 5.02% and 5.3%. Lactose (milk sugar) is composed of glucose and galactose, printing a sweet-tasting milk. Thus, lactose is able to be fermented by the action of lactic acid bacteria starter cultures for dairy products to obtain acidophilous.

Table 1

Qualitative parameters of buffalo milk, raw material, village Dragus -Brasov

Parameter	n	X±Sx	S	V%
% Fat	18	7,71±0,048	0,2	2,67
% Protein	18	4,75±0,05	0,23	4,39
% Lactose	18	5,3±0,18	0,76	14,33
Total non-fat substance (SNF)	18	9,89±0,066	0,28	2,89
Density (g/cm^3)	18	1.0282±0,219	0,93	3,3
Added water	18	6,93±0,45	1,91	27,6
Freezing point	18	-0.558±0,27	1,15	2,07

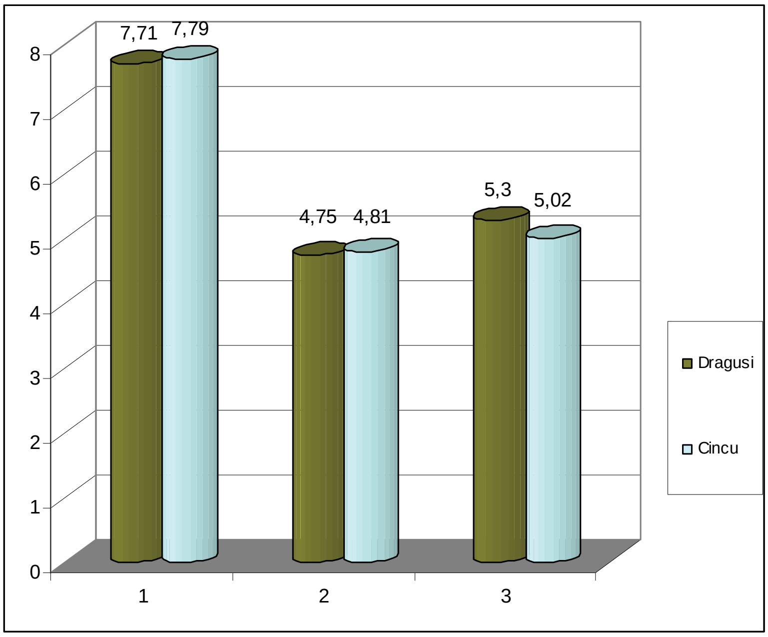
- determine the density of buffalo milk at least 2 hours after milking, at 20^0 C, and average values are between 1,029 and 1,033 g/cm^3. The samples we analyzed, the mean density was much lower due to higher fat content than average values.

- normally this water buffalo milk freezing point is -0.544^0 C. We analyzed samples had values of 0.56, which correlates with lower levels of density and milk with higher fat content.

Table 2

Qualitative parameters of buffalo milk, raw material, village Cincu -Brasov

Parameter	n	X±Sx	S	V%
% Fat	17	7,79±0,046	0,191	2,45
% Protein	17	4,81±0,034	0,141	2,94
% Lactose	17	5,02±0,13	0,54	10,75
Total non-fat substance (SNF)	17	9,93±0,52	2,17	23,09
Density (g/cm^3)	17	1.0284±0,15	0,62	2,21
Added water	17	6,49±0,27	1,14	17,59
Freezing point	17	-0.560±0,16	0,68	1,22



Graphic representation of the chemical composition of buffalo milk
1 - % fat, 2 -% protein, 3 -% lactose

3. CONCLUSIONS

1. Overall, sensory and physical-chemical properties of buffalo milk is different from the other species of animals producing milk. It has white color, taste and high nutritional value. Buffalo milk is consumed fresh after filtration and cooling to 4-6^{o}C, is

very popular in some regions. Also it is used with good results in making cheese more appealing (buffalo cheese, mozzarella) and yoghurt, often mixed with cows milk and cream, very good quality is required than consumers.

2. The study further showed that buffalo milk, raw material processing industry has a high calcium content (194.3 g), very high fat content 7.71% -7.79% higher than average values in other countries which are grown buffalo. The content of protein (4.75-4.81% is within the average limits of literature and the lactose content is higher than the average recorded in our country. Density and freezing point are important parameters for manufacturing techniques, which correlates with the addition of water and fat content.

ACKNOWLWDGEMENT

This work was cofinanced from the European Social Fund through Sectoral Operational Programme Human Resources Development 2007-2013, project number POSDRU/89/1.5/S/63258 ”Postdoctoral school for zootechnical biodiversity and food biotehnology based on the eco-economy and the bio-economy required by eco-san-genesys”

REFERENCES

1. *Borghese, A.*(2005)- Buffalo Production and research, FAO, Roma
2. *Cockrill, R.* (1977)-the water buffalo, FAO, Roma
3. *Renaud, J.* (1992) –Buffalo milk supply and technology of main traditional milk products, Prospects of buffalo production in the Mediterranean and the Middle Est, International Center for Agriculture, Doki (Cairo) Egypt, EAAP Publication No. 62
4. *Vidu, Livia* (2007)- Scientific report, Project 123/2006 CEEX: Quantification of morpho-productive performance and breeding of buffalo populations in Romania and setting improvement objectives in alignment with the EU perspective.

The 39th International Session of Scientific Communications of the Faculty of Animal Science, Bucharest, Romania
Scientific papers (seria D; vol. LIII) – Animal Science

STUDIES ON THE INFLUENCE OF QUANTITATIVE AND QUALITATIVE FACTORS ON THE ECONOMIC RESULTS OF A COMPANY

IOANA NICULAE, ALINA MĂRCUȚĂ, FLORESCU AURELIA, LIVIU MĂRCUȚĂ

Key words: investment, economic efficiency, financial efficiency, fixed capital, quantitative factor, qualitative factor

SUMMARY

The extremely high responsibility of the investment decision is given by the role of investments in the economy of economic operators, their economic, financial, social impact, the limited character of investment resources, and the risks involved.

The more efficient use of resources (the qualitative factor) has a stronger influence on the profit evolution than the quantitative factor (assigning a bigger part of the profit to investments) because the qualitative factor also provides a raise of the fixed capital value, which leads to the future determination of the economic result by both qualitative and the quantitative factors.

The economic efficiency of investments represents an objective necessity, especially within the market economy, which is governed by competition.

Within the system of competition, of free market, the entrepreneurial actions are competitive if they are efficient, meaning they ensure the obtaining of as large as possible results compared with the submitted efforts.

The accomplishment of projects or investments programs leads mainly to the raise of the fixed capital value, which will represent the main tool for the economic improvement of the company by creating new and more efficient structures.

1. MATERIAL AND METHOD

The study involved a company, which has a fixed capital of 535 million lei.

The following technical and economic indicators characterize the activity of the company: incomes - 1000 lei, fixed capital -1400 lei, profit rate – 15 %, depreciation rate – 9 %. 70 % of the investments are transformed into fixed capital and annually, 10 % of the working fixed capital is kept aside. At the end of the year, the resulted profit will be assigned as follows: 50 % for the payment of dividends, 30 % for net investments and 20 % for the acquisition of working capital. Three variants are prepared and the influence of changing the incomes to a fixed capital of 1000 and the influence of changing the weight of net investment on the economic results of the company are analyzed. In the respective year, the unfinished investments to be taken into consideration are of 20 million lei, and the outlook is of six years.

2. RESULTS AND DISCUSSIONS

The calculation of the influence of quantitative and qualitative factors on the economic results of the company involved the following steps:

- For each of the three variants, the table with the evolution of the main economic and financial factors for the forecasted period of six years was prepared;
- The result of changing the incomes to a fixed capital of 1000 lei (qualitative factor) was compared with the result of changing the weight of net investments in profit (quantitative factor) on the process of multiplying the fixed capital.

From the analysis of the values which are obtained for the three variants, it is established that the 2nd variant, which represents the influence of the qualitative factor (the change of incomes from 1400 lei to 1600 lei to 1000 lei of fixed capital), a quicker raise of profit than in the 1st variant takes place. The more efficient use of resources leads to the obtaining of bigger incomes and of a bigger profit, respectively. A bigger profit shall provide an additional raise of the volume of fixed assets in the context of the same rate of net investments. As a result, in the following years, the level of results - incomes, profit, investments - will be influenced by both the higher efficiency and the larger value of fixed capital.

Comparing the 3rd variant with the 1st variant, it is noticed that a higher profit is obtained in the 3rd variant as a result of assigning a higher percent of the profit to net investments, which leads to a raise of the working fixed capital, the obtaining of higher incomes and of a bigger profit, respectively.

The 3rd variant represents the influence of the quantitative factor, assignment of a bigger part of the profit to the performance of investments aimed to the increase of the manufacturing capability of the company.

Certainly, a bigger profit shall provide an additional raise of the value of the fixed capital in the context of the same rate of net investments. Therefore, in the following years, the level of results - incomes, profit, investments - shall be influenced by both the increased efficiency and the higher value of fixed assets.

1st and 3rd variants have almost the same profit path. The 2nd variant provides the quicker evolution of profit because the change of the qualitative factor, the economic efficiency of using the fixed capital lead to the same growth rate of the economic indicators (for the profit).

The more efficient use of resources (the qualitative factor) has a stronger influence on the profit evolution than the quantitative factor (assigning a bigger part of the profit to investments) because the qualitative factor also provides a raise of the fixed capital value, which leads to the future determination of the economic result by both the qualitative and the quantitative factors.

Table 1

1st variant - economic analysis indicators (thousand lei)

1st variant

V_1 = 1400 lei; d_1 = 50 %; i_1 = 30 %; c_1 = 20 %

Year	**Fixed capital**	**Annual incomes**	**Annual profit**	**Annual dividends**	**Net investments**	**Working capital**	**Annual depreciation**	**Gross investments**	**Decommissioning**	**Total investments**	**Commissioning**	**Unfinished investments**	Change of the capital value
1.	535	749	97.7	48.85	29.31	19.54	48.15	77.46	53.5	97.46	68.22	29.24	14.72
2.	549.72	769.61	100.38	50.19	30.11	20.08	49.47	79.58	54.97	99.58	69.71	29.87	14.74
3.	564.45	790.24	103.08	51.54	30.92	20.62	50.8	81.72	56.45	101.72	71.2	30.52	14.75
4.	579.21	810.89	105.77	52.89	31.73	21.15	52.13	83.86	57.92	103.86	72.7	31.16	14.78
5.	593.99	831.59	108.47	54.24	32.54	21.69	53.46	86.0	59.4	106.0	74.2	31.8	14.8
6.	608.79	852.31	111.17	55.58	33.35	22.23	54.79	88.14	60.88	108.14	75.7	32.44	14.82
7.			113.88							110.28			14.84

Table 2

2nd variant - economic analysis indicators (thousand lei)

2nd variant
$V_2 = 1600$ lei; $d_2 = 50$ %; $i_2 = 30$ %; $c_2 = 20$ %

Year	Fixed capital	Annual incomes	Annual profit	Annual dividends	Net investments	Working capital	Annual depreciation	Gross investments	Decommissioning	Total investments	Commissioning	Unfinished investments	Change of the capital value
1.	535	856	111.65	55.82	33.5	22.33	48.15	81.65	53.5	101.65	71.16	30.49	17.66
2.	552.66	884.26	115.3	57.65	34.59	23.06	49.74	84.33	55.27	104.33	73.03	31.3	17.76
3.	570.42	912.67	119.04	59.52	35.71	23.81	51.34	87.05	57.04	107.05	74.93	32.12	17.89
4.	588.31	941.3	122.78	61.39	36.83	24.56	52.95	89.78	58.83	109.78	76.85	32.93	18.02
5.	606.33	970.13	126.54	63.27	37.96	25.31	54.57	92.53	60.63	112.53	78.77	33.76	18.14
6.	624.47	999.15	130.32	65.16	39.1	26.06	56.2	95.3	62.45	115.3	80.71	34.59	18.26
7.			134.14							118.09			

Table 3

3rd variant - economic analysis indicators (thousand lei)

3rd variant

V_3 = 1400 lei; d_3 = 40 %; i_3 = 40 %; c_3 = 20 %

Year	**Fixed capital**	**Annual incomes**	**Annual profit**	**Annual dividends**	**Net investments**	**Working capital**	**Annual depreciation**	**Gross investments**	**Decommissioning**	**Total investments**	**Commissioning**	**Unfinished investments**	Change of the capital value
1.	535	749	97.7	39.08	39.08	19.54	48.15	87.23	53.5	107.23	75.06	32.17	21.56
2.	556.56	779.18	101.63	40.65	40.65	20.33	50.09	90.74	55.66	110.74	77.52	33.22	21.86
3.	578.42	809.79	105.62	42.25	42.25	21.12	52.06	94.31	57.84	114.31	80.02	34.29	22.18
4.	600.6	840.84	109.67	43.87	43.87	21.93	54.05	97.92	60.06	117.92	82.54	35.38	22.48
5.	623.08	872.31	113.78	45.51	45.51	22.76	56.08	101.59	62.31	121.59	85.11	36.48	22.8
6.	645.88	904.23	117.94	47.18	47.18	23.58	58.13	105.31	64.59	125.31	87.72	37.59	23.13
7.			122.17							129.08			

3. CONCLUSIONS

Based on the calculations which were performed, the more efficient use of resources (the qualitative factor) has a stronger influence on the profit evolution than the quantitative factor (assigning a bigger part of the profit to investments) because the qualitative factor also provides a raise of the fixed capital value, which leads to the future determination of the economic result by both the qualitative and the quantitative factors.

REFERENCES

1. *Ion Stancu* – Gestiunea financiară a întreprinderii – Ed. Domino, Bucureşti, 1993.
2. *Românu Ion, Vasilescu I. şi colab.* – Managementul investiţiilor – Ed. Mărgăritar, Bucureşti, 1997.
3. *Românu Ion, Vasilescu I.* – Eficienţa economică a investiţiilor şi a capitalului fix – Ed. Didactică şi Pedagogică, R.A. Bucureşti, 1993.
4. *Staicu Florea şi colab.* – Eficienţa economică a investiţiilor – Ed. Didactică şi Pedagogică, R.A. Bucureşti, 1995.

The 39th International Session of Scientific Communications of the Faculty of Animal Science, Bucharest, Romania
Scientific papers (seria D; vol. LIII) – Animal Science

SLAUGHTER CHARACTERIZATION OF TURKEY AT S.C. GALLI GALLO CODLEA COMPANY

LAZĂR ROXANA, BOIŞTEANU P. C., OTILIA CRĂCIUN, CASIANA PETRESCU
lazarrxn@yahoo.com
University of Agricultural Sciences and Veterinary Medicine
„Ion Ionescu de la Brad" – Iaşi

Key words: turkey, carcass, performances parameters

SUMMARY

The research conducted is part of a postdoctoral research program that aims the relationships between morphology and physiological status of the turkey's pineal gland in relation to the degree of somatic development. Inquiries are realized at S.C. Galli Gallo Codlea, which is the only breeding and slaughter high capacity unit of turkeys from Romania.

Measurements were performed on important specie in modern animal husbandry, respectively turkey, which can provide a wider area of knowledge regarding the relationship between the technology of growth, the modulation of microclimate parameters and growth performance.

We evaluated the following parameters: body weight variation in males and females, average daily gain, feed and water consumption and the results at slaughter regarding weight of carcass and the percentage of anatomical regions in carcass.

Physiology of the pineal gland and its implications in the expression of productive performance is a topic of interest to specialists in the field, combining basic research with technology management of the specie.

The physiological and metabolic role of pineal gland, assessed in the light of biochemical, hematological and hormonal parameters, offer the opportunity to identify correlations between environmental factors (perception of light as an important technological factor), whose modulation directly affect the steering of metabolism towards the anabolic component, through the complex physiological interrelations of protein, lipid, carbohydrate and mineral metabolism.

The study supports the possibility of finding technological solutions regarding growth and maintenance, which are involved in maximizing the somatic development and also to increase meat production through the research of physiology. The duality of fundamental research to the assessment of growth and maintenance management of turkeys was done by establishing the technological parameters which demonstrates the functional context of the body ability to express their genetic potential for meat production.

1. MATERIAL AND METHOD

As biological material was used But Big 6 hybrid, being taken into study a total number of 100 exemplars, randomized chosen (50 males and 50 females), aged between 84 and 140 days, bred on the ground and on permanent litter. The studied turkey group was marked individualy with rings, the birds beeing exploating in the halls of growth with the similar technologic conditions.The light program at this age group was 8N/16D, with an intensity of 20 lux.

Determinations were made regarding live weight, carcass weight, weight of the anatomical regions (upper leg, lower leg, breast and wings). We pursued and quantify water and feed consumption and average daily gain. Females were slaughtered at the age of 20 weeks and males at 24 weeks. The temperature in the halls of growth was 16° C with a humidity of 70%.

2. RESULTS AND DISCUSSIONS

The technological indicators of performance, established in the experimental protocol, were monitored, females and males, at the age between 12 and 20 weeks. At the differences between the gender has been reported and the average of productive performance from their initial halls of growth.

At females, we started to measure the dynamic of weight beginning with the twelfth week, in this period registering an average weight of 7,32 kg, the maximum being reached at 20 weeks, respective 13,49 kg.

Table 1

Parameters of productive performance at females

Week	Age (days)	Weight (kg)	S.M.Z (g)	Feed consumption/day (g)	Water consumption (mL)
12	84	7,32	128,6	343	66
13	91	8,22	128,6	360	68
14	98	9,09	124,3	380	73
15	105	9,94	121,4	399	76
16	112	10,74	114,3	414	79
17	119	11,50	108,6	416	80
18	126	12,22	102,9	427	81
19	133	12,88	94,3	437	83
20	140	13,49	87,1	450	86

The average daily gain was constant during 12 and 13 week, having a value of 128,6 g followed by downward slope up to 114,3 g at the 16th week and at 20 weeks it has recorded an S.M.Z of 87,1 g.

During the research, the food consumption recorded an daily grow, at 16 weeks being of 414 g while the maximum value was recorded at the end of the surveillance period, at 20 weeks being 450 g.

The water consumption was 66 mL at 12 weeks, while at 16 weeks this value was 79 mL, the maximum consumption being at 20 weeks of 86 mL.

Table 2

Parameters of productive performances at males

Week	Age (days)	Weight (kg)	S.M.Z (g)	Feed consumption /day (g)	Water consumption (mL)
12	84	9,88	191,4	433	82
13	91	11,24	194,3	454	86
14	98	12,61	195,7	483	90
15	105	13,96	192,9	511	96
16	112	15,30	191,4	541	101
17	119	16,61	187,1	556	103
18	126	17,90	184,3	584	108
19	133	19,16	180,0	614	114
20	140	20,39	175,7	644	119

Comparing to the females batch, at 20 weeks the males recorded a corporal weight of 20,39 kg. The medium daily gain was 175,7 g, while the medium food consumption was 644 g/ day and the water consumption was up to 119 mL. We observed a decrease of the medium daily gain, from 191.4 g recorded at 12 weeks up to 175,7 g at slaughter.

The results of slaughtering were appreciated by determining the weight of the carcass and the share of the anatomic parts in the carcass.

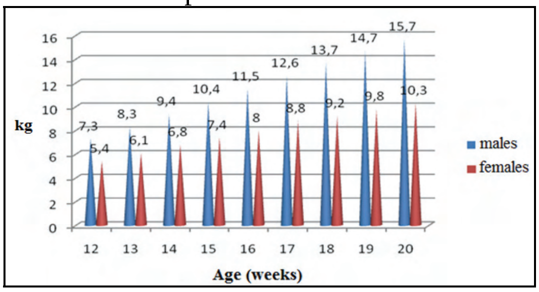


Fig. 1- Dynamic of turkey carcass weight regarding the age at slaughter

From the formatted groups, we slaughter every week a precise number of turkeys, in order to determine indicators for assessing the slaughter.

The weight of the turkey carcass reached the maximum at 20 weeks, being 15,7 kg at males and 10,3 kg at females.

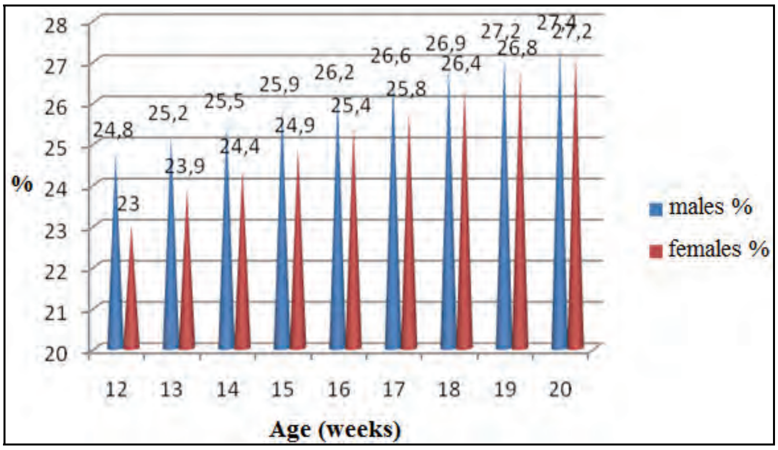


Fig. 2-The percentage of turkey without skin breast in carcass (%)

Assessment of slaughter results was made on the basis of the cutting anatomical parts from the carcass. The chest is the main part from carcasses of this specie, and the analysis of this indicator requires an assessment of skin weights, due to the deposition of subcutaneous fat on birds and consumer preference.

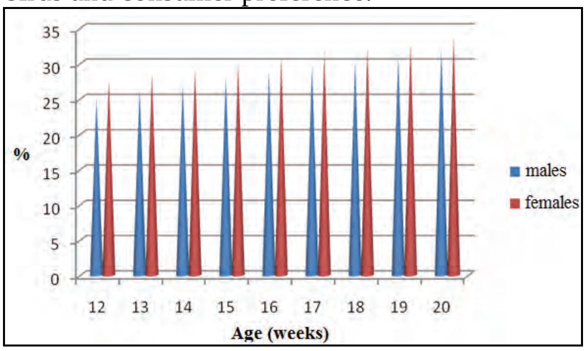


Fig. 3-The percentage of turkey with skin breast in carcass

The chest had the largest percentage of cutting. This signified 27,8% at females carcass with the age of 12 weeks compared with males which recorded at the same age 25,3%. At 20 weeks, the females had a maximum of 33,7% compared to males who recorded a percentage of the chest in carcass of 32,1%. At slaughter appreciation on turkey carcasses was made determinations both on the chest itself with skin and chest without skin. The skin of the chest showed an oscillation between 2,3% and 4,9% at 12 weeks, compared with females that were obtained at 12 weeks a rate of 3,0% to 6,3% at the end of study.

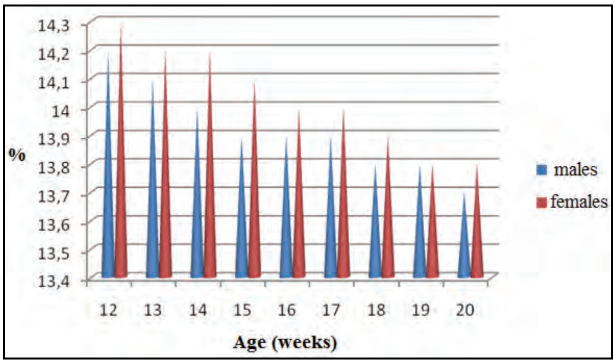


Fig. 4-The percentage of upper thighs in turkey carcass

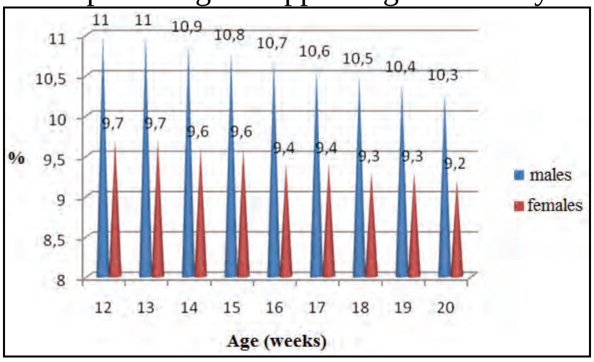


Fig. 5 – The percentage of the turkeys lower legs in carcass

The upper legs from females at 12 weeks age have seen a maximum of 14,3% followed by a decrease in the percentage who reached at 20 weeks at a rate of 13,8%. The same decrease was observed also at males, that started from a value of 14,2% at 12 weeks and reaching to 13,7% at 20 weeks.

Analyzing the proportions of lower legs, it was observed that at 20 weeks those represented 10,3% of male total carcass and 9,2% of female carcass.

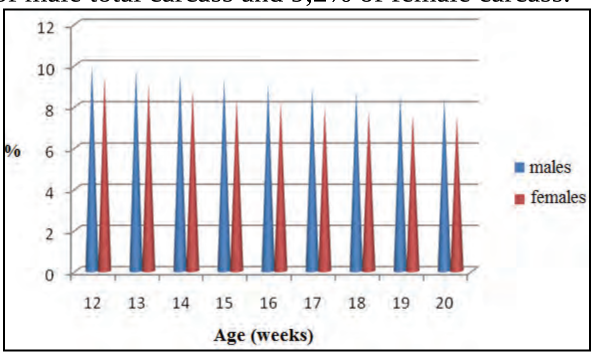


Fig. 6 – The percentage of the turkeys wings in carcass

The highest value was recorded at 12 weeks when males recorded a value of 10,1% and the lowest was obtained at 20 weeks when females recorded 7,5%.

3. CONCLUSIONS

This paper aims to characterize, trough the presented data, a control group of turkeys, females and males, kept in microclimate conditions and technological factors. Track parameters underlying referential values for the experimental group, where the implementation of changes in the lighting system influence epiphysis, endocrine functions and is responsible for coordinating the metabolism involved in growth and development.

ACKNOWLEDGMENTS

This work was cofinanced from the European Social Fund through Sectoral Operational Programme Human Resources Development 2007-2013, project number POSTDRU/I.5/S62371 „Postdoctoral Schole in Agriculture and Veterinarz Medicine area”.

The authors would also like to thank SC Galli Gallo for their support.

REFERENCES

- *András D.N., J. C. Valér*, 2007, Cry1 expression in the chicken pineal gland: Effects of changes in the light/dark conditions, General and Comparative Endocrinology, Vol 152, Issue 2-3, pp. 144-147.
- *Bailey M.J., P. D. Beremand, D. R. Hammer, T. L. Bell-Pedersen,V. M. Thomas Cassone*, 2003, Transcriptional profiling of the chick pineal gland a photoreceptive circadian oscillator and pacemaker, Mol Endocrinol, 17(10), , pp 2084-95.
- *Boisteanu P.C.*, 2000, *Glanda pineala si rolul ei in crestere si dezvoltare la pasari*, Editura Corson, Iasi.
- *Law, W.A., and L.N. Payne.* 1990. The poultry industry. F.T.W. Jordan, ed. Bailliare tindal, London, UK.
- *Siopes, T.D., G.R. Baughman, and C.R. Parkhurst.* 1993. Photoperiod and seasonal influences on the growth of turkey hens. Br. Poult. Sci. 66:521-527.

UNIUNEA EUROPEANĂ

GUVERNUL ROMÂNIEI
MINISTERUL MUNCII, FAMILIEI ŞI PROTECŢIEI SOCIALE
AMPOSDRU

fse
Fondul Social European
POS DRU
2007-2013

Instrumente Structurale
2007 - 2013

MINISTERUL EDUCAŢIEI CERCETĂRII TINERETULUI ŞI SPORTULUI
OI POS DRU

Universitatea de Ştiinţe Agricole şi Medicină Veterinară Iaşi

The 39th International Session of Scientific Communications of the Faculty of Animal Science, Bucharest, Romania
Scientific papers (seria D; vol. LIII) – Animal Science

EVOLUTION OF GOAT LIVESTOCK AND GOAT MILK PRODUCTION IN THE EUROPEAN UNION IN THE PERIOD 1999-2009

I. RĂDUCUȚĂ, I. CUSTURĂ, DANA TĂPĂLOAGĂ, A. MARMANDIU

Key words: number of goats, evolution, goat milk production.

SUMMARY

In Romanian agriculture goat rearing may become a future economic activity for farmers, providing better organization of the sector, adequate financial support and improving goat productivity through proper nutrition, selection and crossing with specialized breeds.

The aim of this paper was to make an analyze of goat breeding domain in EU, especially regarding the goats number situation and milk production between 1999-2009 period. In Romania, goat milk production is currently at a satisfactory level being ranked 4th in the EU after France, Greece and Spain, following the tradition of consumption, but the individual milk production should increase in the near future, so that increasing of goat milk production to make on basis of increasing individual milk yield and not by increasing the number of goats milked. It is imperative to find a way to better understanding of the goat sector in Romania and based on this approach to find suitable systems for growth and subsequent exploitation of this species, as those applied in developed European countries.

1. MATERIAL AND METHOD

The aim of this paper was to analyze the goat sector from EU, especially regarding the goat livestock and milk production in 1999-2009 period. For achieving this goal we have studied the official statistical databases of FAO, we calculated the percentage differences between the reference years and we interpreted the obtained data.

2. RESULTS AND DISCUSSIONS

The goat number evolution in the world is presented in table 1. As it can be seen from table 1 data the goats number in the world was estimated by FAO in 2009 at 867,969 thousand heads. Over the past ten years the goat livestock increase with about 18.91%, with an annual increase rate of 1.9%. As shown in table 1, the European continent is ranking at fifth in the number of goats, and we can observe also that it was in a continuously decreasing over the past ten years with a ratio of about 16.43%. The tendency to reduce the number of goats is also found in the European Union, being diminished with 16.43% in the past ten years. First place in the number of goats is held by Asia, followed by the African and South America, a situation that is correlated with human population.

The evolution of goat livestock in the EU countries is presented in table 2. As can be seen from table 1 the number of goats in the EU was estimated by FAO at 11.948 million head in 2009. As shown in table 2, the largest goat herds are located in sequence in the following countries: Greece, Spain, France, Italy and Romania. So from this point of view Romania ranks 5th in the EU.

Table 1

The evolution of goat livestock in the world
(source: FAO website, 2010) - thousand heads –

Specification	1999	2009	Differences (±%) 2009/1999
Africa	227,811	294,871	29.44
N+C America	14,474	15,996	10.52
South America	19,262	21,125	9.67
Asia	447,300	516,661	15.51
Europe	19,040	15,912	-16.43
Oceania	2,066	3,404	64.76
European Union	14,472	11,948	-17.44
Total World	729,954	867,969	18.91

Table 2

The evolution of goat livestock in the EU countries
(source: FAO website, 2010) - heads –

Countries	Year		Differences (±%)2009/1999
	1999	2009	
Austria	54,200	62,500	15.31
Belgium	-*	31,000	-
Bulgaria	1,047,611	429,834	-58.97
Cyprus	322,000	318,401	-1.12
Czech Republic	33,900	21,709	-35.96
Denmark	-*	-*	-
Estonia	2,100	3,600	71.43
Finland	7,900	5,924	-25.01
France	1,198,649	1,267,200	5.72
Germany	125,000	220,000	76.00
Greece	5,614,523	4,178,000	-25.59
Hungary	148,800	66,000	-55.65
Ireland	13,500	10,100	-25.19
Italy	1,331,000	957,300	-28.08
Latvia	10,492	12,900	22.95
Lithuania	23,700	16,600	-29.96
Luxembourg	-*	3,130	-
Malta	6,500	6,361	-2.14
Netherlands	153,000	416,000	171.90
Poland	190,000	118,842	-37.45
Portugal	676,000	485,000	-28.25
Romania	585,000	898,000	53.50
Slovakia	38,900	35,686	-8.26
Slovenia	16,805	24,228	44.17
Spain	2,779,000	2,264,900	-18.50
Sweden	-*	-*	-
United Kingdom	80,329	95,000	18.26

*no data available

Over the past ten years the goat livestock decreased in most of the european countries with a ratio between 1.12% (Cyprus) and 58.97% (Bulgaria), and in other countries the goat livestock was in a continuos increasing, like in Austria, Estonia, France, Germany, Latvia, Netherlands, Romania, Slovenia and United Kingdom.

The data presented shows that the goat livestock in the period under review a downward trend in countries with a tradition of growth and exploitation of this species (Greece, Italy, Spain, Bulgaria, Portugal) with the exception of France and Romania.

We do not know exactly what led to the goat herd reduction in these countries (the attractiveness of other species of domestic animals, poorly supportive of the sector, etc..), but in Romania goat livestock grew rapidly after the EU accession negotiations due to the attractiveness its (lack of milk quota, the possible establishment of modern farms through SAPARD program, promoting dairy products made from goat milk, etc.).

In France, goat livestock has also increased due to increasing demand for dairy products from goat's milk, both internally and especially externally, and excellent organization of the sector of production and processing of goat milk (the existence of strong professional and inter-professional federations – FNEC and ANICAP, which supports the farmers and processors through all ways and means specific).

The total world milk production in 2009 was estimated by FAO at 696,554 thousand tons. Normally, cow milk production has the greatest percentage (83.34%), being followed by buffalo milk production (table 3). Goat milk production ranks third in the world having just 2.17% of the total milk. In the EU milk production situation is different from the existing world, in that cow's milk has 96.77% (a huge percentage), followed by sheep milk with 1.87% and goat milk with only 1.22%, ranking the 3rd place also here.

Goat milk production worldwide has been estimated by FAO at 15,128 thousand tonnes in 2009 (table 4). Like as goat livestock, goat milk production in the last 10 years recorded a significant increase being 20.12% higher in 2009 compared with 1999 (2% annual growth rate). Asia ranks first in the production of goat milk, accounting for approx. 59% of total global production, followed by Africa (accounting for approx. 21%) and Europe (accounting for approx. 16%).

Table 3

The main types of milk in the world and EU in 2009 (source: FAO website, 2010) -thousand tons-

Specification	Total milk	Cow milk	Buffalo milk	Goat milk	Sheep milk	Camel milk
World milk production	696,554	580,482	90,334	15,128	8,975	1,636
Percentage (%)	100	83.34	12.97	2.17	1.29	0.23
EU milk production	153,033	148,086	217	1,866	2,864	-
Percentage (%)	100	96.77	0.14	1.22	1.87	-

Table 4

**The evolution of goat milk production in the world
(source: FAO website, 2010) - tonnes –**

Specification	1999	2009	Differences (±%) 2009/1999
Africa	2,615,368	3,206,195	22.59
N+C America	307,555	361,234	17.45
South America	184,471	182,440	-1.10
Asia	7,011,291	8,909,416	27.07
Europe	2,475,851	2,468,861	-0.28
Oceania	27	40	48.15
European Union	1,890,973	1,865,881	-1.33
Total World	12,594,563	15,128,186	20.12

Goat livestock in the EU although the period under review decreased by approx. 17.5%, milk production fell by only 1.33% in the same period, which shows that in the EU countries are growing and operated performant breeds of goats whose average milk production was continuously improved, and their feeding and maintenance shall be done according to very high quality standards.

Regarding the evolution of goat milk production in EU countries, from the data presented in table 5 we can see that with the exception of France, Latvia, Malta, Romania and Spain it has fallen in other countries in the union, even recorded a very significant decrease such as Bulgaria, Lithuania and Italy (67.96%, 67.02% respectively 59.79). In Romania, goat milk production has increased by approx. 45% in the period under review, due mainly to increase in numbers of goat livestock and less or not at all due to the increase of the average milk yield, as is the case of France, a country where milk production has increased by approx. 26% and only 6% in goat herd.

The most spectacular increase of goat milk production in the period under review was in Malta, where it has risen about 3.5 times, followed by Latvia, where milk production has almost doubled.

The data presented in table 6 show that the highest average individual production of goat milk is recorded on the European continent (239.4 kg/head/year) and implicitly in the EU (225.5 kg/head/year) and the smaller in South American continent and Oceania.

From these data can also be seen that the average individual milk production is about three times higher in European continent compared with that existing in the world. In Romania, the average milk production of goats is estimated by Goat Breeders Association (Caprirom) at approximately 270 kg/head/year. From this point of view, we stand at a low level compared with other EU countries (Germany, France, Czech Republic, Austria, etc..) where the average milk yield is between 500 and 1000 kg.

Table 5

The evolution of goat milk production in the EU* countries (source: FAO website, 2010) - tonnes –

Countries	Year		Differences (±%)2009/1999
	1999	2009	
Bulgaria	200000	64090	-67.96
Czech Republic	15154	8652	-42.91
Estonia	549	477	-13.11
France	495800	623460	25.75
Greece	526142	505000	-4.02
Hungary	4165	3200	-23.17
Italy	114400	46000	-59.79
Latvia	1726	3392	96.52
Lithuania	12320	4063	-67.02
Malta	277	1296	367.87
Portugal	34393	26877	-21.85
Romania**	126360	183346	45.10
Slovakia	13200	8200	-37.88
Slovenia	2160	1539	-28.75
Spain	404100	473000	17.05

* Only countries with data available in both years;**Data provided from Caprirom and own calculations.

Table 6

The evolution of average milk production of goats (kg/head/year) in the world (source: FAO website, 2010)

Specification	1999	2009	Differences (±%) 2009/1999
Africa	55.9	56.0	0.18
N+C America	180.8	185.2	2.43
South America	32.1	32.3	0.62
Asia	78.6	85.8	9.16
Europe	220.9	239.4	8.37
Oceania	28.1	30.7	9.25
European Union	212.5	225.5	6.12
Total World	81.4	84.3	3.56

3. CONCLUSIONS

1. In perspective, the worldwide trends of goat livestock and goat milk production are to maintain the current level or a slight increase over its 2009 level, due to

the increasing needs of the population for these nutritious sorts of cheese with a special flavor obtained from goat milk.

2. It is expected (especially in advanced countries and those in developing countries) as the goat average milk production to grow by improving various local races, using the infusion crosses with specialized breeds and selection for this character, together with improving the quantity and quality of the food used in goats.

3. In Romania, goat milk production is currently at a satisfactory level being ranked 4th in the EU after France, Greece and Spain, following the tradition of consumption, but the individual milk production should increase in the near future, so that increasing of goat milk production to make on basis of increasing individual milk yield and not by increasing the number of sheep milked.

REFERENCES

1. *Răducuţă, I.* (2007): The evolution of livestock, milk and goat cheese production in the european countries. Acta Universitatis Cibiniensis, Agricultural Sciences Series, Vol. 1, nr.1 (7), “Lucian Blaga” University of Sibiu, pag. 127-134.
2. *Răducuţă, I.* (2008): Filiera laptelui în România. Editura Cermi, Iaşi.
3. *Taftă V.* (2002): Producţia şi reproducţia caprinelor. Editura Ceres, Bucureşti.
4. *** (2010): www.fao.org

The 39th International Session of Scientific Communications of the Faculty of Animal Science, Bucharest, Romania
Scientific papers (seria D; vol. LIII) – Animal Science

ABOUT „ŢURCANA BĂLĂ DE BISTRIŢA”

ANNAMARIA BĂCILĂ, VASILE TURCULEŢ, VASILE BĂCILĂ

Key words: Turcana, local type, transhumant type, bala, transhumance, varosa

SUMMARY

Turcana Bala de Bistrita ecotype is the result of passion and hard work of some sheep breeders from Bistrita-Nasaud county. They, for several decades, have engaged in a constant selection towards increasing size, increasing endurance, increasing milk production and eliminate spots on the body. Thus, resulted a „bala” sheep (the feminine from „balan”, ie white), of great beauty, with a separate identity, with immaculate white wool and glow and of big size.

Turcana race is made up of two distinct types: the local type and the transhumant type, which also are divided into several types, varieties and morpho-productive types, influenced by exploitation conditions and factors as wel as by the natural or artficial selection.

Local Turcana , in its various types was formed in restricted areas, following an empirical selection usually based on the subjectivity of the breeder, on conservatism and many times on repeated inbreeding.

The transhumant Turcana type is superior to the local type and resulted following a more rigorous selection.

However, both types are very well acclimatized to the environmental and exploitation conditions and are perfectly adapted to the specific mode of practice sheep breeding in the areas where were formed. In the 1970-1980, in Bistrita-Nasaud county existed both types of Turcana, the local type on the Higher Somes Valley and the transhumant type on the Sieu Valley.

The differences between the yields obtained from the two types of Turcana, dissatisfaction of some local type breeders regarding the production obtained from the exploited sheep and the competitive spirit which was very present in the sheep breeding made that in some localities such as Budacu de Sus, Ardan and other localities from Bistrita Nasaud county with traditions in sheep breeding to be purchased Turcana white rams from the transhumant type from areas with long tradition, in which such sheep have had a real improvement (Cibin Valley – Sibiu county and Sebes Valley – Alba county).

The breeding effect of the rams purchased in that period was very evident, indicating that the rams brought from the Sebes Valley belonged to a genetically enhanced type, which favored the character transmission to the resulting products. Moreover, the rams brought from Loman, Sugag, Sasciori were white (no colored spots in the head area or on the body), the lambs obtained from them having no spots on the body.

Also in the 1970-1980, from Sasciori were purchased about 300 sheep „bale de Sugag” to be taken in Satu Mare county, in Negresti Oas. Here the „bale de Sugag” sheep were half-breed with Turcana sheep belonging to the local type from Oas Mountains, which was unilaterally selected for milk production. After several generations of crossbreeding with sheep performant in milk production and in conditions of abundant and corresponding feeding has been formed a new type of sheep „oaia de Satu Mare", spread in Negresti Oas, Vama, Certeze from Satu Mare county, but also in Barsana, Rozavlea or Mara from Maramures county.

These sheep, surnamed „varose" due to the pure and brilliant white color similar to the freshly applied lime, due to the wool and glow from the sides of the head, the legs and inner faces of the limbs, resulted from the transhumant type of Turcana sheep from the Sugag mountain area of Alba county, adapted, selected and improved in the Oas-Gutai mountain area of Satu Mare county and Maramures county.

In 1985, Toader PASTEAN acquired from Vasile TANTAS from Negresti Oas, the first 200 female „varose de Satu Mare" youth current year, ewes which in 1986 went to the mountain pasture. These ewes „varose de Satu Mare" led to much admiration and numerous comments. In order not to be outdone, in 1987 the breeders GANJ Cornel, HALOSTA Gheorghe and LEONTE Flore purchased other 100 adult sheep from the same TANTAS Vasile from Negresti Oas.

In the spring of 1987 were obtained in Bistrita the first lambs from the „varose de Satu Mare" ewes and in 1988 gave birth also the adult sheep brought in 1987, so that this type of sheep was spread in many areas of the county. Subsequently, white ewes and rams „varose de Satu Mare" were first purchased from Bistrita Nasaud county and then from Satu Mare county by Ioan CAMPIAN, which contributed to the spread of „bale" sheep in Bistrita Nasaud county.

Since the autumn of 1986, TURCULET Vasile also used for breeding rams purchased from Loman and in 1988, 1990 and 1991 he bought „bali" rams from Sugag, Sasciori and Jina. Purchasing further white ram „varosi de Satu Mare" in 1992, 1994, 1995, 1997 and 1998, TURCULET Vasile together with the breeders VOSTINAR Vasile and POP Sandu have formed a strong nucleus of „bale" sheep, with good milk production.

Since 1998, began also in Ilva Mica a program for the improvement of Turcana sheep sustained at first by the breeders MATEI Aurel and SANGEORZAN Avacum, which were later joined by MATEI Valer and BRUMA Gheorghe. At the same time, at Pietris, POP Vasile Florin and POP Ioan joined big brother POP Sandu so that the three breeding nucleus of white Turcana sheep predominantly „bale" numbered 2000 - 2500 heads in 1999. In Bistrita, breeder BANC Ionas agreed to join VOSTINAR Vasile so that in 2004 when all of them joined the Official Control of Production, could rely on already genetically stabilized effectives. Currently, among the „Bala de Bistrita" breeders is also BACA Ioan from Muresenii Bargaului and SARATAN Toader, BUHAI Viorel and others have further brought sheep, especially valuable rams from „varose de Satu Mare" type.

Turcana „Bala de Bistrita", formed in Bistrita Nasaud county, in the climatic condition of the county, in the nutritional conditions of this county, especially after the criteria or preferences of the local farmers, is clearly distinguishable from other types of sheep even similar, so that outsiders confuse them with it. Herds from selection of several generations of sheep shows a greater uniformity and have fixed those characters which gives them a distinct identity as the selection practiced constantly pursued increasing body size, increased resistance to effort, increase milk production and eliminate the spots from the body.I n this way was reached larger sheep with better milk production and no spots , ie „bale”.

The name „Bala de Bistrita” is specific for the area where was formed, this naming a type of Turcana which is clearly distinct from the types that have contributed in its formation. The selection process that led to the formation of „Bala de Bistrita” type of sheep with a duration of approximately three decades includes the period when the official control of production was performed by OARZ Bistrita Nasaud through which the results of selection were certified.

„Bala de Bistrita” type is characterized by proportioned body, harmonious conformation characteristic for mixed breeds, with a long body, large enough and deep, with straight back line, sometimes slightly saddled, croup slightly bevelled but long, relatively thin neck but well tight to the body, limbs relatively long and thin and with correct leg soundness, with strong bones, hard hooves, which favors the movement in the mountain area, and resistance to disease. The head is medium size, expressive and proportionate in length and width. Head profile is straight in females and convex in males. Has robust constitution, high resistance and vitality, with highlighted muscles and developed thighs.

The wool coat is formed of sharp slivers with clear layout, the abdomen is well dressed in thick wool and the extension of wool on the head is reduced, the color of wool and glow is white. As a distinctive feature of these sheep have to be mentioned the color of wool and glow that is pure white, so that on the sides of the head, the legs and inner faces of the limbs, the white is brilliant as freshly applied lime. Relative fiber length is 28 cm, the fineness of wool is over 38 microns. Wool is rich in light color wool oil - yellowish white. The females have back curved horns and the rams horns form is usually spiral, the tips of the horns are always directed outward. Lambs birth weight is between 3,55 and 4,0 kg, recording an average gain of 170 g /day, reaching at 75 days of age 18-20 kg, age at which lambs are weaned.

The quantity of wool varies according to age and sex and the average is around 3,9 kg in young females, 6,3 kg in young males, the average quantity of wool in adult females is 4,4 kg and in adult males the amount is 7,6 Kg.

The lactation lasts for about seven months, the total quantity of milk is between 140 and 160 Kg and the amount of milk milking is between 85 and 100 kg.

The percentage of natality is 115-120% and the percentage of fecundity is 96-98%.

Turcana race, white variety, **„Bala de Bistrita”** type has lively temperament and is docile, with highly developed herd instinct. The organic resistence and the adaptability are very pronounced, including maintenance outdoors in rainy and cold season, characteristics inherited from the parental types. It is well adapted to climatic conditions from Bistrita Nasaud county, highly valuing the hilly and mountain pastures, beeing less demanding in terms of feeding and housing.

Qualities that distinguish it as a distinct population in the race:

- resistance and adaptability to environmental conditions and high resistance to disease;
- more robust constitution;

- higher body development than other types of Turcana race reflected by higher body weight, waist, lengths, widths and depths;
- higher wool production;
- wool and glow color is pure white;
- the quantity of milk is higher than in other types of Turcana race;
- is easy calving without dystocia at birth, lambs have higher weight at birth and the maternal instinct is well developed;
- improved shape and symmetry of the udder and teats size.

The main morpho-productive parameters which were obtained from biometric measurements made in 2009 on Turcana „Bala de Bistrita" are presented in Table 1.

Tabel 1

Morpho-productive parameters registered at the Turcana „Bala de Bistrita"

No. of sheep mea-sured	No. of bree-ders	Weight kg	Waist cm	Body lenght cm	Chest depth cm	Chest width cm	Croup lenght cm	Tho-racic peri-meter	Shin peri-meter cm	Quanti-ty of wool kg
74	10	53.7	60,2	68,3	31,9	20,2	22,4	84,3	8.0	3,9
10	6	73.7	62,2	70,3	32,8	21,2	24,1	85,3	8,7	6,3
632	14	63.1	63,3	73,3	34,4	22.0	24,1	90,7	8,3	4,4
36	12	76.1	76,1	85,5	41.0	26,8	27.0	102,8	10,1	7,6

Following the selection made, it was reached a high degree of homogenity and a hereditary transmission of characters followed in the selection, so it can be concluded that the characters have already been genetically enhanced and the „Bala de Bistrita" sheep type qualifies to be recognized as a particular type of the Turcana race.

The breeding, selection and improvement of this beautiful sheep called Turcana „Bala de Bistrita" is performed under the umbrella and guidance of the „Dealu Negru" County Association of Mountain Sheep Breeders Bistrita Nasaud.

Fig. 1 December 1984 - Turcana sheep of the transhumant type from which the selection started

Fig. 2 December 2004 – Turcana „Bala de Bistrita" sheep

REFERENCES

1. *A.N.A.R.Z.* (2008) – Strategia cresterii si exploatării ovinelor în România
2. *Asociația Județeană a Crescătorilor Montani de Ovine „Dealu Negru" Bistrița-Năsăud* – Ameliorarea genetică a oilor de rasă Țurcană în județul Bistrița-Năsăud
3. *Asociația Județeană a Crescătorilor Montani de Ovine „Dealu Negru" Bistrița-Năsăud* – Istoricul tipului de oi „Bălă de Bistrița" aparținător rasei Țurcană
4. *Asociația Județeană a Crescătorilor Montani de Ovine „Dealu Negru" Bistriț- Năsăud* – Program de ameliorare genetică a ovinelor crescute de membrii A.J.C.M.O. „Dealu Negru" Bistrița-Năsăud
5. *Turculeț V.* – Eroare întâlnită în literatura de specialitate referitoare la rasa de oi numită Țurcană

CONSERVATION OF ROMANIAN BROWN BREED IN ORDER TO PRESERVE BIODIVERSITY

ŞONEA CRISTINEL, ROŞU ION, BĂCILĂ VASILE,
BĂCILĂ ANNAMARIA, DOROFTEI FĂNICĂ

Key words: Schwyz, Brown breed, animal inventory; productions, evolution, indicators

Brown Swiss Alpine breed or Brown breed was formed over 200 years ago in the Swiss Alps in the canton of Schwyz.

Brown breed is originally breed cattle populations brachicer type, over which cattle were overlapped to the Burgundians. On completion of the current type of mixed milk-meat production have contributed rigorous selection made over time, and favorable natural conditions and passion of Swiss farmers.

Over generations they have been set based on rac Brown inherited some outstanding individual qualities: strength, endurance, power adaptation, fecundity, longevity and a good capacity for recovery of feed volume.

These qualities have become characteristics typical of the breed very popular Brown, and in the shortest time, synonyms Brown breed cattle worldwide.

The aim of the current growth, which was fixed recently, once again gives priority to milk production, aiming to achieve a milk-meat mixed type, predominantly for milk production and good physical development.

If I were to characterize the synthetic breed type morpho-Brown is mixed milk-meat production, format and development body eumetric rectangular body (waist 136 cm and weight of 600-650 kg per cow, respectively 152 and 1000 cm kg for bulls).

The head is short, broad, expressive type brachicer. The trunk is large, the upper horizontal line, square and muscular rump, long and open the chest (53.5%), big belly, udder is large, globular, well attached, with developed glandular tissue, nipple milking uniform and good mechanical skills .

Uniform brown color is white ring around the muzzle. It has a mild temperament lively, robust constitution, vitality, disease resistance and high capacity for adaptation, especially in mountainous areas.

In Romania, the breed was brought to Brown for the first time in 1881 in Maramures, the Austrian forest workers. Following adaptation to the conditions of the area and good results on production in coming years, increased demands from farmers and followed the massive imports of cows and bulls of the breed Schwyz, which had spread to all major forestry centers as Borsa, Viseu, Sighet Dragomireşti, Vad, Cîmpulung the Tisza.

Philip N. as mentioned, the results of Schwyz breed crosses with local breeds were better than those with Pinzgau and Simmental, which led the Ministry of Agriculture to import animals from Switzerland in 1908 and founded the Runcun tamazlâc to improve breed Brown.

Cradle of training in our brown race remains Maramures region, where its name comes Maramures Brown.

Table1

Inventory Brown breed in the area of growth between 1996-2010 (heads)

Nr. crt.	County	Year							
		1996	2000	2005	2006	2007	2008	2009	2010
Total		**822985**	**682903**	**607171**	**579399**	**573926**	**520866**	**468299**	**427066**
1	Alba	0	140	120	145	132	36	55	59
2	Arad	1123	562	756	494	888	709	283	257
3	Arges	82300	80478	71887	70329	73273	62609	57320	47487
4	Bacau	74664	66513	59688	57362	59188	53542	49054	44619
5	Bihor	279	634	272	159	175	154	185	161
6	Bistrita N.	11069	9371	6853	6800	6181	6406	6162	5015
7	Botosani	400	48	0	0	14	0	70	60
8	Brasov	4410	7266	6845	7315	7389	6780	6620	6432
9	Braila	648	303	234	304	142	0	0	0
10	Buzau	34965	28475	30017	25103	28705	25732	22530	21029
11	Caras-Sev.	460	933	165	0	0	0	3000	2100
12	Calarasi	775	927	133	93	71	35	0	0
13	Cluj	130	343	391	344	380	531	184	369
14	Constanta	0	0	1580	865	985	825	480	370
15	Covasna	0	250	318	401	210	0	0	0
16	Dambovita	66760	30248	45471	42638	41011	34671	28088	24226
17	Dolj	21184	21654	5833	6022	3409	3026	2744	1844
18	Galati	8756	4616	82	516	637	126	490	396
19	Giurgiu	11249	7346	2597	0	130	100	0	0
20	Gorj	47541	45963	43719	41688	38439	35157	30230	28649
21	Harghita	0	0	0	0	0	0	0	62
22	Hunedoara	500	267	72	389	679	766	630	1026
23	Ialomita	4515	4818	881	901	838	999	844	786
24	Iasi	20200	15461	9569	9944	9104	7382	6099	5931
25	Ilfov	3181	3279	2290	2452	1956	1400	1500	1204
26	Maramures	73260	60194	48392	46881	46020	51411	43548	43423
27	Mehedinti	21993	20938	18427	18694	19032	17273	15037	15005
28	Mures	120	13327	276	235	129	392	607	140
29	Neamt	68290	57810	50986	46778	46926	44486	42268	42379
30	Olt	27616	13716	7553	5683	4977	5403	2454	2070
31	Prahova	54162	46384	47757	40278	37478	32673	26221	23955
32	Satu Mare	11521	12620	9502	9248	9426	9222	7824	7138
33	Salaj	144	703	650	548	470	276	187	162
34	Sibiu	719	61	154	230	172	150	116	82
35	Suceava	32059	29582	34863	35458	36853	35123	31757	29016
36	Teleorman	8928	2120	310	400	370	450	430	700
37	Timis	11657	0	93	33	33	31	45	55
38	Tulcea	100	127	0	0	0	0	770	0
39	Vaslui	21775	11774	8554	10427	9742	4976	4341	4012
40	Valcea	56997	50303	54388	52444	51375	43372	36908	34772
41	Vrancea	38535	33349	35493	37798	36987	34642	39218	32075

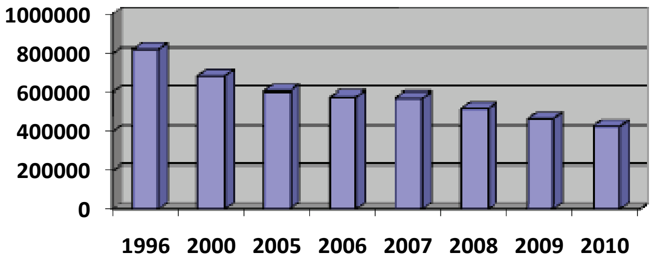


Fig. 1 - Graphic evolution of the flock Brown breed, between 1996-2010 (Heads)

Can easily find, unfortunately, that the 1996-2010 study period, the total number of brown race is a continuous and pronounced decrease, just as evidence or data contained in table 1 and chart number one number.

Decrease very rapidly, within 15 years, Brown-breed herd of cattle census, from 822,985 to only 427,066 head ends, ie more than 48% is a warning and a challenge for all specialists in animal husbandry, which have a duty to make common cause to achieve and implement a conservation program of Maramures Brown breed, the breed can and should contribute to the achievement of sustainable agriculture and preserving balance in rural areas of Romania.

Table 2

Manufacturing performance achieved in the area of growth for the Brown breed (2008) (Source ANARZ)

County	Race	Total current			
		No. lact.	Milk kg	Fat	
				%	kg
ARGEȘ	B	175	3596	3,69	132,69
	BNR	76	4069	3,84	156,24
BACĂU	B	902	3125	3,77	117,81
	BNR	281	4365	4,03	175,09
BUZĂU	B	227	3678	3,68	135,35
	BNR	775	4323	3,69	159,51
DÎMBOVIȚA	B	14	5856	3,63	215,57
	BNR	296	6384	3,86	246,42
GORJ	B	1371	4138	3,77	156,00
	BNR	392	4668	3,78	176,45
MARAMUREȘ	B	741	4008	3,96	158,71
	BNR	39	4847	3,77	182,73
MEHEDINȚI	B	671	4149	3,75	155,58
	BNR	476	4894	3,72	182,05
NEAMȚ	B	462	4459	3,83	170,77
	BNR	248	4751	3,85	189,91
PRAHOVA	B	166	4013	3,72	149,28
	BNR	324	6676	3,65	246,67
VÎLCEA	B	1351	3879	4,02	155,93
	BNR	0	0	0	0
VRANCEA	B	464	4077	3,97	161,85
	BNR	595	6195	3,95	244,70

Table 3

Milk production (quantity of milk and fat) on normal lactating cows during the Brown-Schwyz breed 2001-2008 (Source ANARZ)

Year	Average yield of milk per lactation normal (adult		
	Milk	Milk	Fat
2001	19815	3299	124,00
2002	19630	3033	114,68
2003	10964	3860	150,00
2004	10769	4047	158,00
2005	10616	4214	166,0
2006	10276	4427	175,00
2007	9120	3725	146,00
2008	8283	3583	139,00

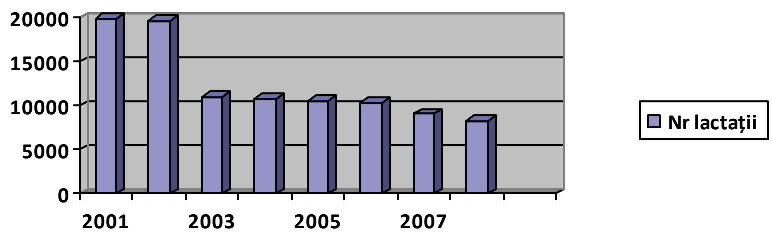


Fig. 2 - Graphic of the number of lactations between 2001-2008 (Source ANARZ)

As can be seen easily, the data presented in the table 3 and chart 2, normal number of lactations completed in one year decreased control, unfortunately, from year to year, while decreasing the number of animals that are listed in official control of production.

Regarding milk production achieved normal lactation, we can say that it greatly increased between 2001-2006, the result of selection and breeding work. The decline in the years 2007 and 2008 may be due to both climatic conditions in these years (prolonged drought) and official control of production output of farms with production of special (Ex. Farm Vlăsia).

Even if the condition of feeding and maintenance is generally known as constraining factor for the manifestation of genetic potential, in such circumstances the Brown cattle shows, in some counties (Dambovita, Gorj, Neamț and Vrancea) their great adaptability to severe conditions and superiority Volume capitalize feed (pasture, hay).

Although production is increasing year by year level achieved can not be compared with yields obtained by active populations of brown breeds bred in Europe (Switzerland, Austria, Germany, Italy, etc.). For the reasons mentioned above. Even with yield of elite livestock farms do not reflect the genetic potential of the breed, as you can see above.

Average milk yield of cows made of bull mothers is higher than the average achieved with the active population forming herds or farms elite. Thus, in 2008 there is a difference between the average yields achieved by the mother cows, bulls, of 2591 kg to 1060 kg active population and leading to the farms. Here's a milk production in cows 8 years of bull mothers shown in the table below and clearly supports our statements.

Table 4

MT milk production in cows, the Brown breed, from 2001 - 2008

Year	**No milk lactations**	**Milk (kg)**	**Fat**	
			%	**kg**
2001	300	5209	3,91	203,67
2002	300	5538	3,79	210,00
2003	260	5894	4,05	239,00
2004	235	5882	4,00	235,00
2005	260	6251	4,00	250,00
2006	261	6393	3,99	255,00
2007	258	5809	4,00	232,00
2008	152	6174	3,90	243,00

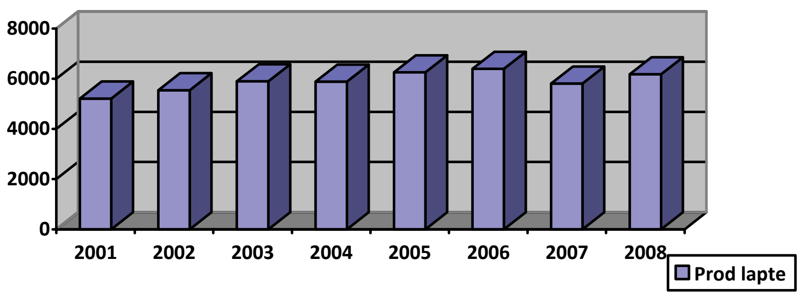


Fig. 3 - Graphic of milk production in cows MT, Brown race, the period 2001 - 2008

Table 5

Productive performance indicators on average mature equivalent (ME), body growing and (conformation) of mothers nominated cow bulls in 2007 - strong elite *

Farm code	N	Average production (ME)					W kg	Waist		Exterior body score					
		L/ kg	G		P			HG	HS	Total	FO	IM	CPL	FU	U
			kg	%	kg	%									
9270221	19	6493	253	3,89	214	3,18	631	136	137	86,9	22,1	8,7		21,6	34,4
13940001	1	4248	194	4,57			580	132	137	88,9	22,1	9,1		22,3	35,3
40370138	5	4369	196	4,49	139	3,12	520	136	138	86,2	20,8	8,8		21,9	34,8
99210001	2	5010	195	3,90	164	3,17	618	134	138	83,2	21,5	7,7		21,2	32,9
105170001	11	5283	201	3,81			476	135	138	85,2	21,6	7,8		21,6	34,2

Table 6

Productive performance indicators on average mature equivalent (ME), body growing and (conformation) of mothers nominated cow bulls in 2008 - strong elite *

Farm code	N	Average production (ME)					W kg	Waist		Exterior body score					
		L/ kg	G		P			HG	HS	Total	FO	IM	CPL	FU	U
			kg	%	kg	%									
91040001	42	7082	270	3,81	209	3,05	620	138	137	87,2	22,2	8,6		21,6	34,8

Tabel 7

Productive performance indicators on average mature equivalent (ME) body growing and (conformation) for cows nominated mothers bulls in 2007 – the elite nucleus

Farm code	N	Average production (ME)					W kg	Waist		Exterior body score					
		L kg	G		P			HG	HS	Total	FO	IM	CPL	FU	U
			kg	%	kg	%									
12350003	2	5677	236	4,17	167	2,9	645	137	138	88,3	22,3	8,9		22,1	35,0
66740005	1	6378	239	3,75	173	3,1	560	136	139	90,0	22,5	9,1		22,4	36,1
67950003	2	5250	214	4,07	156	2,9	555	132	134	87,9	22,4	8,5		22,0	35,0
89620185	40	7061	268	3,80	232	3,1	635	138	137	87,3	22,1	8,7		21,7	34,8
93050350	6	5702	236	4,14	196	3,1	616	137	139	84,3	21,3	7,1		20,9	35,0
99210136	3	4846	198	4,10	166	3,3	563	135	137	81,8	21,0	8,6		20,2	32,0
108720040	1	4936	199	4,03	122	2,7	610	135	137	85,9	21,9	8,5		20,6	34,9
108970003	3	4895	199	4,08	130	2,8	607	134	135	86,4	22,1	8,0		21,3	35,0
120810004	1	4464	187	4,20	143	3,2	600	132	134	84,4	20,9	7,7		21,9	33,9
138220003	1	4939	192	3,90	124	2,6	530	133	138	85,3	21,2	7,7		21,8	34,6

Table 8

Productive performance indicators on average mature equivalent (ME) body growing and (conformation) of mothers nominated cow bulls in 2008 – the elite nucleus

Farm code	N	Average production (ME)					W kg	Waist		Exterior body score					
		L kg	G		P			HG	HS	Total	FO	IM	CPL	FU	U
			kg	%	kg	%									
9270221	23	6476	251	3,87	204	3,17	611	136	137	87,1	22,2	8,8		21,7	34,3
120230002	1	5515	219	3,97	179	3,25	450	133	135	85,7	20,9	8,5		21,5	34,8
120810004	1	5005	206	4,11	160	3,38	560	132	134	86,2	22,2	7,7		21,9	34,5

In Tables 5-8, are presented "productive performance indicators on average mature equivalent (ME), body growing and (conformation) of mothers nominated for cows, bulls, farms and elite core between 2004-2008.

We believe that mothers –cows bull – presented today have very good milk production, the production of protein and fat also very good. There are also items that should and can be improved, factors such as weight, size. Nucleus farms and performance in elite and production value and score of the candidate mothers cows, bulls, entitle us to assert that Maramures Brown breed has a great potential for production that will have an important role in maintaining populated with cattle of the Carpathians.

It must, therefore, attaining the highest priority of a national program for conservation of Maramures Brown breed, to preserve and develop this local breeds, adapted, productive and indispensable for many mountain ranges and alpine pasture in Romania.

This scientific paper was co-financed from the European Social Fund through Sectorial Operational Program Human Resources Development 2007-2013, project number POSDRU/89/1.5/S/63258 "Postdoctoral school for zootechnical biodiversity and food biotechnologies, based on the eco-economy and the bio-economy necessary for eco-sanogenesys"

REFERENCES

1. *Alexoiu A. şi colab*. – Caracteristicile rasei Brune stabilite pe baza datelor controlului oficial de producție, Rev. Zoot şi Med. Vet., nr. 7 Bucureşti
2. *ANARZ* – Controlul oficial al producției, 2000 – 2009
3. *Bogdan A.T şi colab*. – Reproducția animalelor de fermă,Ed. Scrisul Românesc Craiova
4. *Şonea Cristinel* – Actualități şi perspective în ameliorarea taurinelor de rasă Brună, Ed.PRINTECH, 2006
5. *Ujică V. şi colab*. – Rasa Brună în România, trecut, prezent şi viitor, Primul congres al inginerilor zootehnişti din România, Iaşi, 1995

The 39th International Session of Scientific Communications of the Faculty of Animal Science, Bucharest, Romania
Scientific papers (seria D; vol. LIII) – Animal Science

POINT OF VIEW ON ORGANIC PIG

BĂCILĂ VASILE, VLADU MARIUS, BĂCILĂ ANNAMARIA, ŞONEA CRISTINEL, ROŞU ION, DOROFTEI FĂNICĂ

Key words: intensive agriculture, organic agriculture, organic pig production, natural behaviour, prophylaxis

SUMMARY

The intensive pig farming system is mainly focused on getting a bigger production per animal, in a short time, so that the economic efficiency of the operation to be as high as possible. But this system does not take into account the modification of animal behavior, environmental pollution by fossil fuel consumption and the major difficulties encountered in the recovery and degradation of manure. Organic breeding of pigs is an alternative to this system. The demand for meat obtained from pigs reared in organic farms is increasingly high, especially in countries with higher living standards, whose citizens have incomes that allow them to choose quality, considering that all products obtained in the organic farming system are more expensive than those obtained in conventional farming system.

The traditional intensive agriculture which aims to achieve the highest productivity per area unit or per animal in a short time, recently is increasingly challenged. The most challenged are rearing of pigs and poultry in intensive system, where the man have the full control of abiotic factors (the exploitation environment, the feeding program, the program of light) and biotic factors (parasites, infectious agents), trying to keep them within normal limits to ensure increasing production. The integrity of these systems is maintained by human control and the energy behind the operation of these systems is almost entirely produced by fossil fuels.

All of this causes a number of shortcomings such as:

- separation of animals from their natural environment and from the soil and their rearing in a completely artificial system;
- modification of animal behavior, animals may not manifest their ancestral instincts because they have no conditions for this;
- environmental pollution due to high consumption of fossil fuels for providing artificial environment and exploitation conditions;
- accumulation of large amounts of manure for which decomposition or recovery are other expenses;
- because the animal has no food or water sources other than those administered by the farmer, it is fed with industrially produced complete feed, in which for balancing are added various artificial chemical components (e.g. synthetic amino acids), which will be found in the products obtained from these animals.

Sustainable breeding of pigs has as objectives to maintain biodiversity and reintegration of animals in their natural environment, so that they be able to fully express normal and natural behavior in terms of feeding, reproduction, defecation and urination, providing care for newborns and youth and also environmental investigation and group behavior.

By exploiting the pigs in a system close to natural in which they are able to feed themselves by grazing or are fed only natural feed (grazing green mass directly, mown green mass administered in feeder, milled cereals and legumes administered in feeder) and is performed the bringing together of crop and livestock production, which allows the breeder to capitalize on higher crop production obtained on its land, by transforming it into organic pig meat. Also, since the administration of synthetic amino acids and meat meal to supplement the protein intake of feed is prohibited, for ad libitum feeding of organically raised pigs, there may be an increased consumption of feed because the energetic density of the ration is reduced. Thus, a low energy density diet with a low content of amino acids, administered ad libitum, ensures an adequate energy, protein and amino acids intake, without negative effects on carcass quality, following a higher consumption of feed. Organically produced legumes have a high content of protein and they can balance in amino acids the ration of organically produced pigs, as a real alternative to synthetic amino acids.

At the same time, by maintaining the animals in freedom shall ensure their welfare, especially for pregnant sows and nursing sows. The main criticisms that have been brought to the industrial breeding of pigs refers to the immobilization of lactating sows throughout the period of lactation in calving piggeries without the possibility of moving. By maintaining the animals in freedom, pregnant sows are able to show the ancestral nest-building instinct one day before calving, away from other sows and then, after birth, they have freedom of movement for the duration of lactation. Also, sows kept in freedom prefer to build a new nest for the birth, avoiding the use of an old nest where another sow has calved. A major problem of maintaining the pigs in freedom is crushing the newborn piglets. Studies shows that in the case of crushed piglets, about 75% of deaths occur within 3 days after birth and about 50% of piglets are crushed within 24 hours after birth, piglets being crushed or trampled when sows lie down or when they come up, when they change posture or when they eat.

In the intensive industrial type farms animals are constantly subjected to stress, which is determined by many causes (errors in feeding, excessive cold or heat, loud noise, trauma, weaning, transfer from one piggery to another or from one sector to another overcrowding in the shelter or in the means of transportation, brutal behavior of caregivers) that cause abnormal behaviors and do not allow animals to express natural instincts. The stress has as result ill animals, manifestation of abnormal behavior and eventually will lead to economic losses by increasing the stagnation in growth or even weight loss, disease, increased treatment costs, lower quality of meat obtained from these animals and even death.

Organic raising of pigs should reduce or avoid stress and ensure obtaining "healthy" meat, without cortisol and nor epinephrine hormones, which may affect the metabolic system of consumer.

Obtaining organic pig can be done in several exploitation systems, but all must allow animals to remain outdoors at least four months per year for growing-finishing pigs (during summer) either by maintaining them on pasture, with pigs being able to find areas of shade and shelter from rain, or in shelters with paddock, with pigs having the possibility to move and to go out into the paddock after his own will, during both day and night.

Another condition for obtaining organic pigs is their maintenance in groups, so that the animals can see and interact with each other, so they could manifest the behaviors characteristic for the group.

The organic production system must ensure good health of the pigs, because the use of routine preventive actions with antibiotics or chemotherapeutic agents is prohibited, and if the animals were under treatment they can not be slaughtered for a long time, until the drugs are removed from their metabolism.

On the other hand raising pigs on the principles of organic agriculture involves a longer period until the animals reach slaughter weight due to lower average daily gain, therefore higher costs per kilogram of obtained meat, which leads to a higher price for animals sold to the slaughterhouse. All this leads to a decrease of the number of consumers that could buy organic pork because only those who have a fairly high level of income will be able to afford to buy such a product.

In the European Union the legal framework for producing organic pig is provided by:

- Council Regulation (EC) No 834/2007 of 28 June 2007 on organic production and labelling of organic products and repealing Regulation (EEC) No 2092/91;
- Commission Regulation (EC) No 889/2008 of 5 September 2008 laying down detailed rules for the implementation of Council Regulation (EC) No 834/2007 on organic production and labelling of organic products with regard to organic production, labelling and control;
- Council Regulation (EC) No 967/2008 of 29 September 2008 amending Regulation (EC) No 834/2007 on organic production and labelling of organic products;
- Codex Alimentarius - Commission Guidelines for the production, processing, labeling and marketing of organically produced foods, CAC GL 32-1999.

This scientific paper was co-financed from the European Social Fund through Sectorial Operational Program Human Resources Development 2007-2013, project number POSDRU/89/1.5/S/63258 “Postdoctoral school for zootechnical biodiversity and food biotechnologies, based on the eco-economy and the bio-economy necessary for eco-sanogenesys”

REFERENCES

1. *Băcilă V.* – Ecological agriculture – alternative of conventionally agriculture, The extenso papers of the faculties and departments of animal science second joint meeting of the Balkan countries „Balnimalcom 2003”
2. *Drăgănescu C.* – Exploatarea animalelor – ecologie aplicată, Ed. Ceres București, 1984
3. *Gabler S. and Mirsch T.*– Ecology oriented agriculture: objectives, regulations and their implementation, quality management and marketing, the role of farmers and consumers- seminar 13.06.2003, Zschortau Germany
4. *Gegner Lance* – Considerations in organic hog production, ATTRA’s Organic Matter Series, 2001
5. *Presto Hook Magdalena* – Organic pig meat production – Nutrient supply, behaviour and health, Doctoral Thesis Swedish University of Agricultural Sciences, Uppsala 2008
6. www.eur-lex.europa.eu
7. www.fao.org

The 39th International Session of Scientific Communications of the Faculty of Animal Science, Bucharest, Romania
Scientific papers (seria D; vol. LIII) – Animal Science

MORPHOLOGY AND CHARACTER TRAITS ASSESSMENT PRODUCTIVE BREEDS OF TELEORMAN WITH BLACK HEAD TSIGAI SHEEP AND KARAKUL SHEEP IN THE CONTEXT OF PRESERVING BIODIVERSITY CONSERVATION AND LIVESTOCK GENETIC RESOURCES

DOROFTEI FĂNICĂ, ŞONEA CRISTINEL, ROŞU ION,
BĂCILĂ VASILE, BĂCILĂ ANNAMARIA

Key words: Karakul sheep, production, biodiversity

TELEORMAN BLACK - HEAD SHEEP

In 1997, the first Congress of Livestock Engineers in Romania held in Iasi, with international participation were presented research results on the Tsigai black head Teleorman sheep (Teleorman black-head sheep as it was approved in 2010).Then followed the presentation of the various symposia, scientific papers on which were opened for the study of this and by other researchers, teachers and specialists.

Teleorman black head Tsigai since 1998, is found in both exhibitions held each year in Teleorman County and in Tulcea, Braila, Constanta, where she received various awards "MISS SHEEP".

Participation on INDAGRA every year was successful, this breed is appreciated by the degree of excellence, provided by the Ministry of Agriculture and the Chamber of Commerce and Industry of Romania.

MORPHOLOGY, BIOLOGY AND PRODUCTION

Sheep population Teleorman black head Tsigai is oriented towards production of milk, meat, mixed wool, can be competitive in the production of milk and meat with the best specialized breeds, making them useless import.

Sheep breeding mixed ability to produce milk, meat, wool, particularly increasing Teleorman black head Tsigai is much more economical, with early and high prolificacy, with a strong capacity for adaptability and cross combinability.

The lambs were born black, the color fades with age, leaving only black extremities, ears are large, hanging, and the head profile is ram. Lamb weight at birth is 5 - 6.5 kg, and at two months 25 to 30 kg carried weight. Adult specimens shows a development body hipermetric females, reaching weights of 75-80 kg, size of 71-75 cm, globular udder and males 95-115 kg, the size of 83-92 cm body length 95-100 cm, 28 -30 cm chest width, long tail of 50-55 cm is dolicomorf conformation, wool has a fineness of 28-33 μ, making the production of wool in the amount of 3 kg to 5 kg in females and males.

Figure 1 - Young sheep to 5 months - Teleorman black head Tsigai
(black head sheep Teleorman)

Wool is predominantly white on adult age, and coals on his head and limbs are black, long and drooping ears, head profile ram is less wearing on the head and belly wool and has a long tail, reaching up under shank. Copies of this breed are generally doe. Because of precocity is used for breeding from the age of 8-9 months and is a particularly valuable aspect racial bio. It has an average production of 150-170 kg of milk milking, but there are specimens that have achieved a production of 350 kg lactation in 263 days. Prolificacy of 150% on average and in recent years sheep births are common triple and a good growth increase.

Teleorman black head sheep can be considered as forming part of the sheep light heavy weight recommended especially in the lowlands and less in the hilly area.Thanks to his precocious, prolificacy and milk production, the rams of the breed can be used with good results from crosses industrial or local infusion of different breeds to increase milk production, especially meat. This breed is best suited to the production of lambs pascals with a carcass weight of 15-17 kg, because the production of sheep milk good mother provides a high speed of growth of lambs. The main direction of operation of this population is directed towards the production of sheep milk semi-meat and wool.

Initially, sheep selected for breeding were retained by the sheep owners to increase the number and then started breeding distribution of the material as directed in the county and outside the county. Begin 1995 were supplied with certified breeding counties of origin: Calarasi, Buzau, Constanta, Arges, Prahova, Vrancea, Ilfov, Iasi, Ialomita, Olt, Sibiu, Covasna, Sibiu, Brasov, Dambovita, Braila, Hunedoara, Timis and Arad.

By turning the upper productive morphological characteristics of Teleorman black head Tsigai sheep is placed on the new coordinates, to ensure the population's consumption needs of milk, meat, wool, and of course availability for the creation of international economic exchanges, stopping imports burdensome.

The population of black-headed sheep Tzigai Teleorman), with a mixed production of milk-meat-wool, can be competitive in the production of milk and meat with the best specialized breeds, making them useless import.

Sheep breeding mixed ability to produce milk, meat, wool, particularly increasing the Teleorman black head sheep is much more economical, with early and high prolificacy, with a strong capacity for adaptability and cross combinability.

KARAKUL BREED

Karakul of Botosani breed sheep with black varieties white ash (brumariu) was approved in 1987. Is a Romanian breed dedicated to the production of skins, consisting of a combination of Karakul breed (males coming from Bukhara basin - Turkmenistan, Kazakhstan, Germany, Austria, Bessarabia) with females of the black breed Turcana Brumaire (white ash), coarse wool breed native, well adapted specific conditions in the north-east of Moldova.

Newly created genotype meets the most valuable traits of Karakul rams (skin qualitative characteristics) and local Turcana breed (endurance and adaptability). Created new genotype is well adapted to the harsh environmental conditions for growth and produce high quality skins, which equalizes those obtained in the country of origin.

Figure 2 - Youth Karakul sheep to pasture

MORPHOLOGY, BIOLOGY AND PRODUCTION

The exterior is typical of the Karakul breed, body size dolicomorf; head is lean, expressive, elongated nose profile ram. Elongated face, covered jar, forehead covered with short wool jar or slightly wavy. Rams have horns of different sizes, forming a spiral incomplete, and 20-30% are polled. Sheep are usually hundreds, only 5% have rudimentary horns.

Ears are mobile, sloppy, variable length and short hair fibers, glossy, often corrugated neck is slender, slightly elongated, directed from the bottom up.

Long limbs are right, with strong bones, right upright with pigmented hooves adapted to long marches. The legs are covered with wool knee and shank, the rest covered with short and glossy jar.

Tail characteristic of Karakul breed, shows a deposit of fat as a bag with two lobs (10 – 12 kg male, 6 -8 kg in females) or triangle (the half breed) and tail is thin and slender, ending with a buckle in S, which reaches shanks. globular shaped udder, medium to low growth, medium-sized nipples.

Body weight of lambs at birth Karakul lambs is influenced by sex (males 4.2 kg, 3.9 kg in females) and at weaning age (80-90 days) is the average weight of 19.2 kg for males and 17 3 kg to females.

The total output of milk per lactation is normal 80-90 kg, and production of natural wool sheep is 2.5 kg and 4.0 kg in rams.

This breed is characterized by a perfect adaptability to climatic conditions characteristic of growth zone (NE Moldova), durability and high organic strength.

Sheep is robust constitution, constitutional type respirator that offers a good environmental adaptability, disease resistance and high capacity of recovery of the food.

Spectacular and nobility of this breed, it is conferred by the many varieties of color (black, brumăriu- white ash, brown, gray, pink, white, Halili, Sarge) and shades of skins in lambs. The diversity of colors and hues generated by the presence of fibers is monochromatic (black, brown, white) and heterochromatic (gray), color pigments resulting from the combination of melanic pigments and their mode of distribution of the cuticular layer of curly hair fibers.

Figure 3 - Varieties of Karakul lambs

REFERENCES

1. *Drăgănescu C., Sandu Gh (1972)* - Genetic analysis of Dulbanu Karakul Works Del Series D, vol 15, I.A.N.B., Bucharest
2. *Drăgănescu C., Sandu Gh, (1984)* - Quantitative Methods in improving basic domestic animals (Guide for practical work), IANB Bucharest
3. *Drăgănescu C., (1984.)* - Breeding animals, Ceres Publishing House, Bucharest
4. Documentation of approval Karakul sheep breed Botosani SCPCO King, 1987, Botosani
5. *H. Grosu, Oltenacu A. Pascal. (2005)* - Genetic improvement programs in livestock, Ceres Publishing House, Bucharest
6. *Gligor V.*, (1965) - Methods to create new types and breeds of animals, Scientific Publishing House, Bucharest
7. *Tafta V. et al.*, (1997) - production, improvement and breeding of sheep, Ceres Publishing House, Bucharest
8. *Tafta V.* (1967) - Increase and improve the Karakul sheep and crossbred, Ed agro, Bucharest

The 39th International Session of Scientific Communications of the Faculty of Animal Science, Bucharest, Romania
Scientific papers (seria D; vol. LIII) – Animal Science

RESERCHES CONCERNING THE DURABLE DEVELOPMENT OF THE VIILAGES FROM MOUNTAIN AREA

STANCIU MIRELA*, SĂVOIU GHEORGHE**, VLAD IULIAN***,
CIORTEA GLIGOR*, POMOHACI MARCEL*
*"Lucian Blaga" University from Sibiu, **University from Pitesti,
***U.S.A.M.V. Bucuresti

Key words: pastoral villages, development, resources

SUMMARY

The mountain areas on the European continent are recognized for the quality of their landscape, for the environment and the products originated in the mountain regions. These regions cover 40,6 % of Europe's surface and represent the place of activity and life for about 21 % of the European Units Population contributing to the value of these territories.

The paper present the concept of the durable development and the aims in rural development and environment protection in Romania.

We try to find the relation between the local habitats in its natural environment in order to adapt local pastoral techniques to contemporary market economy. It is also described the issue of transhumance at national and international level.

The Society "Progresul Silvic" Sibiu, a NGO with environmental protection and sustainable development profile, implements during this year the project "Mountain Resources and Sustainable Development", financed by the Governments of Iceland, Lichtenstein and Norway, through the Financial Mechanism of the European Economic Area (EEA). The other partners within the project are the University of Pitesti, the Chamber for Agriculture of Sibiu County and the Public County Service Salvamont Sibiu.

The project's general objective is to make a complex analysis of pastoral villages in Romania's mountain area with the goal to value all resources: human, material, natural and entropic, that contributed to the durable development of these places by growing sheep and maintaining the pastoral character.

Durable rural development has become a priority in E.U. programs and other developed countries and it has the tendency to become a principle, a main factor in global development. More and more global resources need to be directed and used for aims in rural development and environment protection. [1]

"…agriculture is not only an economical branch producing products and profit but is, maybe, before all, a way of life. At the same time, the rural area is not just a production area, but, first of all, an environment for life, a cultural and social place with complex implications upon the overall life of a nation…" **The durable, ecological and economical rural development** concerns those processes that related to changes of structure, organization and activities in a social-economical system. It is the only alternative to improve the quality of life. Thus durability does not limit itself to the implied biological aspects, but includes also, economical, technological and sociological aspects.

The principles of durable development in agriculture are: the creation of a competitive agriculture sector to face competition on the world market; using methods and practices of production to ensure the protection of the natural environment to determine quality and healthy agricultural foods products; diversification of agricultural activities considering the traditions and local specificity, maintaining the existent population in their rural communities, especially the disadvantaged categories, recognizing agricultural producers their contributions to the economical process, the conservation of natural resources and cultural patrimony, the maintenance of the quality of the natural landscape, improving the rural population's awareness concerning environment protection and its active implication in decisions taking and activities developed in the rural areas by training economical and ecological consciousness.

To implement these principles Romania has adopted structural measures to integrate into the Agricultural Policy of the E.U. mainly in the following directions: improving legislation and institutions for the functioning of agricultural markets; including food products commodity exchange by developing the infrastructure for agro-food markets, improving "product" marketing in the chain from producers to consumer, ensuring food security, diversification of rural economy, extending agricultural and nonagricultural services, introducing an informational system to support agricultural producers and raise the income of inhabitants of rural communities, stimulation of investments in a natural resources and reducing product costs and implementing a complex professional training system for all participants to specific rural environment activities.

According to negotiations with the European Commission Romania will obtain label protection for 162 traditional food products that can not be fabricated under the same label by any other E.U. member state. The list comprises some cheese types and meat products. The Romanian agricultural producers can choose amount three types of label protection: a origin label protection (PDO), geographic index protection (PGI) and guaranteed traditional characteristic protection (TSG). These methods give the producers the opportunity to obtain a better price for their products due to traditional methods and quality. The protected traditional products will have a favorable impact upon tourism in Romania.

In 2004 through H.G. 1779 the Government of Romania has approved **The Strategy of Durable Development of the Mountain Area,** which states that the durable development of the mountain area in Romania presupposes the development of family farms in specific, balanced ecosystems. The perspectives of the mountain area development must be viewed in the context of stable local population, area and environment identity basic for a favorable evolution of mountain communities. The durable development in this area needs to economically improve local communities and the cultural heritage. The main objective is to **develop a competitive mountain agriculture** based on knowledge and private initiative capable in the long run to protect the historical, cultural and natural patrimony of rural mountain areas as well as creating a larger number of working facilities, capable to ensure social and economical cohesion at local, regional an national level, according to E.U. standards. According to The Strategy there have been established 21 objectives of durable development of the mountain area along with implementation methods.

The mountain area of Romania represents a territory of national interests, economically and socially special and a natural environment. 32 % from the territory of the country in Romania is a mountain region, 42 % of it are agricultural surfaces. These represent 71,5 % pastures and natural hay-fields, 25,6 % arable land and 2,7 % orchards and vineyards. The mountain population is about 3.600.000 inhabitants out of which 2.100.000 are farmers. The number of subsistence village households does not exceed 1.000.000 and own an average of 3 ha agricultural land/household.

The agricultural sector plays a decisive role for the future of mountain areas. Agricultural production in mountain areas is much smaller compared to the law land region. Handicaps like difficult landscape, less fertile and profitable soils and severe climate can not be eliminated.

Restructuring village households especially in the mountain area where the pedo-climatic conditions and the existence of considerable pastures and natural hay-fields make ruminants the only beneficiaries of fodder potential **is the key issue today**.

A debated theme at the Annual Congress of the European Zoo technique Federations in 1996 was: “Extensive strategies of production systems with small ruminants” as solution to improve efficiency and environmental protection.

According to the last counting (2002) the number of sheep in Romania was of 7.447 thousand heads. No people in the area are so much historically linked to sheep breading as the Romanian people are. [2]

The structure of races at this species in 2004 was: Turcana and Stogosa – 65 %, Tigaie 20-25 %, Merinos and Spanca – 5-7 %, Karakul and other races – 3 % [3]. The Turcana sheep in competition with the other races have proved to be more enduring and easier to handle especially in the cold period of the year when maintenance costs in the low lands are twice lower compared to those for races Tigaie and Merinos.

The structure according to classes of size and degree of qualification of the breeders shows that today in our country there are 1.037 private breeders owing 200-500 sheep and 134 private breeders owing over 500 sheep. These breeders are mostly to be found in the villages with pastoral specificity that is in villages in the mountain area where the Turcana is breaded.

In villages like: Rod, Jina, Tilisca, Poiana Sibiului, Rasinari, Rau Sadului (Sibiu), Vaideeni (Valcea), Novaci (Gorj), Sacelele Brasovului (Brasov), shepherding represents the occupation along generations that imposed the typology of places, the structure of households and the way of life.

From the perspective of cultural ecology there is a need to analyze the adaptive cultural model practiced in these villages according to production based on transhumance. [4] We need to understand the relation between the local habitats in its natural environment in order to adapt local pastoral techniques to contemporary market economy. Relevant data is represented by the place of the villages, the family organization of pastoral economy as well as aspects of the material culture which define the village in our days in order to analyses the potential for adaptations of pastoral communities.

Due to the general objective of our project we consider is necessary to view the main changes in sheep breeding in Romania: drastic reduction of number and level of wool, meat and milk productions; changes in production directions; no improving of activities for populations important for the genetic evolution of herds. These modifications have been determined by numerous limiting factors (economical, technical and social): higher exploitation costs versus very low valorization prices of productions; the size of farms or herds functioning as limit to the introduction and application of reproduction, improvement techniques, and production of breeding material; the lack of laws and regulations to support and protect sheep breeders.

According to the objectives of **The National Program for sheep breeding** in our opinion it is very important that for the Turcana breed representing 65 % from total number of sheep to consider that: maintaining and developing the number of animals reported to existent natural and economical conditions according to the tradition of growing this breed in the pastoral villages of the rural region; improving of their genetic potential in direction of better quality and quantity for meat and milk productions.

THE ISSUE OF TRANSHUMANCE

In time numerous personalities have dealt with the problem of transhumant shepherding. The first known witness about the expansion of Transylvania shepherds to a Walachia date from 1662 by the chancellor Nic. Bethelen. Ion Ionescu de la Brad is the first to notice the importance of this expansion up to the heart of Drobrogea. He wrote to his friend Ghica that he “discovered our national California”. Nicolae Iorga considered transhumant shepherding as one basic factor of the unity for nation, language and popular Romanian culture. Traian Herseni and Cornel Irimie said about the “margineni” that they denied any limitation due to the vast space seen with the eyes and a passed by the herds. The grate fame of the “margineni” is due to transhumant shepherding with all connecting activities. The inhabitants of “Marginimea Sibiului” have always been great travelers home and abroad living traces and legend through to the famous “shepherds roads” from the Carpathian’s to the Danube towards Constantinople and the Adriatic, from the Tisa to Poland, from the Black Sea to south Ukraine, Crimea and the Caucasus.

The writer Emanoil Bucuta said that: “hundreds of years our shepherds have created a Carpathian civilization and their roads represented a voyage of a whole country with lands, people and destinies to the most running waters”.

Generally the word transhumance is defined as an aspect of shepherding which includes continuous movement of herds from the mountain to the law lands, more precise the moving of herds to alternatively using according to season two pasture regions separated by a region that has to be passed. [5]

National lows allow transhumance only in certain conditions. They are regulated through the rules of both the ministry of agriculture and the ministry of public administration nr. 226/235/2003 concerning the strategy and organization of activities for the improvement and exploitation of pastures at national level at medium and long term. It provides measures as following: the organization of the transhumance is done by the specialists from the department of agriculture and county rural development together with the local councils; the movement of sheep herds from a county to another is allowed only with the agreement of the veterinary offices from the county of origin; the sheep owners need to keep in touch with the veterinary offices of the region of departure in order to observe prophylactic actions; the sheep owners have the obligations to protect the crops in the area they settled their herds.

THE TRANHUMANCE AT INTERNATIONAL LEVEL [7]

The European Charta for Transhumance has been signed in 1997 at Cuenca – Spain and it underlines that "Transhumance constitutes the most developed extensive system in sheep breeding". [6].

Euro Montana is a European association for the cooperation and development of mountain regions. It reunites regional and national organizations from different countries in Europe. Its mission is to promote the way of life in mountain regions and to durably develop and improve the quality of life for the local populations. It facilitates information exchanges and expertise among the member countries by organizing seminars and conferences promoting studies and European projects and the collaboration with European institutions on themes and issues of the mountain region. In 2000 at Trento in Italy there has been the 2nd European Conference of the Mountain: "The mountains pioneers of durable development – quality comparable advantage of the future". There has been created a working team of researchers, technical experts acting and operating in the field that initiated a program of study coordinated by Euro Montana and co-financed by the General Research Department within the fifth Research and Development Frame Program. The result of this project was the European Charta of Agro-food Products from the Mountain Region.

Euro Montana initiated starting with 2002 a study along two years with the theme: "Quality of life and living resources management" having as key action "Agriculture, fishing and durable forestry and integrated development of agricultural areas in the mountain region". The participants of this project have been 13 organizations of 8 European countries.

The mountain areas on the European continent are recognized for the quality of their landscape, for the environment and the products originated in the mountain regions. These regions cover 40,6 % of Europe's surface and represent the place of activity and life for about 21 % of the European Units Population contributing to the value of these territories. At the same time economical activities in the region become more and more fragile, the main reason being the handicap of the landscape, climate etc.

A study of the European Agency for Environment (EEA) in 2003 stipulates that maintain adequate agricultural activities are the condition for the conservations of the biodiversity of the environment. This study shows that areas that are ecologically reach are equivalent to mountain regions. [8]

In Kenya in 2004 at Nairobi there has been a Workshop in order to formulate a Pastoral World Program.

In 2006 at Abuja in Nigeria The International Conference for The Future of Pastoral Transhumance in Central and West of Africa took place organized by the Federal Ministry of Agricultural and Rural Development, The National Research Institute for Animal Products, The Special National Program for Food Safety, all from this country.

Pastoralism will continue for the near future in poor nations, especially in Central Asia, because it is generally an efficient, low energy requiring subsistence base for semi-arid regions. During the 20th century, however, most national governments tried to force pastoralists to stop their migrations and to reduce the size of their herds in order to prevent over-grazing. These efforts at controlling them were consistently resisted by pastoralists. Large herds were usually seen by them as symbols of wealth and as security against unpredictable climates and periodic epidemics among their animals. Conservation has not been traditionally important for pastoralists because they migrated over vast areas and could easily move on when grasses and water were depleted.[9]

The European Charta of Quality agro-food products from the Mountain Region has been official launched at the end of 2005 within the European Parliament in Brussels and has been signed by 62 participants from 11 European Countries and some Governments (France, Norway, Romania). Today there is a European Syndicate of issues of the mountain regions (COPA-COGECA). [10]

In France there exists French Association of Shepherding with the main goal to promote a scientific approach to shepherding. The association organizes reunions, scientific sessions and training seminars. It approaches shepherding in an interdisciplinary way (shepherding, pastoral equipment, pastoral forestry, animal breeding, animal feeding, veterinary medicine, fodder production, rural landscaping, local development, conservation and environmental protection, agronomy, agriculture, beekeeping, Geography, Ethnography, Sociology, legislation, rural economy) and it reunites different interested institutions. The association opened WEB Centre for francophone pastoral resources.[11]

In France again The Pastomed Association has the goal to create a network of partners capable to work together on shepherding issues and to improve the training of farmers. For the future the association means to enlarge the network with partners from the Mediterranean regions. CEPRAM has been created in France in 1982 as a partner services for research development of pastoral issues having the following domains of activities: applicative researches and dissemination of research results, professional training activities for development and territory expertise.

In the region of Ariege in France The Ariege Pastoral Federation has been constituted in 2000 to re-launch transhumance practices. A traditional route has been established for herds to pasture in rural areas. In 2003 a new association was born “Transhumance in Couserans” that reunites all interested actors for developing pastoral and transhumance activities. This association organizes: “The days of transhumance” representing an exceptional moment for a union of sheep, cattle and horse herds. The association has an internet site “Transhumance in Couserans”. The feast lead to the development of tourism with a double effect: short term and long term. At the same time it generated a higher income for restaurant owners, for producers through selling the farms products and places in pensions as well as higher incomes for the local businessmen.

The European Forum on Nature Conservation and Pastoralism (EFNCP) was established in 1988 and has developed as a European network of scientists, conservationists and policy makers which interacts with farmers, land managers and agricultural and environmental ministries. The EFNCP is a non-profit organisation, functioning legally as a company limited by guarantee under English law. [12]

The European Forum on Nature Conservation and Pastoralism (EFNCP) is a Europe-wide network which raises awareness of the importance of low-intensity farming for nature conservation and aims to improve the way public policies respond to the needs of these farming systems.

The concept of "High Nature Value farming**"** developed in the early 1990s from a growing recognition that the conservation of biodiversity in Europe depends on the continuation of low-intensity farming systems across large areas of countryside.

The underlying principles behind the development of the HNV farming concept were, and remain, that [13]:

- Market, agricultural policy and social pressures are increasingly making such HNV farming systems economically unviable
- Any resulting intensification or abandonment of such farming systems would adversely impact on the associated HNV
- There is therefore a justifiable case to be made for directing additional financial support to these farming systems to help maintain the HNV

The HNV concept has been adopted by the European Commission with the result that Member States are required to ensure that the Axis 2 (Sustainable Land Management) element of their 2007-2013 Rural Development Programmes (RDPs) are targeted at "…biodiversity and preservation of high nature value farming and forestry systems, water and climate change".

Although some HNV farmland occurs in association with traditional cropping systems in southern Europe, in general the majority of Europe's remaining HNV farmland is now largely associated with livestock grazing systems on semi-natural habitats in the mountains and other remote areas of Europe. Ensuring the maintenance of the farmland biodiversity value associated with such areas therefore depends on ensuring the continuation of appropriate low-intensity farming systems in those areas.

CONCLUSIONS

The issue of transhumance and future development of shepherding is important for today within the frame of future dimensions of agricultural exploitations and development of Romanian rural space especially in the mountain areas.

Transhumance contributes to preserve the environment it is important to the European culture and economy.

The maintenance of "High Nature Value" farming systems (HNV farmland) **-** now a central aim of the EU Common Agricultural Policy **-** raises huge challenges.

REFERENCES

1. *Drăgănescu Condrea,* 2007 - Dezvoltarea durabilă si problema unei strategii naționale pentru dezvoltare durabilă a producției animale, Revista de Zootehnie V.1.martie 2008:7-16
2. *Padeanu I., Daraban S.,* 2007, Transhumanta, la răscruce de drumuri, articol publicat în revista Ferma nr. 2(46)/2007

3. *Paun Ion Otiman*, 1997 – Restructurarea agriculturii si dezvoltarea rurală a României, Editura Mirton, Timisoara.
4. *Stanciu Mirela* coord., Studiu privind stâna, produsele si subprodusele de stână din arealul montan, Editura Universitătii "Lucian Blaga" din Sibiu.
5. *Stanciu Mirela*, 2007 *The durable development through rural tourism of the mountain area villages,* "Integrated Systems for Agri-Food Production– Durable Development", Proceedings of the 5thInternational Conference "Integrated Systems for Agri-Food Production", SIPA 07, November 22-24th 2007, Sibiu, Romania, Editura Orizonturi Universitare Timişoara, ISBN 978-973-638-348-9, pag. 423-426
6. *Tafta Vasile*, 2008 – Cresterea ovinelor si caprinelor, Editura Ceres, Bucuresti.
7. http://www.eea.europa.eu/
8. http://anthro.palomar.edu/subsistence/
9. http://www.mountainproducts-europe.org/sites/Euromontana
10. http://www.bibliopax.com
11. http://www.efncp.org/high-nature-value-farmland/biodiversity/
12. http://www.knowledgescotland.org
13. http://www.efncp.org

The 39th International Session of Scientific Communications of the Faculty of Animal Science, Bucharest, Romania
Scientific papers (seria D; vol. LIII) – Animal Science

STUDY ON UNIT COST OF FREE - RANGE TYPE BROILERS

I. CUSTURĂ, I. VAN, MINODORA TUDORACHE,
ELENA POPESCU-MICLOȘANU, ANA MARIA COVAȘĂ

Key words: free-range, weekly average gain, specific consumption, viability

SUMMARY

Studies were performed with Plymouth Rock barred breed chickens, by using ecological poultry production technology type Free-range.

Experiment design was in pens (three experimental variants x three treatments/each variant). The three treatments were composed of using processed feeds with different energy and protein levels (M – constant energy and protein level, F1 – constant energy and variable protein level and F2 – variable energy and constant protein level). Feeding was performed in two production phases and slaughtering was performed la at 56 days of age.

Parameters checked were: live weight, feed intake and livability; slaughtering was followed by cutting; all data were processed and read statistically and finally costs for product unit were found (unit cost for processed feed and respectively unit cost per kg live weight).

Several factors are involved in the rapid increase of poultry meat production, including the ecological one. Some of them are intensive production systems, centralized and vertically integrated poultry industries, available and accessible feedstuffs, mechanized processing, design of consumer convenient products and, most important, constantly rising consumer demand. But production rise would also lead to increase of expenses cu care for nowadays producers, including the need for a lower cost for being able to compete economically on a more and more competitive global market, for achieving food safety and animal welfare standards and to control problems posed by diseases and poor biosecurity standards.

Cost is an extremely useful economical tool for decision making about resource usage, production amount and structure, increasing or decreasing product range, technological innovation, etc., in market oriented economies. Input consume for making such goods and services is found in their prices. Production cost in included in price and it must be calculated because: resources are limited; a smaller production cost makes a higher income possible; a smaller production cost keeps your clients and satisfies your share partners, administration board and employees.

A production cost means all costs for inputs consumption performed by the enterprise for goods and services produced and offered. Production costs are very meaningful about business quality and it is a decision-making condition for every producer; lowest cost level is the standard in choosing the right option.

These researches were intended to give an overview about these problems. Objectives were first to find unit costs for feeds and kg live weight to broilers type Bio and second to reduce unit costs by changing energy and protein content of feeds for these broilers.

1. MATERIAL AND METHOD

Experiment was performed in S.D.E. Avicola Moara Domnească, experimental station of the University of Agriculture and Veterinary Science Bucharest, for broilers type Bio, on three pen trials with even body weight and proportion of sexes in block trials. Chickens were Plymouth Rock and they were raised according to standard technology for this breed and in the same conditions of management, feeding and watering.

There were performed three treatments for every experimental flock to find bird's qualitative and quantitative performances and experiments were performed in the same time and with the same biological material and in the same unit.

Trial schedule was designed for chickens Bio and it was as follows:

- treatment I (M): even energy and protein level;
- treatment II (E_1): variable protein level and even energy level;
- treatment III (E_2): even protein level and variable energy level;

In all the three treatments there were used 5 groups with 10 birds each were used by treatment (table 1).

Groups were formed with chickens from the same hatchery at day one. Chick's parents were of the same age to diminish genetic influence over results. Trial period was 84 days and feeding technology was biphasic. During trials it was used a processed feed produced in I.B.N.A. – Baloteşti according to the nutritional needs of chicks and based on the trial design.

Chickens live weight, feed intake and livability were the performance parameters established and checked weekly for every treatment and group during the trial.

Body weight was checked and registered weekly by individual weighting. Average daily weight gains, average weekly weight gains and average weight gains for whole trial period was calculated based on weight gain progression.

Processed feeds consumption was assessed by daily weighting of birds taking into account feeds left in feeders at the end of each week. From these data average feed consumptions were calculated.

Table 1

Work schedule for Free-range broilers

No.	Specification	U.M.	Phase					
			Rising			Rising		
			T_1	T_2	T_3	T_1	T_2	T_3
1	Time	days	28	28	28	28	28	28
2	Flock	cap.	50	50	50	50	50	50
3	Pens	nr.	5	5	5	5	5	5
4	ME	MJ/kg	100	100	93.46	100	100	93.37
5	Protein	%	100	95.36	100	100	95.12	100

Weekly and whole specific consumptions were calculated based on data about average weight gains and processed feed consumptions.

Mortality was registered each day and weekly mortality and mortality for whole raising period were assessed.

Slaughtering performances were assessed at 56 days of age by slaughtering 25 % of flock. Chicks were scaled before slaughtering and chicks representing average weight of the group were slaughtered.

After slaughtering by neck breaking chicks were plucked, scaled and cut and weights of carcass, breast, legs, wing, internal organs and the rest of the carcass were assessed.

Resulting data were registered and statistically processed and for every experimental group there were assessed cost by product unit for analyzed broiler types based on results obtained.

2. RESULTS AND DISCUSSIONS

Broiler production profitability might be most basically expressed as final output value minus production costs. The leading component of production cost is feed, which makes up to 70% of production cost. For this reason, any unit costs and profitability analyze should also contain a feed cost analyze, because feed is the main factor of an economic analyze. Because of the importance of feed in broiler production, optimizing feed combinations both economically and for biological performances is essential. Unit cost is cost by product unit or by unit of value. Average cost might be: fix, variable, total. When we are working with unitary cost, fix cost became also variable and it is decreasing as products quantity is increasing and it is on the rise when production is shrinking.

Unit costs by product were assessed based on structure and cost of combined feeds used, consumption and cost of other resources and final production performances of Free-Range broilers by experimental groups.

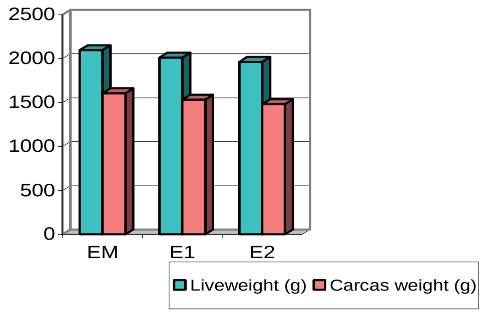
Final production performances of Free-Range broilers are shown in table 2 and figure 1. Their analyze reveals that average live weight of Free-range broilers is between 2096,14 g, in group FM and 1964,08 g in group F2. Best feed intake is that of group F1 (2,51 kg.), followed by F2 (2,58 kg.), FM having the worst feed efficiency (2,64 kg.). Differences between all these variant are very significant. Best live ability is in FM (92%) and F1 (91,60%), compared to F2 (89,80%), however not significant statistically. In conclusion, best results for Free-range broilers are those of groups with variable protein or energy with a better feed efficiency.

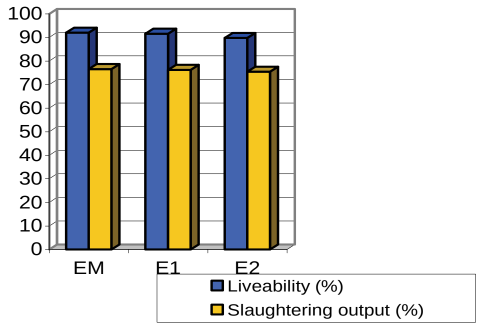
Table 2

Final production performances of Free-range broilers

No.	Specification	UM	Group		
			ME	F1	F2
1	Live weight	g	2096,14	2012,19	1964,08
2	Feed intake	kg	2,64	2,51	2,58
3	Live ability	%	92,00	91,60	89,80
4	Slaughtering output	%	76,59	76,25	75,45
5	Carcass weight	g	1605,43	1534,29	1481,89

Slaughtering performances reveals that best efficiency of Free-range broilers was obtained in variant FM (76,59%), closely followed by F1 (76,25%).





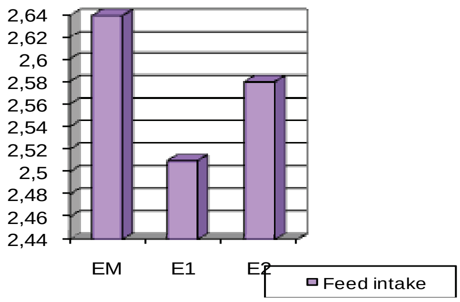


Fig. 1. Final production performances of Free-range broilers

2.1. FEED UNIT COST ANALYZE

Because of the nature of poultry meat production, price is an important weapon in the competitive arsenal of poultry companies, which causes a pressure to reduce production costs. As feed cost is highest singular expense, broiler nutrition has a double aim: covering broiler nutritional needs for a given objective and feedstuffs management for a flexible and economical feed production. For this reason average feeding unit price was found for every experimental group based on combined feed consumption by production phase and by production cost for processed feeds (table 3 and figure 2).

Presented data are showing that processed feed production costs for Free-range broilers by experimental group are different and average unit cost is varying between 1,312 lei/kg in group F2 and 1,375 lei/kg in group FM.

Table 3

Average cost of processed feed used for Free-range broilers

No.	Specification		Time (days)	Processed feed consumption (grams)	Production cost (lei/kg)	Average cost (lei/kg)
1	**FM**	**Starter**	**0 - 28**	1492,92	1,39	1,375
		Finisher	**29 - 56**	4040,88	1,37	
2	**F1**	**Starter**	**0 - 28**	1267,67	1,35	1,335
		Finisher	**29 - 56**	3782,92	1,33	
3	**F2**	**Starter**	**0 - 28**	1196,69	1,32	1,312
		Finisher	**29 - 56**	3870,63	1,31	

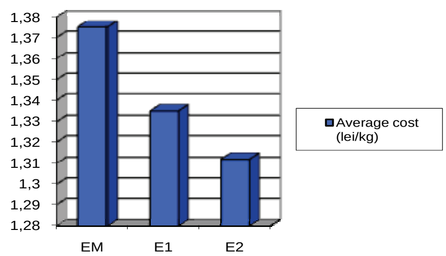


Fig. 2. Average cost of processed feed used for Free-range broilers

2.2. UNIT COST BY KG LIVE WEIGHT ANALYZE

It is very important to be evaluated the effect on profit when decreasing feed cost is targeted. Increasing nutritional parameters will also increase feed cost. Poultry performances will be improved and so income will rise and so profit will rise compared to feed price rise. Obviously maxim profit is not given by diminishing feed cost and it is achieved at highest difference between income and cost.

It is very important to understand the difference between reducing feed cost by bird and reducing feed cost by kg live weight or carcass parts. Feed cost by bird would be little diminished by reducing nutritional parameters of feeds. Performances would be reduced excepting groups F1, F2 - for feed conversion Performances would be reduced and results about live weight would mean rising production costs.

Unit cost for live weight meat production for every experimental group assessed were measured based on performances obtained in experiment (average daily weight gain, feed intake and livability), prices and resources consumption. These are between 6467,73 lei/ton in group FM, 6234,58 lei/ton in F1 and 6316,53 lei/ton in group F2.

There are obvious differences about unit costs due to expenses for biological material, mortality losses, bigger or smaller compared to control group, and feed costs, due to both price differences between feeds used for the three experimental groups and higher or smaller feed intake compared to control group. So there are differences between Free-range broilers (table 4 and figure 3) between 233,15 lei/ton in group F1 and -151,20 lei/ton in group F2 compared to control group.

Analyze of results reveals that diminishing nutritive composition of processed feeds are leading to lower feed costs but also to lower production performances (body weight, feed intake - except groups F1, F2 and livability). These effects are telling that if we are dealing with a rise of feed cost reducing nutritive levels in 'feeds would be an answer but financial impact on whole business should be evaluated before taking such a decision.

Table 4

Structure Cost difference structure for live meat production in Free-range broiler

No.	Specification		Total difference	Biological material	Feed intake	Processed feed cost
1	F1	Value - lei	-233,15	+46,00	-173,55	-105,60
		Structure - %	100	19,72	74,43	45,29
2	F2	Value - lei	-151,20	+93,84	-78,72	-166,32
		Structure - %	100	62,06	52,06	110,00

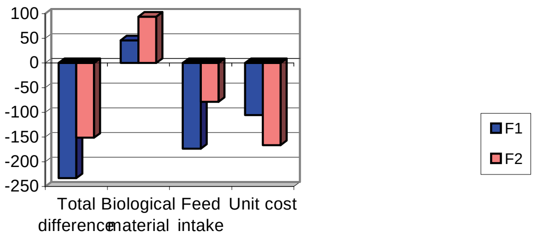


Figure 3. **Structure Cost difference structure (variants F1 and F2 compared to FM) for live meat production in Free-range broiler**

3. CONCLUSIONS

Researches described in this paper are leading to following conclusions:

1. there are different production performances (average daily weight gain, feed intake, live ability) between experimental groups and best production performances are usually in control group FM excepting groups F1, F2 (feed intake);
2. average cost of processed feed is different by experimental group and is between 1,312 lei/kg in group F2 and 1,375 lei/kg in group FM;
3. cost of product „live meat production" is between 6467,73 lei/ton in group FM and 6316,53 lei/ton in group F2;
4. decreasing nutritive composition of processed feeds conduce is leading to lower feed costs but also to lower production performances (feed intake – except groups F1, F2);
5. these effects are telling that if we are dealing with a rise of feed cost reducing nutritive levels in 'feeds would be an answer but financial impact on whole business should be evaluated before taking such a decision.

REFERENCES

1. *Boboc, Viorica* (2005) – Managementul fermelor avicole ecologice, Ed. Cartea Universitară, Bucureşti.
2. *Custură,I., Van, I., Minodora Tudorache, Elena Popescu Micloşanu, Covaşă Ana Maria* (2009) – Researches on performances of raising Free-range chickens, Lucrări Științifice – Universitatea de Științe Agronomice şi Medicină Veterinară, Facultatea de Zootehnie, Seria D, Vol. LII, p. 338-343, ISSN 1224-4295
3. *Minodora Tudorache, I. Van, I. Custură, Elena Popescu – Micloşanu, Daniela Custură* (2009) - Researches on growth performances in Bio – poultry, Lucrări Științifice – Universitatea de Științe Agronomice şi Medicină Veterinară, Facultatea de Zootehnie, Seria D, Vol. LII, p. 343-349, ISSN 1224-4295
4. *Van I. - coordonator, Damian, A., Marin, Gh., Cofas, V., Custură, I., Ana-Maria Covaşă* (2003) - Creşterea şi industrializarea puilor de carne; Ed. Ceres, Bucureşti, 480 pag., ISBN 973-40-0604-5.

The 39th International Session of Scientific Communications of the Faculty of Animal Science, Bucharest, Romania
Scientific papers (seria D; vol. LIII) – Animal Science

STUDY ON UNIT COST OF BIO-TYPE BROILERS

MINODORA TUDORACHE, I. VAN, I. CUSTURĂ,
ELENA POPESCU-MICLOŞANU, DANIELA CUSTURĂ

Key words: bio, weekly average gain, specific consumption, viability

SUMMARY

Experiment was performed with Plymouth Rock barred breed chickens, raised according to the technology to produce ecological poultry meat type Bio.

Three experimental variants were used; respectively three treatments/each variant and experiment design was in pens.

Experimental period was of 84 days of age; feeding technology used was bi-phase, as following: group M, with constant energy and protein level, group E1, with constant energy and variable protein level and group E2, with variable energy and constant protein level.

Major production performances were checked and slaughtering was followed by cutting and finally all data were processed and read statistically.

Finally unit costs per kg processed feed and per kg live weight were analyzed.

Cost is an extremely useful economical tool for decision making about resource usage, production amount and structure, increasing or decreasing product range, technological innovation, etc., in market oriented economies. Input consume for making such goods and services is found in their prices. Production cost in included in price and it must be calculated because: resources are limited; a smaller production cost makes a higher income possible; a smaller production cost keeps your clients and satisfies your share partners, administration board and employees.

A production cost means all costs for inputs consumption performed by the enterprise for goods and services produced and offered. Production costs are very meaningful about business quality and it is a decision-making condition for every producer; lowest cost level is the standard in choosing the right option.

These researches were intended to give an overview about these problems. Objectives were first to find unit costs for feeds and kg live weight to broilers type Bio and second to reduce unit costs by changing energy and protein content of feeds for these broilers.

1. MATERIAL AND METHOD

Experiment was performed in S.D.E. Avicola Moara Domnească, experimental station of the University of Agriculture and Veterinary Science Bucharest, for broilers type Bio, on three pen trials with even body weight and proportion of sexes in block trials. Chickens were Plymouth Rock and they were raised according to standard technology for this breed and in the same conditions of management, feeding and watering.

There were performed three treatments for every experimental flock to find bird's qualitative and quantitative performances and experiments were performed in the same time and with the same biological material and in the same unit.

Trial schedule was designed for chickens Bio and it was as follows:

- treatment I (M): even energy and protein level;
- treatment II (E_1): variable protein level and even energy level;
- treatment III (E_2): even protein level and variable energy level;

In all the three treatments there were used 5 groups with 10 birds each were used by treatment (table 1).

Groups were formed with chickens from the same hatchery at day one. Chick's parents were of the same age to diminish genetic influence over results. Trial period was 84 days and feeding technology was biphasic. During trials it was used a processed feed produced in I.B.N.A. – Baloteşti according to the nutritional needs of chicks and based on the trial design.

Chickens live weight, feed intake and livability were the performance parameters established and checked weekly for every treatment and group during the trial.

Body weight was checked and registered weekly by individual weighting. Average daily weight gains, average weekly weight gains and average weight gains for whole trial period was calculated based on weight gain progression.

Processed feeds consumption was assessed by daily weighting of birds taking into account feeds left in feeders at the end of each week. From these data average feed consumptions were calculated.

Table 1

Work schedule for broilers type Bio

No.	Specification	U.M.	Phase					
			Rising			Finishing		
			T_1	T_2	T_3	T_1	T_2	T_3
1	Time	days	28	28	28	56	56	56
2	Flock	birds	50	50	50	50	50	50
3	Pens	no.	5	5	5	5	5	5
4	ME	MJ/kg	100	100	93.46	100	100	92.90
5	Protein	%	100	95.00	100	100	94.51	100

Weekly and whole specific consumptions were calculated based on data about average weight gains and processed feed consumptions.

Mortality was registered each day and weekly mortality and mortality for whole raising period were assessed.

Slaughtering performances were assessed at 84 days of age by slaughtering 25 % of flock. Chicks were scaled before slaughtering and chicks representing average weight of the group were slaughtered.

After slaughtering by neck breaking chicks were plucked, scaled and cut and weights of carcass, breast, legs, wing, internal organs and the rest of the carcass were assessed.

Resulting data were registered and statistically processed and for every experimental group there were assessed cost by product unit for analyzed broiler types based on results obtained.

2. RESULTS AND DISCUSSIONS

Cost is a value expression for a consumption of lucrative factors. Expense became cost through consumption and cost is preceded by consumption. Reducing production costs is a priority and so there have to be analyzed in details expenses included in costs, their efficiency study and the study of relationship between production costs and production outcome.

Unit costs (fix, variable, total) are calculated by referring the global costs to products quantity. Conversely, cost size for whole production in one industry or another is given by the quantity of products produces and the unit cost.

If price for acquiring production factors is decreasing at a given level of consumption of production factors for product unit cost is decreasing and opposite. If production factors price is constant and their consumption for product unit is decreasing unit cost is also decreasing. Cost increase for product unit is also influenced by change of product characteristics, product quality, etc. Limited resources of raw materials and energy are asking for more scientifically knowledge about value engineering which essentially means obtaining a minimum cost with no compromise on friability and performance etc.

Unit costs by product were assessed based on structure and cost of combined feeds used, consumption and cost of other resources and final production performances of broilers type Bio by experimental groups.

Table 2

Final production performances of broilers type Bio

No.	Specification	UM	Group		
			EM	E1	E2
1	Live weight	g	2456,00	2496,14	2439,84
2	Feed intake	kg	3,34	3,42	3,52
3	Live ability	%	93,80	91,80	89,60
4	Slaughtering output	%	79,70	79,90	81,20
5	Carcass weight	g	1957,43	1994,41	1981,15

Final production performances of broilers type Bio are shown in table 2 and figure 1. Average weight at 12 weeks of age is between 2496,14 g for group E1 and 2439,84 g for E2. Protein or energy variations had no influence on results and there were no statistically assured differences between results. Most favorable specific consumption is in ME, with constant protein and energy level, and the less favorable one is in E2, with variable protein and energy level, between 3,34 – 3,52. All differences between groups are statistically assured. Chickens live ability is also better in ME (mortality 6,2 %) and higher in E2 (mortality 10,4 %), but differences are not statistically assured. In conclusion, best results in production of broilers type Bio are those of variant ME, with feed consumption significantly lower, compared to the other variants, and slaughtering performances are showing that the best efficiency of broilers type Bio, of 81,20%, is obtained at variant E2, with variable energy.

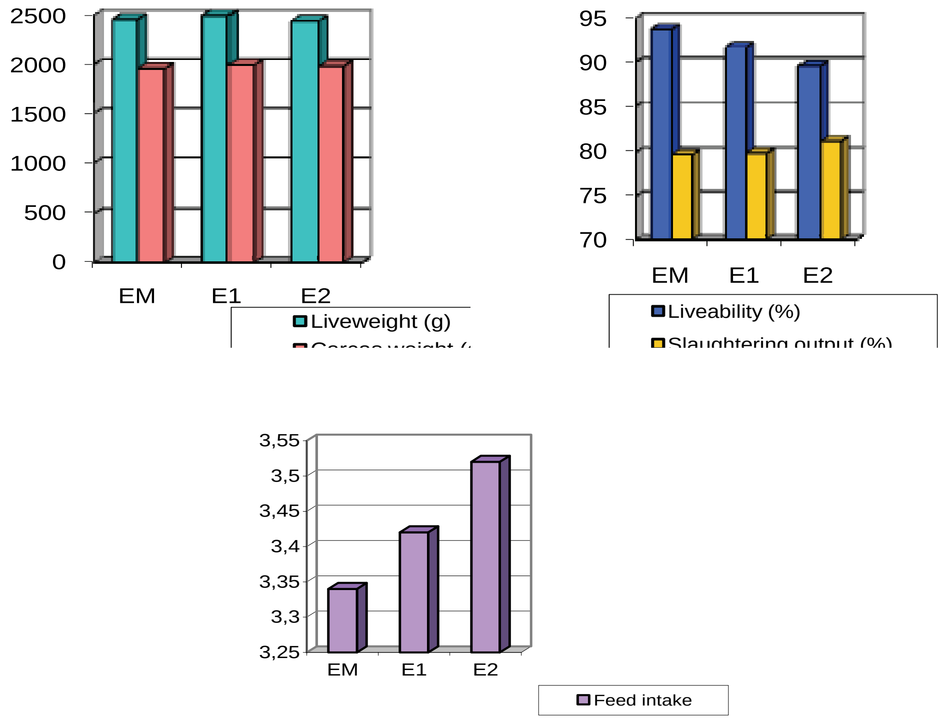


Fig. 1. Final production performances of broilers type Bio

2.1. FEED UNIT COST ANALYZE

Aims of experimental plans were both revealing unit cost by product at broilers type Bio and a possible reduction of production costs by decreasing feed unit cost, because when a rise of feedstuffs cost brings a rise of feed cost firs instinct is to find a solution to stop financial impact on our business, which usually is simply decreasing recommended nutritional parameters in feeds, to reduce feed cost by tone.

For this reason, average unit price of feeding for every experimental group was found based on processed feed consumption by production phase and production cost for every feed combi9nation (table 3 and figure 2).

Table 3

Average cost of processed feed used for broilers type Bio

No.	Specification		Time (days)	Processed feed consumption (grams)	Production cost (lei/kg)	Average cost (lei/kg)
1	ME	Starter	0 - 28	1243,99	1,44	1,398
		Finisher	29 - 84	6959,05	1,39	
2	E1	Starter	0 - 28	1232,74	1,41	1,376
		Finisher	29 - 84	7304,05	1,37	
3	E2	Starter	0 - 28	1291,13	1,40	1,366
		Finisher	29 - 84	7297,10	1,36	

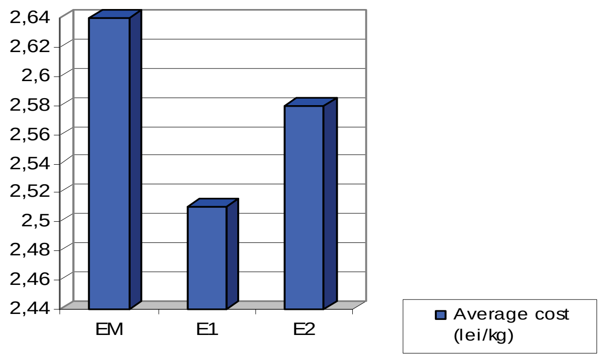


Fig. 2. Average cost of processed feed used for broilers type Bio

Presented data are showing that at broiler type Bio production cost for combined feeds are varying by experimental group and unit cost are varying between 1,366 lei/kg to E1 and 1,398 lei/kg, to group ME.

2.2. UNIT COST BY KG LIVE WEIGHT ANALYZE

Desire to reduce feed cost per ton as much as possible should always be in agreement with maintaining or increasing profit. It is very important to understand the difference between reducing feed cost by bird and reducing feed cost by kg live weight or carcass parts. Feed cost by bird would be little diminished by reducing nutritional parameters of feeds. Performances would be reduced and results about live weight would mean rising production costs.

Unit cost for live weight meat production for every experimental group assessed were measured based on performances obtained in experiment (average daily weight gain, feed intake and livability), prices and resources consumption. These are between 9113,83 lei/ton in group ME, 9157,79 lei/ton in E1 and 9291,47 lei in E2.

There are obvious differences about unit costs due to expenses for biological material, mortality losses, bigger or smaller compared to control group, and feed costs, due to both price differences between feeds used for the three experimental groups and higher or smaller feed intake compared to control group. So there are differences between broilers type Bio (table 4 and figure 3) between +43,96 lei/ton in group E1 and +139,00 lei/ton in group E2.

Analyze of results reveals that diminishing nutritive composition of processed feeds are leading to lower feed costs but also to lower production performances (body weight – except group E1, slaughtering output –except groups E1, E2). These effects are telling that if we are dealing with a rise of feed cost reducing nutritive levels in 'feeds would be an answer but financial impact on whole business should be evaluated before taking such a decision.

Table 4

Cost difference structure for live meat production in broiler type Bio

No.	Specification		Total difference	Biological material	Feed intake	Processed feed cost
1	E1	Value - lei	+43,96	+7,36	+110,12	-73,52
		Structure - %	100	16,74	150,50	67,24
2	E2	Value - lei	+139,00	+38,64	+207,24	-106,88
		Structure - %	100	27,79	149,09	76,88

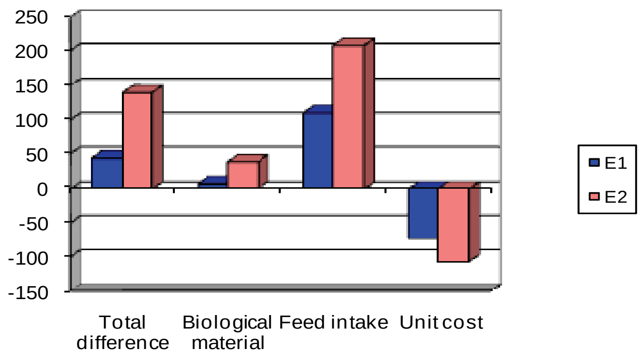


Fig. 3. Cost difference structure (variants E1 and E2 compared to ME) for live meat production in broiler type Bio

3. CONCLUSIONS

Researches described in this paper are leading to following conclusions:

- There are different production performances (average daily weight gain, feed intake, live ability) between experimental groups and best production performances are usually in control group ME excepting groups E1 (body weight), E1, E2 (slaughtering output);
- average cost of processed feed is different by experimental group and is between 1,366 lei/kg in E1 and 1,398 lei/kg in group ME;
- cost of product „live meat production” is between 9113,83 lei/ton in group ME and 9291,47 lei in E2.
- decreasing nutritive composition of processed feeds conduce is leading to lower feed costs but also to lower production performances (body weight – except group E1);
- these effects are telling that if we are dealing with a rise of feed cost reducing nutritive levels in ‘feeds would be an answer but financial impact on whole business should be evaluated before taking such a decision.

REFERENCES

1. *Boboc, Viorica* (2005) – Managementul fermelor avicole ecologice, Ed. Cartea Universitară, București.
2. *Custură,I., Van, I., Minodora Tudorache, Elena Popescu Micloşanu, Covaşă Ana Maria* (2009) – Researches on performances of raising Free-range chickens, Lucrări Științifice – Universitatea de Științe Agronomice și Medicină Veterinară, Facultatea de Zootehnie, Seria D, Vol. LII, p. 338-343, ISSN 1224-4295
3. *Minodora Tudorache, I. Van, I. Custură, Elena Popescu – Micloşanu, , Daniela Custură* (2009) - Researches on growth performances in Bio – poultry, Lucrări Științifice – Universitatea de Științe Agronomice şi Medicină Veterinară, Facultatea de Zootehnie, Seria D, Vol. LII, p. 343-349, ISSN 1224-4295
4. *Van I. - coordonator, Damian, A., Marin, Gh., Cofas, V., Custură, I., Ana-Maria Covaşă* (2003) - Creșterea şi industrializarea puilor de carne; Ed. Ceres, București, 480 pag., ISBN 973-40-0604-5.

INFLUENCE OF MEAT HIBRID HENS AGE ON HATCHING PARAMETERS

ELENA POPESCU – MICLOŞANU, MIHAI GEORGE PÎRVULEŢ, IOAN CUSTURĂ, CRISTINA ŞTEFANIA PÎRVULEŢ, VLAD IULIAN

Key words: hens age, incubation, fertility, hatching

SUMMARY

Given the constant evolution of performance, this paper aims at showing how the main parameters of incubation change a high current hybrid intensive meat industry. This was followed by a series of 8 numbers of 100.000 eggs hatching on the entire flow range technology incubation and there were calculated the following values: fertility, hatching and hatch of fertile percentage, non-incubated eggs and one day chicken weight. The birds age periods studied were: 25-30 weeks, 30-35 weeks, 36-40 weeks, 41-45 weeks, 46-50 weeks, 51-55 weeks, 55-60 weeks and 61-65 weeks. The results showed that the fertility percentages, hatching and hatch of fertile percentage had good values at the beginning of the hatching period, at the age of 25 to 30 weeks, fertility reached the values of 92.02%, 82.25% - the hatching, and the hatch of fertile percentage was of the 90.96%. The best values of these parameters were recorded when birds were aged 36-40 weeks: fertility - 95.50%, hatching - 88.66% and hatch of fertile percentage - 93.99%. hatch of fertile percentage peak was obtained at 41-45 weeks and it was of 94.12%. After this period, the incubation parameters decreased slowly until the end of the operation. At the end of the studied period, when the birds were aged between 61 - 65 weeks, fertility was 63.57%, and hatching of 55.70% hatch of fertile percentage reached 89.65%. As the percentage of non-incubated eggs, was the lowest when parents age was 41-45 weeks, representing a 3.33% and higher when eggs were collected from parents aged 56 - 60 weeks. One day old chicks live weight was lowest when the eggs collecting was made at age of 25-29 weeks, 38.50 g, and highest parents when parents age was between 61-65 weeks. Meat hybrid incubation values formulated for observation birds were generally higher than those of the highest technological standard which was part of the operating period and the age for eggs collecting with the best results in incubation was between 36-40 weeks.

1. MATERIAL AND METHOD

The experiment took place in the hatchery poultry unit SC Avicola Tărtăşeşti, Dâmboviţa county, specialized in breeding and laying breeds exploitation. The biological material was represented by a series of meat parent hybrid eggs, reared on permanent litter and fed with compound fodder. Their eggs were incubated, and parents were divided according the following intervals: 25-30, 30-35, 36-40, 41-45, 46-50, 51-55, 56-60 and 61-65 weeks. During the entire period of operation, the analyzed incubation parameters were: the percentages of fertility, hatching, the hatch of fertile percentage and non-incubated eggs.

2. RESULTS AND DISCUSSIONS

The fertility percentage was different from one age to another. At the beginning of eggs collecting, when hens were aged 25 to 30 weeks, average fertility was 92.02% higher than the one provided by the standard value, which was 90.50% (table 1).

Table 1

Eggs fertility according to the parents age (%)

Parents age (weeks)	Results			Standard
	X	S_x	*c.v.*	*X*
25 – 30	92,02	0,015	3,99	90,5
30 – 35	95,42	0,007	2,67	94,5
36 – 40	95,50	0,002	0,67	84,8
41 – 45	94,17	0,002	0,66	93,8
46 – 50	92,55	0,004	1,36	92,3
51 – 55	81,08	0,023	8,66	90,4
56 – 60	74,43	0,032	13,07	86,8
61 – 65	63,57	0,006	3,24	79,5

This parameter increased during the evolution age up to a maximum of 95.50% during the weeks 36-40. After this period, the fertility rate has gradually decreased to values lower than technology standard, accompanied by increased variability after the age of 51 weeks. Thus, fertility was 81.08% in the 51-55 weeks, the standard being of 90.40%. At the end of the operation, the fertility rate reached the value of 63.57% with an average error of 0.006 and a coefficient of variation of 3.24%.

Table 2

Hatching percent according to the parents age (%)

Parents age (weeks)	Results			Standard
	X	S_x	*c.v.*	*X*
25 – 30	82,25	0,033	9,99	85,8
30 – 35	87,19	0,003	1,24	87,8
36 – 40	88,66	0,005	1,75	88,4
41 – 45	87,83	0,003	1,16	87,4
46 – 50	84,76	0,005	1,81	85,6
51 – 55	68,96	0,010	4,73	83,2
56 – 60	60,29	0,043	21,44	79,2
61 – 65	55,70	0,006	3,52	76,1

At the beginning of the operation, the hatching rate was 82.25% with 3.25% less than standard hybrids (table 2, figure 1). During the operation, the hatching rate increased, reaching the age of 36-40 weeks, 88.66%. After this period, the hatching rate decreased progressively to 68.96% at the age of 51-55 weeks, and at the end of the operation, at the age of 61-65 weeks reached the value of 55.70%, all these values were below the expected average standard.

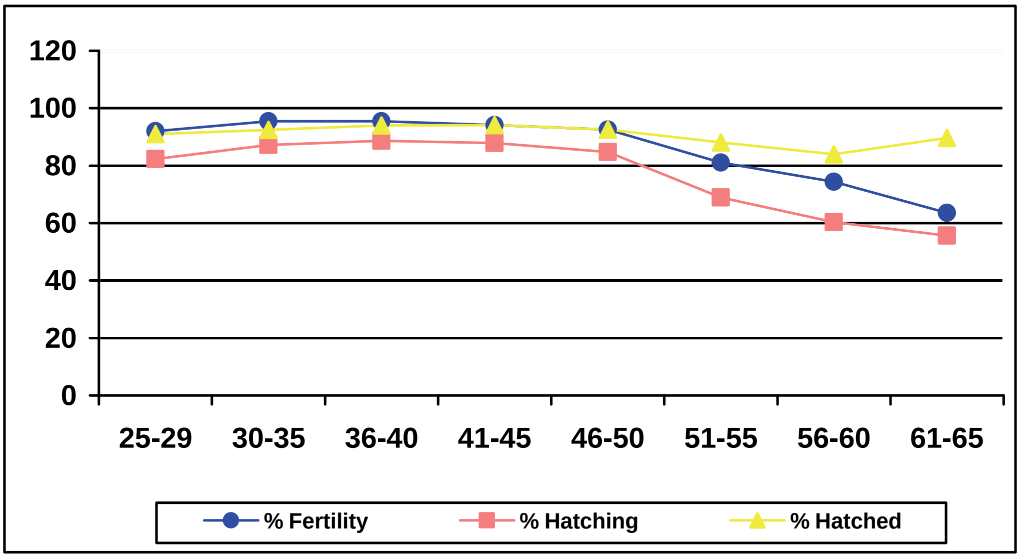


Fig. 1 – The main parameters of the incubation

Table 3

Hatch of fertile according to the parents age (%)

Parents age (weeks)	Results			Standard
	X	S_x	*c.v.*	*X*
25 – 30	90,96	0,018	5,13	81,3
30 – 35	92,45	0,003	1,31	84,3
36 – 40	93,99	0,007	2,33	86,7
41 – 45	94,12	0,002	1,93	86,9
46 – 50	92,61	0,002	1,68	86,9
51 – 55	88,13	0,002	2,71	86,5
56 – 60	83,96	0,022	7,97	85,6
61 – 65	89,65	0,005	1,92	81,3

In table 3 we can see that the percentage of hatched eggs operating throughout the laying period was higher than the one required by standard values. Throughout the studied ages, hatch of fertile percentage had different values. The young ages ranging from 25 to 30 weeks, the parameter studied was as an average of 90.96%, with a percentage of variability of 5.13%. With an increasing age, analyzed hatched percentage value increased to 94.12% at the age of 41-45 weeks. After this period, the parameters studied decreased to a low value of 83.96% at the age of 56-60 weeks. At the end of the reporting period, the hens were aged 61-65 weeks and hatch of fertile percentage tended to increase slightly, reaching a value of 89.65% with 8.35% higher than the standard set for this hybrid.

Table 4

Percentage of non-incubated eggs according to the parents age (%)

Parents age (weeks)	Non-incubated eggs (%)		
	Average	Average error	Coefficient of variation
25 – 29	5,47	0,005	14,94
30 – 35	4,12	0,004	17,58
36 – 40	3,68	0,004	18,86
41 – 45	3,33	0,003	17,11
46 – 50	4,13	0,006	13,84
51 – 55	6,24	0,01	5,33
56 – 60	7,50	0,01	20,81
61 - 65	3,79	0,004	24,87

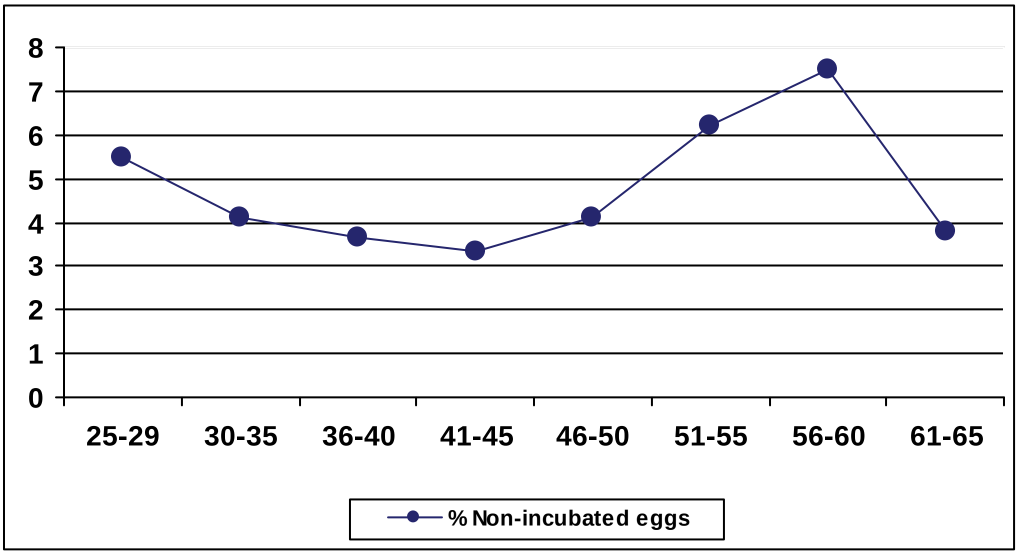


Fig. 2 – Dynamics of non-incubated eggs percentage according to the parents age

Percentage of non-incubated eggs reached the lowest value when parents age was of 41-45 weeks, 3.33%, after words showing an upward trend. The highest value was recorded when the eggs were collected from parents aged 56-60 weeks (table 4, figure 2).
The chicken weight after hatching was different depending on the age of parents. This was a slow trend of growth during the production cycle (table 5, figure 3).

Table 5

Chicks weight after hatching according to the parents age

No.	Parents age (weeks)	Chicks weight after hatching (g)		
		Average	Average error	Coefficient of variation
1	25 – 29	38,50	0,85	7,14
2	30 – 35	41,50	1,06	8,91
3	36 – 40	41,00	0,47	3,45
4	41 – 45	42,00	0,72	4,26
5	46 – 50	44,00	1,43	3,71
6	51 – 55	44,83	1,08	2,88
7	56 – 60	45,00	0,84	5,89
8	61 - 65	45,67	0,69	3,24

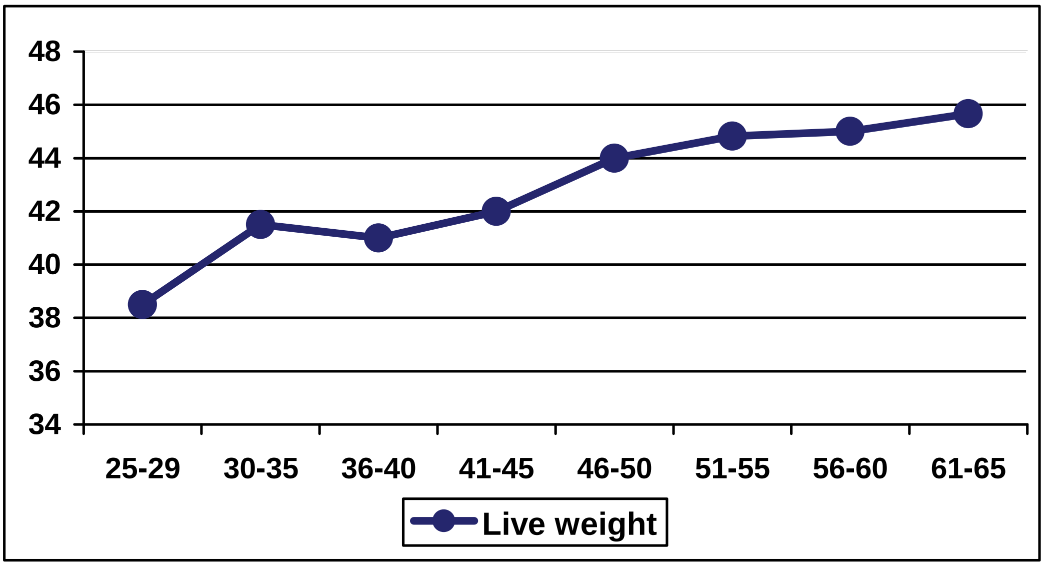


Fig. 3 – Dynamics of the one day old chicks weight depending on the parents age

The lowest value was in the early period of operation, eggs collecting was done when parents were aged between 25-29 weeks, 38.50 g with a variation coefficient of 0.85% and the highest weight of the chicks was recorded when parents age was between 61-65 weeks. Average weight of one day old chicks weight on a mid-term basis has been operating around the age of 41-45 weeks.

3. CONCLUSIONS

1. Fertility increased over the studied birds ages up to a maximum of 95.50% during the weeks 36-40 of life, then gradually decreased to values lower than the standard technology, reaching 81.08% in the 51 - 55 weeks, the standard value being 90.40% and at the end of the operation reached the percent of 63.57%;
2. The hatching percentage was of 82.25% at the beginning of the operation, with 3.25% less than standard hybrids, but increased during the operation, reaching the age of 36-40 weeks, 88.66% and gradually decreased to 68.96% at 51-55 weeks, came to the end of the analyzed period, at the age of 61-65 weeks to be a percent of 55.70%, these values being below average in the standard;
3. Hatch of fertile percentage, reflecting technologies applied throughout the incubation period of the eggs was higher than the one required by standard. The young ages ranging from 25 to 30 weeks, the parameters studied was rated at 90.96%, with a variability percentage of 5.13%. With age, hatch of fertile percentage value increased to 94.12% during the 41-45 weeks and then decreased to 83.96% at 55-60 weeks. At the end of the reported period, the hens were aged 61-65 weeks, and the hatch of fertile percentage tended to increase slightly to 89.65%, with 8.35 higher than the standard set for this hybrid;
4. Percentage of non-incubated eggs reached the lowest value when parents age was of 41-45 weeks, showing a tendency to increase with 3.33%, according to age, most occurring in older parents, aged of 56 - 60 weeks;
5. The weight of the hatched chick has tended to increase during the production cycle, from 38.50 g at the beginning, when the parents age is of 25 weeks, and their weight increases to 45.67 g, when parents are aged 61-65 weeks;
6. To conclude in the effected research, we can say that the current values of the indices formulated for meat hybrid were generally higher than the standard set of technology except the last part. When eggs were collected from parents aged between 51 - 65 weeks, the incubation parameters represented by fertility and hatching percentage had lower values than standard value, and the hatch of fertile percentage was even greater.
7. It is recommended a further study on the causes of lower eggs fertility after the age of 51 weeks, which seems to affect the hatching rate.

REFERENCES

1. *Van I.* – Tratat de avicultură, Ed. Ceres, București, 2002;
2. *Van I.* – Note de curs, București, 2007 - 2008;
3. ***Avicultorul, Ed. Ceres, 2001 – 2008;
4. *** Ghid cu obiective de performanță la părinții de reproducție Ross 308, iunie, 2007;
5. ***Watt Poultry Yearbook;

The 39th International Session of Scientific Communications of the Faculty of Animal Science, Bucharest, Romania
Scientific papers (seria D; vol. LIII) – Animal Science

PHENOTYPIC CORRELATIONS AMONG LIVE BODY WEIGHT AND MAIN DIMENSIONS OF YOUNG NEW ZEELAND RABBITS BY SEASON

CRISTINA ŞTEFANIA PÎRVULEŢ, ELENA POPESCU – MICLOŞANU, MIHAI GEORGE PÎRVULEŢ, MINODORA TUDORACHE, IŞFAN NICOLETA

Key words: phenotypic correlations, body weight, body length, body width, perimeter

SUMMARY

The present research aims at studying the phenotypic correlation between live weight and main body sizes in New Zeeland young rabbits, bred in semi-intensive system. The studied livestock was made of four groups, each of them containing 60 rabbits, in equal sex ratio from birth until the age of 180 days. The groups were analyzed according to the season they were born and annually, body weight and main body sizes: body length, trunk length, head length, head width, thorax width, croup width, thoracic perimeter and left whistle perimeter. At the end of the experiment it was established that the highest live weight observed in rabbits reared in the spring season, was of 2502.17 g. This was followed in descending order by autumn, with an average of 2138.05 g, by summer 2100.34 g and the lowest weight was found during the cold season and was of 2029.62 g. The annual level average was of 2192.55 g, with a average error of 105.627 g. Phenotypic correlations between live weight and body length sizes in young rabbits were positive, the highest values were recorded in autumn, from 0.53 between live weight and body length, to 0.31 between live weight and trunk length, 0.48 between live weight and head length, body length and weight were closely related and have evolved in the same way every time. Phenotypic correlations between live weight and body widths were positive throughout the year studied, the highest values being recorded during the autumn, of 0.24 between live weight and head width, 0.43 between live weight and thorax width and 0.60 between live weight and croup width, which shows a very close correlation of the studied characteristics. Determined phenotypic correlations between live weight and the thoracic perimeter and left whistle perimeter was positive, the highest values were in autumn of 0.61 and respectively 0.46, showing that the weight and perimeter are highly correlated closely during the given period. In other seasons were values close to average rate during the summer season and lower in spring and winter.

1. MATERIAL AND METHOD

The experiment on phenotypic correlations between body live weight and main body sisez was held in the biological headquarters of Cantacuzino Institute. The biological material was represented by a population of New Zeeland laboratory rabbits. The investigations were performed on 240 rabbits, 60 heads for each season: summer, autumn, winter and spring. Young rabbits were maintained in semi-intensive system, in dark halls with natural light and ventilation, with no heating in winter. Lodging rabbit cages were made of wire mesh floors on two levels in batteries. Reproduction was semi-intensive type and feeding was done with granulated fodder throughout the all analyzed year. Young rabbits were observed from birth until the age of 180 days, the last determinations were made before reproduction. The following measurements were made: body length, trunk length, head length, head width, thorax width, croup width, thoracic perimeter and left whistle perimeter. These data were statistically analyzed for each season separately, resulting an average, the average error and phenotypic correlation for each season and on annual basis.

2. RESULTS AND DISCUSSIONS

Table 1 presents the results obtained in terms of living body weight, body length and phenotypic correlations between them. The largest weight occurred in rabbits reared in the spring season, of 2502.17 g, followed in descending order by autumn, with an average of 2138.05 g, 2100.34 g in the summer and the lowest value was found during the cold season, reaching 2029.62 g. The annual average was of 2192.55 g, with a medium error of 105.627 g. Body length was highest in winter, of 49.69 cm. Then summer season followed, with 49.04 cm, and 46.62 cm in autumn, and in spring, the final data was of 46.54 cm. The annual average body length was 47.97 cm.

It is to be remarked that the living body weight and length have evolved differently from one season to another, places taken in the hierarchy are different according the two studied parameters. Phenotypic correlations between live weight and body length showed that the highest values were recorded during the summer and autumn, which shows that both body length and weight have evolved in the same way during all periods. In other seasons, the phenotypic correlation decreased, the two traits were weakly correlated to 0.15 in the spring and in the winter it has reached the minimum value of 0.13 (figure 1).

Table 1

Phenotypic correlations between body weight and body length for young 180 days New Zeeland rabbits

Season	Body weight		Body length		Phenotypic correlation
	X	**S_x**	**X**	**S_x**	
Summer	2100,34	73,775	49,04	0,238	0,55
Autumn	2138,05	37,086	46,62	0,262	0,53
Winter	2029,62	26,060	49,69	0,203	0,13
Spring	2502,17	25,082	46,54	0,181	0,15
Annual total	2192,55	105,627	47,97	0,815	0,43

Trunk length depending on the season evolved from a minimum of 25.75 cm in autumn, up to 29.27 cm in the spring. The annual average was of 26.98 cm (table 2). Phenotypic correlations values between live weight and trunk length were higher during peak seasons change from hot to cold and vice versa, in the autumn and spring the values were of 0.31 and 0.27 (figure 1). In winter the phenotypic correlation coefficient was of 0.23 and during the warm season dropped to the minimum value of 0.08, the two traits are poorly correlated.

Table 2

Phenotypic correlations between body weight and trunk length for young 180 days New Zeeland rabbits

Season	Body weight		Trunk length		Phenotypic correlation
	X	**S_x**	**X**	**S_x**	
Summer	2100,34	73,775	27,03	0,224	0,08
Autumn	2138,05	37,086	25,70	0,196	0,31
Winter	2029,62	26,060	25,93	0,164	0,23
Spring	2502,17	25,082	29,27	0,197	0,27
Annual total	2192,55	105,627	26,98	0,815	0,50

Table 3

Phenotypic correlations between body weight and head length for young 180 days New Zeeland rabbits

Season	Body weight		Head length		Phenotypic correlation
	X	**S_x**	**X**	**S_x**	
Summer	2100,34	73,775	13,50	0,105	0,06
Autumn	2138,05	37,086	12,77	0,090	0,48
Winter	2029,62	26,060	12,06	0,076	0,17
Spring	2502,17	25,082	12,72	0,077	0,36
Annual total	2192,55	105,627	12,91	0,197	0,10

Head length had quite large fluctuations from one season to another. The annual average was of 12.91 cm. The highest value was recorded during the summer, of 13.50 inches, and the lowest in the cold season, of 12.06 cm. In other seasons the values were intermediate 12.77 cm and 12.72 cm during the spring and autumn (table 3). Phenotypic correlations between live weight and head length were positive throughout the studied period. The highest phenotypic correlation between two parameters was recorded in autumn and it was of 0.48. Then came the spring season in descending order, with 0.36, then winter with 0.17 and finally summer with 0.06 (figure 1).

Table 4

Phenotypic correlations between body weight and head width for young 180 days New Zeeland rabbits

Season	Body weight		Head width		Phenotypic correlation
	X	**S_x**	**X**	**S_x**	
Summer	2100,34	73,775	5,13	0,078	0,03
Autumn	2138,05	37,086	4,98	0,049	0,24
Winter	2029,62	26,060	5,05	0,052	- 0,27
Spring	2502,17	25,082	5,36	0,067	0,06
Annual total	2192,55	105,627	5,13	0,083	0,19

Table 4 presents head width in young rabbits according to season. The annual average was of 5.13 cm. As an average, the largest head was found with the rabbits reared in spring season, of 5.36 cm and the narrowest in autumn, of 4.98 cm.

Phenotypic correlations between live weight and head width were positive in autumn, presenting the values of 0.24, 0.06 in spring season and 0.03 in summer (figure 1). The only time of the year with a negative correlation coefficient it was the autumn, when there was a value of -0.27, when the live weight evolved so differently than the width of the head. At an annual level, phenotypic correlation between live weight and width of head was tight and had a value of 0.19.

Table 5

Phenotypic correlations between body weight and thorax width for young 180 days New Zeeland rabbits

Season	Body weight		Thorax width		Phenotypic correlation
	X	**S_x**	**X**	**S_x**	
Summer	2100,34	73,775	7,34	0,153	0,15
Autumn	2138,05	37,086	7,51	0,105	0,43
Winter	2029,62	26,060	6,97	0,099	0,08
Spring	2502,17	25,082	8,32	0,101	0,16
Annual total	2192,55	105,627	7,54	0,285	0,44

The annual average of the young rabbits thorax width was of 7.54 cm. It ranged from 8.32 cm during the spring, at a minimum of 6.97 cm in winter (table 5). There were determined phenotypic correlations between live weight and thorax width of 0.44 on an annual basis. The correlation coefficient ranged from 0.08 during the winter to 0.43 in autumn. In other periods there were intermediate values of 0.15 and 0.16 in the hot and spring season (figure 1).

Table 6

Phenotypic correlations between body weight and croup width for young 180 days New Zeeland rabbits

Season	Body weight		Croup width		Phenotypic correlation
	X	**S_x**	**X**	**S_x**	
Summer	2100,34	73,775	10,10	0,127	0,51
Autumn	2138,05	37,086	10,53	0,116	0,60
Winter	2029,62	26,060	10,14	0,103	0,06
Spring	2502,17	25,082	11,26	0,120	0,23
Annual total	2192,55	105,627	10,51	0,269	0,53

In Table 6, there are presented the croup width dimensions during a year. The annual average of this parameter was of 10.51 cm. Croup width ranged from a low of 10.10 cm in summer to 11.26 cm in spring. Phenotypic correlation coefficient between live weight and croup width was of 0.53 yearly, two traits evolve in the same direction.

Positive values were registered during the studied year, from 0.06 in winter to 0.60 in autumn.

Thoracic perimeter reached an average of 31.58 cm. This value ranged from a low of 30.30 cm during the summer to 32.88 cm in spring season (table 7). Phenotypic correlations established between live weight and thoracic perimeter were positive, annual average was of 0.52. Depending on the season, the lowest value of phenotypic correlation has been studied and it was of 0.52 in spring and the highest of 0.61 was in autumn.

Table 7

Phenotypic correlations between body weight and thoracic perimeter for young 180 days New Zeeland rabbits

Season	Body weight		Thoracic perimeter		Phenotypic correlation
	X	**S_x**	**X**	**S_x**	
Summer	2100,34	73,775	30,30	0,259	0,48
Autumn	2138,05	37,086	31,45	0,241	0,61
Winter	2029,62	26,060	31,67	0,245	0,29
Spring	2502,17	25,082	32,88	0,199	0,15
Annual total	2192,55	105,627	31,58	0,529	0,52

The last analyzed parameter was the left whistle perimeter. It took the average values ranging from 5.81 cm in winter, up to 5.85 cm in the autumn, 5.95 cm in the spring season and reached up to 6.53 cm during the warm season (table 8).

Table 8

Phenotypic correlations between body weight and left whistle perimeter for young 180 days New Zeeland rabbits

Season	Body weight		Left whistle perimeter		Phenotypic correlation
	X	**S_x**	**X**	**S_x**	
Vara	2100,34	73,775	6,53	0,110	0,14
Toamna	2138,05	37,086	5,85	0,056	0,46
Iarna	2029,62	26,060	5,81	0,050	0,11
Primăvara	2502,17	25,082	5,95	0,060	0,10
Total anual	2192,55	105,627	6,04	0,168	0,11

Phenotypic correlations values between live weight and whistle perimeter were low, annual average was of 0.11, the two traits were porly correlated with one another. The closest values to the annual average were recorded in spring, of 0.10, then 0.11 in winter, and 0.14 in summer. Higher value was recorded only during autumn and was 0.46.

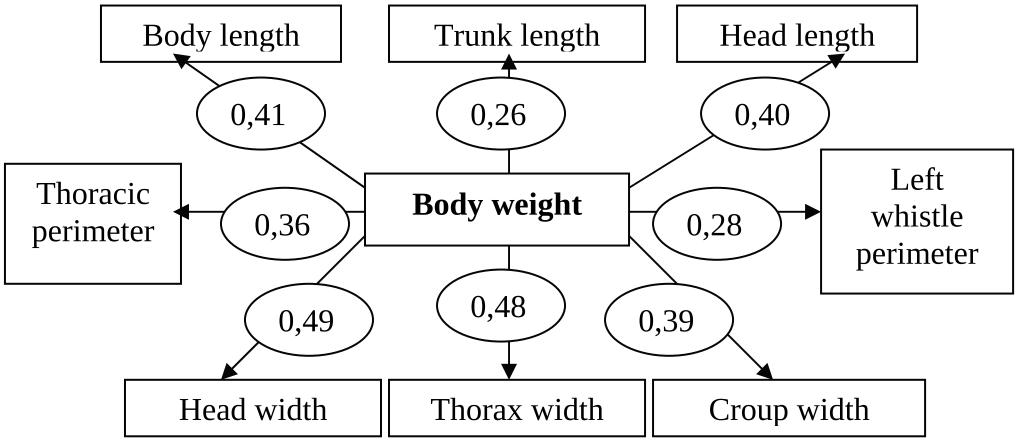


Fig. 1 – Phenotypic correlations between live weight and main body sizes in young rabbit

3. CONCLUSIONS

As a consequence of the experiment achieved on phenotypic correlations between body weight and main body sizes, we have the following conclusions:

1. Phenotypic correlations between live weight and body length size were positive, the highest values were recorded in autumn, from 0.53 between body weight and body length, between weight and trunk length of 0.31, and 0.48 between weight and head length, both body weight and body length have been very closely correlated, evolving the same way in the studied period of time.

2. Phenotypic correlations between live weight and body widths were positive throughout the year studied, the highest values being recorded in autumn, and reaching of 0.24 between weight and head width, between body weight and thorax width to 0.43 and 0.60 between the body weight and croup width. During other periods, there were recorded values close to the annual average.

3. Phenotypic correlations were established between live weight and thoracic perimeter and live weight and whistle perimeter were positive in autumn of 0.61 and respectively 0.46, the two characters are very closely related to the above mentioned period.

REFERENCES

1. *Drăgănescu C., Grosu H.* – Ameliorarea animalelor, Ed. Agrotehnica, Bucureşti, 2003;
2. *Grosu H., Popa Al.* – Tehnici elementare de analiză şi evaluare în ameliorarea genetică a animalelor – îndrumător de lucrări practice, Uz intern, USAMV – AMD, Bucureşti, 2002;
3. *Negruţiu E., Petre A., Pipernea N.* – "Genetica şi ameliorarea animalelor ", Ed. Didactică şi Pedagogică, Bucureşti, 1969;
4. *Popescu-Micloşanu Elena, coord. şi colab.* – Tratat de animale de blană şi iepuri, Ed. Bioterra, Bucureşti, 2002;
5. *Popescu-Micloşanu Elena., Tudorache Minodora* - Cunicultură, animale de blană şi vânat, lucrări practice, A.M.D.- U.S.A.M.V., Bucureşti, 2006.

RISK AND OCCUPATIONAL TRADITIONAL IMPACT IN THE DECISION CONCERNING SHEEP BREEDING IN PEASANT FARMSTEAD

GHEORGHE SĂVOIU[1], MIRELA STANCIU[2], VLAD IULIAN[3]
[1]Universitatea din Piteşti,[2]Universitatea „Lucina Blaga" Sibiu,[3]USAMV Bucureşti
e-mail: [1]gsavoiu@yahoo.com, [2]mirela_stanciu2008@yahoo.com, [3]vladiul@yahoo.com

Key words: investigstion in the rural farmstead, decision in animal husbandry, occupations tradition, ecological impact, trends in rural areas.

SUMMARY

Rural Romanian economy was based upon agricultural activities, mostly achieved by family, structured on kinship relationships , its entire organization being determined by size and coordination between consumption demands and size of the labour force. That's how the importance of rural overpopulation issue is explained, this one connecting the population density with the village agricultural surface between the world wars and after them. The traditional pastoral or especially sheep breeding constituted viable solutions of expansion for Romanian village. After almost half a century, the present Romanian village paradoxally suffers due to underpopulation. With an emphasized ageing of population synthetised in a percent of almost 10% older for the group of age, of 65 and over, with a living expectancy, smaller with almost 2 years, and a general and infant mortality rate, bigger with almost 50%, with an 3,3 more numerous illiterate population than in urban areas, category which represents almost 4,5 % from the total of the population over 10 years old, rural population is still mostly defined by Romanian peasant traditional farmstead and in a less measure by modern agricultural farm.

The analysis of the risk problems and of the ecological and traditional impact are the conseqence as well of holistic approach need in Romanian husbandry (especially within the suport agricultural politics on national and European level), as especially cultural and educational patrimony , almost extincted or found in a difficult survival in a still more tourmented economic and social environment. There are many the questions which requst even more specific answers, starting with, „how does a peasant farmstead evaluate, the efficiency of its own invesments in sheep breeding, in this new context?,'' to „ which are the main causes of the risk increase of pastoral occupations and of the traditional connected to it?", or „how, can we identify, the main risks provided by the farmstead expenses, which may lead to financial crash an activity, like the sheep breeding?'', or „ how can we identify concretely a surviving program of the peasant farmstead , in the context of the increase of some category of expenses specific to sheep breeding, identified and shown in the present context" etc. The present work represents a synthesis of some aspects submitted to a research achieved within the project with European financing, entitled'' Mountain resources and sustainable (RO 0010 PMS 29 – small grant-projects, approved within the Request of projects proposal - Second tourin he Financial Mechanism of European Economic Space (SEE), The Fund for NGOs -in 2010).

After almost half a century, since the impact of an imposed co-operativization, Romanian village suffers paradoxically of under-population. The latest two decades amplified the presence of the risk and of the ecological impact, extended also by the incertitude of the occupational traditional survival, within the decision of Romanian farmstead to maintain sheep breeding as main agricultural occupation or even secondary, even in the mountain areas. The main expected trend which may be confirmed by the two census, respectively the agricultural and the population ones which are practically unfolded in 2010 and 2011, is the one that Romanian rural economy which dominated the Romanian community until 1986, is in regression, but not in the necessary rhythm after our country's adhering to E.U. (with natural social, economic and demographical iimplications) and the significant rural dimension of our national economy (which may be estimated to almost 40%) will keep on constituting a social and economic reality with important and long lasting consequences. The regressive and involutive factors of the rural environment, expected to be confirmed by the new census, to reach more consistent values are: a) accentuated ageing of population synthetised in share with almost 15-20% bigger for the age group of 65 years; b) a living expectancy smaller, practically with 2 and a half years, with a general and infantile mortality rate bigger with over 60%; c) an illiterate population, 3,5 - 4 times more numerous than in the urban area , category which will possess a share of almost 5-6 % from the total of the population aged over 10 ; d) a rural population terribly defined by the Romanian peasant traditional farmstead under 5 ha (about 75% from the farmsteadss total) and in a very small measure by the modern agricultural farm of over 50 ha; e) an occupation and activity rate which is double on the inferior educational segment, rural population will suffer from more than a third from the unemployment rate, despite the BIM evaluation which was axed upon a limited number of hours worked in agriculture; f) the house specific to rural areas stays located only in a living building, mostly built during 1945-1970 and supplied with water and sewing equipments in a 40%reduced proportion and just 30-35% for sewing (in the most optimistic alternative); g) more than 2/3 of rural farmsteads are likely not to be supplied with sanitary groups with toillets and bathrooms; h) natural gas supply isn't provided to more than 1/3 of the rural population , and central heating is provided to mostly 15-20%; j) the total population may decrease with 1,5-2 million inhabitants, as consequence of the legal or illegal migration and of the negative spore registrer between census, comprised between 20 and 40 thousand inhabitants every month; k) linguistic and ethnical structure of the majoritary Romanian population will decrease, making a parallel with the increase in number of gipsies.(with values comprised between 3-5%, on general average); l) religious structure registered by the18th of March 2002 census will undertake substantial changes, the orthodox religion adepts decreasing with almost 10% in favour of another religions etc.

The dramatism of the informational reality offered by the new census will promptly request immediate measures in a context of recession and postrecession. Rural farmstead and Romanian rural economy could remain occupational traditional and going on with the husbandry contribution , even in the resizing context of adjustment to the modern type of organic agriculture and finnalyof valorization, but the absence of a decisional context risks to lead to the loss of cultural models, traditions and historical originality.

The analysis of risk problems and of the ecological and traditional occupational impact are the consequence as well of a necessity to approach in a holistic way, Romanian Husbandry (especially in the support agricultural politics, on national and European plan), as of educational and cultural patrimony elements preserving, almost dissapeared or found in a difficult survival in a still tormented economic and social environment . There are a lot the questions which request answers, gradually particularized, starting with „''how a peasant farmstead evaluate, the efficiency of its own invesments in sheep breeding in this new context ?", till „which are the main causes of the risk increase of pastoral occupations and of the traditional connected to it?", since „"how , can we identify , on short term the main risks by the farmstead expenses which may lead to financial crash an activity like the sheep breeding?, to „how can we identify concretely a surviving program of the peasant farmstead, in the context of the increase of some category of expenses specific to sheep breeding, identified and shown in the present context?" The present work represents a synthesis of some aspects submitted to a research achieved within the project with European financing, entitled'' Mountain resources and sustainable (RO 0010 PMS 29 – small grant-projects, approved within the Request of projects proposal- Second tourin he Financial Mechanism of European Economic Space (SEE), The Fund for NGO s -in 2010).

1. MATERIAL AND METHOD

The research area aimed at a selection of localities found at the south of Carpathians, according to occupational traditional criteria, related to grazing or to sheep breeding. These traditions preservers are known in this geographical area as „ungureni", and the localities Corbeni, Rucăr and Domneşti were choosen for their their,''ungurean ,' origin and for their diversity. „Ungurenii", the way the sheep breeders are called presently too, were different from the local shepherds to whom, they influenced almost completely the sheep breeding system, as their strong traditions came from Ardeal, from two big regions , the one from Sibiu (ţuţuieni) and the other from Sebeş (poenari). The same name of Ungureni is kept today too, by the shepherds from Corbeni areas, as almost all the shepherds in Domnesti and Rucar monographies used to appear , all of them being localities , located under the south slope of Meridional Carpathians, on the area of Arges county, and all of them being under century influences and under the traditional protection of Sibiu borders.

In their way, ,,Ardelenii''followed two grazing variants for flocks moving, respectively perennial''poieran'' grazing and the „tutuian" one, though different alternatives and however close by means of the border broad concept .These two variants with major impact on sheep breeding and in preparing sheepfold products, in the respect of masculin conservatorism (under the authority of the shepherd) or of female creativity (under the sign of female shepherds creativity became harmonious with the passage of time, in an almost unitary formula.

Then, besides male and female shepherds, Ungurenii, gained a fact with a lot of consequences in terms of traditions and customs. If the shepherds in the south of Olt river kept the essential traits of poienar grazing (Sebes and its borders influences being the ones which dominated and gave birth to the denomination of poienari), given by the big number of the sheep in the sheepfold and their changeable characteristics concerning their sheepfolds, gradually, they left room to the customs of,'ungureni'' which left the Border of Sibiu, respectively, the dominant trait being given by the mountain sheepfold, with the three rooms and and the pen next to them, mixed with the presence, strength and skill of the shepherd, who, at the lost beginnings of history, prepared dairy products, instead of their wives. Traditions homogenization took place as it was naturally for „ungurenii” in the right side of Olt river, where rapidly interfered traits of poienar grazing, such as, the presence of shepherds wives in some sheepfolds, and hence the feminin trait in preparing dairy products. Hence, each sheep host had and still has a shepherd, his wife, and in their pen, so many exits, pots and hooks as guests they had. The association in the common grassland use was done and it is still done as usual between related families, fact which conveys certain particularities kept in the family, to dairy products.

In order to be able to take a right decision and within the agricultural zootechnical activities, the analyzed process, even if it is at the stage of a small enterpriser or at the stage of peasant farmstead, or at he local zootechnical farm stage, naturally cover all phases, accompanied by tools, methods and specific statistic information necessary to:

Table 1

The need of statistic information in the stages of managerial decision

No. Stage denomination (statistics presence)
1.Problems knowledge (statistic information)
2.Elaboration of distinct decisional variants (statistic anlysis)
3. Choice of opimal decisional variant (statistical selection and hierarchy)
4. Decision taking and monitoring (check by statistic indexes)
5. Estimation of decision impact on the (statistic information)

This truth requested to this work authors the application of a special investigation in research, effected on the field, in order to gain statistic decision support, investigation as the ones integrated in farmsteads, adjusted to the specific of animals breeding activities and especially to sheep. Statistic data of the latest two decades concerning sheep number in the three localities describe a descendant dynamics with negative impact in the future.

Table 2

The situation of sheep number after 1990, in the selected localities

Selected locality	Sheep number according to the statistical record of locality (heads number)			Sheep number according to subsidies statements
	1990	**2000**	**2002**	**2009***
Corbeni locality	7698	3500	3900	800
Domneşti locality	5524	1115	1158	200
Rucăr locality	6100	4500	4356	4200

* Note = the number is estimated according t the adress written by the one who requested the subsidy, in his ownstatement and it comprises only farmsteads with over 50sheep heads.

A small analysis of the present state is requested in order to understand the occupational reality and its perspectives. The number of farmsteads which requested subsidies for sheep breeding (over 50 heads) and for cattle (over 3 heads) in 2009 decreased significantly. The problem is just the one related to the inventory, as in 2010, such subsidies weren't even given .Reasons are linked to many causes and some objectives generated by the signature of EU adhering, but also by the lack of some projects for Romanian traditional agricultural workers, financed from European funds.

Within investigated statistical data, the declared field of Argesean sheep herd is placed in in the interval of 50 - 1500 sheep, but more than 60% possess under 100 sheep. The herds, which are considered to be traditionally profitable with over 1000 heads reprent only 1,2% from the total, this being a first signal alarm in the respective field, according to the data extracted from subsidies demands. For cattle, the frequent amplitude of breeder is of 1-4 heads, but in the case of subsidies requestors only 0,05% of the farmsteads (only 5) possess an efficient number of heads (over 100 cattle), capable to generate long term profits. In Arges county, in 2009, the number of farmsteads involved in the pastorality was apparently a surviving one, respectively over 800 farmsteads for sheep (having almost 108 thousand heads) anf of the ones involved in cattle breeding of over 8 000 (having almost 37 thousand heads).As a parallel, the number of the people who demand subsidies for goats increased (over 25 heads), recording about 200 farmsteads with a livingstock of over 12 thousand goats (with an average of about 60 heads).

The research methodology needs a broader initial presentation. There were selected three localities in the Arges mountain areas: Corbeni, Rucăr and Domneşti where, the farmsteads were established by the method of data massive, selecting the list of the first 20 farmsteads, in comparison with the livingstock size, and by volunteering, the farmsteads completed a form (synthetically described in the annex), where our guide was the structuring guide of ABF investigation (statistical investigation of families budgets, unfolded by INS in Rimania, with a continuous tradition for over 70 years), which we drastically reduced to only 4 pages. From the 14 farmsteads which offered data monthly (February 2010) , only 9 offered complete data basis for our research. The small sample group, well guided and self-selective by volunteering and completeness allowed only the formulation of opininons connected to general structures and trends, but we think that they are enough in order to express them as alarm signals in the pastorality evolution in the south of Carpathians. The information related to the incomes of the 9 farmsteads from the sample group were obtained by their self declaring, taking into account that, practically we don't know other methods to estimate them. The incomes variety, in terms of source, peridiocity and size makes diificult this presentation in a standard manner. In this context, we wonder how true the data obtained by self-declaring are. In the speciality literature, it is mentioned, that in the developed countries, the omission or underevaluation may overcome 20-25% from incomes and expenses (for which there) isn't a strict check for their globalization

Incomes underdeclaring may be caused by many aspects, such as:

- some incomes even if they are illegal, aren't declared or are underevaluated when they don't agree with some norms and values;

- incomes underclaring is also done, wanting to obtain a social support whose approval is linked to a limit or even to an income absence;

- underestimation of bigger incomes due to a fear of social reaction;
- it is possible that the person who provides the information not to know some aditional incomes of the partner or family;
-the incomes obtained from the sell of the produces obtained in one's oown farmstead etc.

It is obvious that in our small research , the declared incomes present alterations, in a difficult to estimate degree, but we can consider that their limit is of 35-40%. The risk of underdeclaration is small or almost inexistent concerning the incomes which come from formal economic activities (salaries, pensions etc). Some income categories were approximate, as the responsible ones didn't have a proper perception of their level.

The incomes adequate to one's own consumption were estimated with an aproximing method, taking into account their difficulty. Putting monthly data in a year report by questions related to incomes and to expenses was necessary in order to understand the way how these farmsteads can resist during long periods of time, without covering their expenses by adequate incomes. This kind of intervention, extended the level of erorrs and omissions to over 40%, towards 50%. Unfortunately, a monthly investigation for a 12 months continuous interval isn't possible.

The used methodology was based on the following area methodological criteria, resulted from subjective estimations and reactions of the people analysed, which requested that the incomes level should be perceived and determined in research with a certain caution on account the information gathered from farmsteads but also compared in a relative manner to traditional fairs.

Methodological research materials and references

Box n. 1

The annual incomes on a sheep were determined starting from the folowing aspects stated by the interviewed farmsteads:
- during a 2 months period in spring, one obtain 4 kg sheep cottage cheese which is sold with 15 lei/kg;
- during a 2 months period in summer one obtain 3 kg mixed sheep cottage cheese which is sold with 30 lei/kg;
- a slaughtered lamb is sold with about 10 kg x 20 lei/kg = 200 lei;
- the abnnual income per sheep is about 2 x 4 x 15 + 2 x 3 x 30 + 200 = 500 lei

The annual incomes on a cattle are determined starting fro the following aspects :
- the milk output is of 10 -15 l/day ;
-a cow is milked about 9 months in a year ;
- a kg of cow cheese is obtained from 5 lof milk, being sold with 8 lei/kg;
-total incomes from cow milk sell (shhep milk isn't sold) is of 10768 lei in the 9 studied farmsteads (see anex no.1);
- the cattle number on the assembly of the 9investigated farmsteads is of 76heads ;
- the value of sold milk/cattle head = 10768 /76 = 142 lei, adică 142 : 2,5 lei/l = 57 lmilk sold on cattle head ;
-the annual income obtained from cow cheese sellling = [(15x30x9)-57] /5x8 = 6388 lei;
- taking into account that the share of own consumption is of 40% from the obtained cow

cheese, it result that the incope on cattle head is of : 6388-6388x40% =3833 lei;
- the incomes rom a calf selling may be of about 40 kg x10 lei/kg = 400 lei;
- then, the anual incomes on a cattle head are of : 142 + 3833 +400 = 4375 lei;
The expenses on a sheep head, respectively cattle head are determined on account of the information gathered from the 9 farmsteads from the final control stock, knowing that:
The expenses for a cattle feed are 5 times bigger than with a sheep feed;
- in terms of feed expenses, we agree that a cattle is equivalent to 5 sheep';
- it results that the cattle proper to the 9 farmsteads represent 380heads;
- the total equivalent sheep number is of 380 + 2650 = 3030 heads;
-total expenses for a sheep = 196981 : 3030 = 65 lei /sheep;
- total expenses for a cattle = 65x 5 = 325 lei /cattle;

On account of the data mentioned above, we determine he efficiency on sheep respectively cattle head, such as
- the annual profit per sheep = 500 – 65 = 435 lei;
- the annual profit per cattle = 4375 – 325 = 4050 lei;

The information which wee estimated above represent the sizewhich was considered to be medium, according tothe statements in the investigation, of the results obtained on a sheep head, respectively on a cattle head.

The structure and profitability being different from one farmstead to another, the data aren't defined as a spectrum, by broad variation intervals.

Taking into account that the number of the mmembers of one farmstead is different from one family to another, the total incomes analysis shows that an increase of the incomes must be analysed depending on the number of people.

Thus, a significant increase of incomes appears when passing from one person family to two persons family.A bigger number of members in a family is associated with a modest increase of incomes, andin the more numerous families, we may meet even cases of incomes decrease.

The incomes from agriculture cover more than one third from the consumption necessary.

The results are detailed and presented in annex no.1, respecting families confidentiality.They demonstrate that the involvement by support agricultural politics of pstorality as support of mountain rural communities and of agro-tourism constitute a first degree necessity.

The particularities presented by the production process in agriculture and animal husbandry, but especially the sheep breeding process, the organization way of record system concerning the resources consumptions leave a mark upon the calculation of the production cost for this kind of specific activity.

2. RESULTS AND DISCUSSIONS

In the presentation, there were used the values which are the leasttransparent, respectively th medium values. These values are strictly presented here:

Table 3

The main indexes of one studied farmstead medium budget

Index denomination	Medium value /farmstead	Medium value /person	-in % significant
TOTAL INCOMES (lei)	15.243	3346	
1.Money entries	1.384	304	9,1%
2.Products sell	2.750	604	18,0%
2.1. Basic products (milk)	1.031	226	
2.2. dairy products	1.718	377	
3. Slaughtered animals meat sell	4.587	1007	30,1%
4. Meat products sell	197	43	1,3%
5.Living animals sell	6.291	1381	41,3%
6.Alchoholic drinks	33	7	0,2%
TOTAL EXPENSES (lei)	16462	3614	
I. Farmstead expenses	2.473	543	15,0%
1.1. Production consumption expenses	724	159	
1.2. Gas expenses	907	199	
1.3. House expenses	842	185	
II. Direct expenses withthe livestock (hay, feed)	6.804	1.494	41,3%
III. Other indirect expenses	7.185	1.577	43,7%
3.1. Expenses with the animals feed (expenses related to grazing)	4.665	1.024	
3.2. Expenses with animals attendants	1.956	429	
3.3. Expenses with veterinary treatment	375	82	
3.4. Expenses with the maintenance of own or rented grasslands	150	33	
3.5. Other expenses	39	9	
Final financiary result	-1.219	-268	

Note : the data gathering was supplied in February 2010

Some of the alarming aspects of the analysis , starting from the structural approach of thse data, affected by an error percent, relatively reasonable in research of this kind, of about 35-40% (data being appropriate to February, relatively more stable, aren't analysed annualy n this presentation form), are the following:

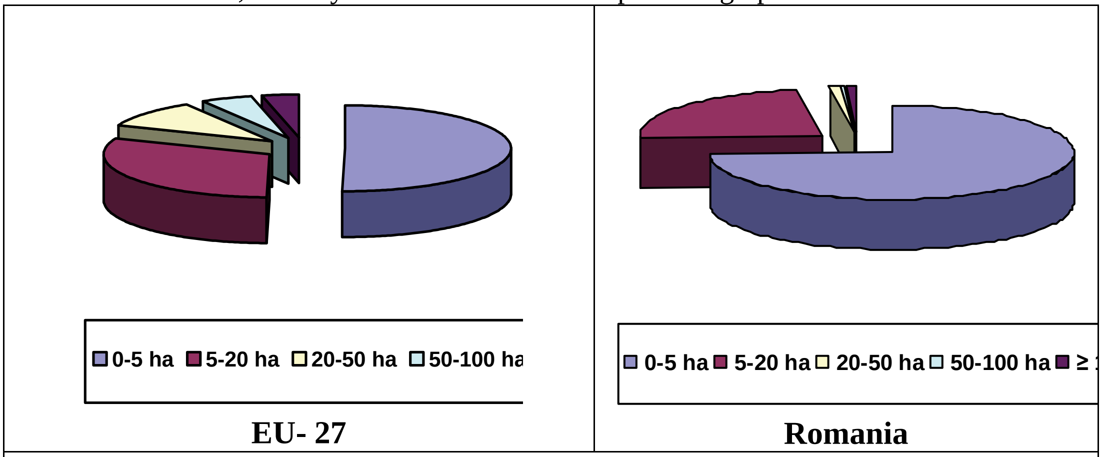
- among the calculation procedures of the product cost which might adjust better to the contemporary pastoral farmstead, we might mention: the procedure of the left value, adequate to the sheep category, to cereal crops, to milk cows category and the procedure of quantity equivalation of the secondary product with the main product (produces obtained within a sheepfold), and the choice among these two depends on the livstock structure and on the valorized type of feed;

- a technical economic calculus aspect shows that that the cost calculus for wool must lower the value from the total of expenses, at the internal cost of discount or at the net achievable value, of the other products simultaneously obtained : milk, weaned lambs, sheep youth from the previous year, skins and manure (sthe procedure of the remained value is applied). By consequence, there a lot of main products without a calculation process of the cost, which influences in anegative way the cost of the main product, for which one makes appeal to a cost calculation process. In this situationm it is requested the use of equivalence indexes ; unfortunately the way it is sen from this research, the wool became a secondary product, ceding the place to the sheepfold dairy products;
- the activity has an accentuated incomes seasonality by the distribution of the incomes in two big periods, marked by the Eatern and Pastoral Nedelea fest, at the end of changeable flocks moving (March- April and respectively the end of August- September).
- For 10 months in the year, the pastoral shepherd budget has a loss as result, which is expressed by the support or subventions need (either by the state intervention, or by the other touristic activities, where funds, programs and projects based on European resources which it could finance necessary investments);
- the trend on medium and long term which come from incomes is a serious one, about 71,4% being result from the occupational selfdestruction by animals slaughtering, much over the normal quota;
- the local meat products tend to a much more rapid dissapearance, than the pastoral tradition could expect during crisis (meat products sell have in the medium budgetof cashings only 1,3%);
- self consumption grows at the farmstead level, the cause being the insufficient incomes iduring the periods of great pressure of expenses (the medium expenses on a person for bought food reach the amount of about 160 lei on a person, each month, the rest of the aliments necessar to a physical activity, being supplied by an increased selfconsumption);
- almost 70% from the expenses are connected to the animal feed and to the covering of direct expenses found in report with the livestock breeding (hey, feed, investments in livestock) or indirect (expenses related to grazing, sheepfold, to workers, to grassland maintenanceetc.);
- the sheepfold or the traditional pastoral economic enterprise, doesn't present the efficiency established and it becomes even more a bankrupt enterprise;

3. CONCLUSIONS

Concerning the number of sheep, our country is situated on the 5th place in Europe, at the moment of its adhering. The agroalimentary market will keep on requesting sheep meat products, especially lamb products but also goat and sheep milk. Not anyone is able to rear sheep, as a lot of experience, patience and application are necessary. The profit won't be to neglect if the obtained products adjust to the European norms, in the global context of an expected alimentary crisis.The mountain peasants, păcurarii, ungurenii or the traditional peasants have the tendency to become just simple historical without being replaced by other crafts or occupations in the rural area, which seem to go towards selfdestruction, not being supported, or at least let the way it is... The efficiency of pastoral occupation doesn't reduce only to its alimentary products, but this one received social forms, even cultural ones, difficult enough to describe in detail in a small work, the way this one is, which increases the impact degree of animal. After 1990, parallelly with the unfoldment of the 5 electoral cycles, the national economy division in two distinct parts was accentuated, defined by the residential criterion, an urban Romania, with a solid liberal component , which expects from the state rather chances than support and a conservatory rural Romania, with people aged 65 and mor, as well as with people found under the limit of poverty, who need hel, not only for their households develooment, but especially to survive. The future elections will add another variant of political division, according to the preference for an excessively presidential or parliametary Romania. Econometrical shaping becomes almost impossible, when the the structure of rural economy is chasnging rapidly, what obviously happens in the transition countries. The present state of agriculture is due to numerous agricultural politics changes. Political factors with major negative influence still acts over Romanian agricultureand especially over animal husbandry, with an underuse of existent production factors and a weak complementarity.

Tipology of standard American farm seems to constitute a practical impossibility, making a parallel with the reach of a quota comparable with EU-27 average, on short or even medium term, the way it results from the comparative graphic below.



Source: The FSS for 2005 REPORT, EUROSTAT, http://epp.eurostat.ec.europa.eu/

Fig. 1 Structural discrepancy of agricultural properies on size between the European average and Romania

The discrepancy between a medium European farm and a Romanian farm is a specially big one. Two of three properties belong to the 1- 8 ESU category, while only 4% are bigger than 100 ESU. The European Union agriculture is dominated by less specialized farms in the new state members (especially in Romania and Lithuany). The smallest dimensions of the farm which have the biggest proportion fromthe farms total belong to new state members of EU.(over 90%) especially in Romania, Lithuany, Letony and Bulgaria. Rentability discrepancies in animals breeding and especially in sheep breeding are at their turn even bigger.

There are also discrepancies which might be positively valorized, the ecological farm example being important in this respect, but at the same time combined with the breeding of a reduced in dimension livingstock in comparison with Romanian occupational traditional, where the average was situated at the level of thousand of heads and was based on moving of flocks. In comparison with the urban economy, the rural economy isn't a business concerning its classical definition, but a business which shall combine the production factors bought from a market, in order to obtain a profit from an advantageous sell of products, on another market. Presently, the Romanian peasant, even if he doesn't put into function an enterprise in economic terms, he manages a farmstead, which might turn into a business only when the business would become mostly ecologic and organic. The ecologic or organic agricultural farm possess about 4 % in.EU. with a slow increasing trend. The dimension of this ecological or organic type of farm is mostly bigger than the usual one. But some states posssess a high potential of ensuring an organic and ecologic agriculture, reaching about 70-100%, especially in Romania, Bulgaria, Cyprus, Lethony, Lithuany, Malta and Slovenia.

REFERENCES

1. *Axenciuc, V.* (1996), Evoluția economică a României. *Cercetări statistico istorice, 1859-1947*, vol. II, Agricultura, Bucureşti.
2. *Brown L., R.*, (2006), Plan B2.0: Rescuing a Planet Under Stress and a Civilization in Trouble. *2006*, apărută şi la Bucureşti, în Editura tehnică, sub titlul Planul B 2.0 Salvarea unei planete sub presiune şi a unei civilizații în impas.
3. *Brown L. R.*, (1995), Who will feed China?: Wake-Up Call for a Small Planet, Worldwatch Environmental Alert Series.
4. *Gusti, D.* (1940), Enciclopedia României, Monitorul Oficial şi Imprimeriile Statului, Bucureşti.
5. *Madgearu, V.*, (1995), Evoluția economiei româneşti după războiul mondial, Ediția I 1940, Ed. Ştiințifică, Bucureşti, reeditată.
6. *Rosener, W.*, (2003),Țăranii în istoria Europei, Ed. Polirom, Iaşi.
7. *Săvoiu G.*, (2006), Populația lumii între explozie şi implozie demografică, Ed. International University Press, Bucureşti.
8. *Săvoiu, G*, (2007), Statistica.Un mod științific de gândire, Ed.Universitară, Bucureşti.
9. *Spengler, O.*, (1929), The Decline of the West, vol. II, New York Knopf.
10. *Stahl, H., Stahl P.*, (1968), Civilizația vechilor sate româneşti, Editura Ştiințifică, Bucureşti.
11. *Trebici V.* (1985), Mică enciclopedie de statistică, Editura Ştiințifică şi Enciclopedică, Bucureşti.
12. *Wolf, E. R.* (1966), Peasants. Englewood Cliffs, NJ: Prentice-Hall.
13 ***, Romania hopes organic agriculture makes business sense, Green Horizon Magazine of The Regional Environment Center for Central and Eastern Europe, Bulletin vol.10, no 2 /2005. www.greenhorizon. rec.org/buyletin//Bull102/romania.html
14 *** www.insse.ro
15.*** http://www.insse.ro/cms/filespublicatiiRomaniaincifre2010.pdf
16.*** http://epp.eurostat.ec.europa.eu/
17.***http://epp.eurostat.ec.europa.eu/portal/page/portal/product_details/publication?p_product_code=KS-CD-09-001

Annex 1

Centralized and compressed self-selected farmsteads budget
- Incomes and expenses budget corresponding to studied farmsteads

Index denomination	**farm.1**	**farm.2**	**farm.3**	**farm.4**	**farm..5**	**farm..6**	**farm.7**	**farm.8**	**farm.9**	***Total***
INCOMES TOTAL (lei)	**17.726**	**12.207**	**14.554**	**14.412**	**38.126**	**9.282**	**17.093**	**7.321**	**6.469**	*137.190*
1. Money entries	131	1073	1130	800	2542	1042	3040	1622	1080	*12.460*
2.Produces sell	7.145	4.875	2.184	4.550	2.060	1.275	1.208	420	1.030	*24.747*
2.1. Basic produces (milk)	1800	1590	1080	1500	1020	1040	618	165	470	*9.283*
2.2.Milk products	5345	3285	1104	3050	1040	235	590	255	560	*15464*
3. Slaughtered animals meat sell	1950	1625	5020	1690	11.390	4060	9400	3300	2850	*41285*
4.Meat products sell					184	255	995	169	174	*1777*
5.Living animals sell	8500	4634	6220	7372	21.950	2650	2450	1810	1035	*56621*
6.Alcholic drinks									300	*300*
EXPENSES TOTAL (lei)	**12.938**	**10.820**	**16.999**	**11.338**	**41.402**	**16.796**	**11.629**	**18.877**	**7.359**	*148158*
I. Farmstead expenses	3.238	2.720	1.455	2.588	2.992	4.455	1.167	2.865	775	*22255*
1.1. Consumption products expenses	930	642	460	630	770	1220	130	1320	415	*6517*
1.2. Gas expenses	1200	1200	820	1000	1435	1200	200	1025	82	*8162*
1.3. Housing expenses	1.108	878	175	958	787	2035	837	520	278	*7576*
II. Direct expenses with the livestock (hay, feed)	4300	3550	7504	4050	16.184	7.826	3746	10.384	3.694	*61238*
III. Other indirect expenses	5400	4550	8040	4700	22.226	4515	6716	5628	2890	*64665*
3.1. Expenses with animals feed (expenses connected t grazing)	2000	1700	6040	1800	19.296	2.310	4416	3528	900	*41990*
3.2. Expenses with farm workers salaries	2400	2100	1400	2200	2400	2000	2000	1800	1300	*17600*
3.3. Expenses with the veterinary treatment	300	200	600	250	530	205	300	300	690	*3375*
3.4. Expenses with own or grasslands	500	400		450						*1350*
3.5. Other expenses	200	150								*350*
IV. People number	6pers.	8 pers.	3 pers.	3 pers.	5 pers.	4 pers.	6 pers.	3 pers.	3 pers.	*41 pers*
V. Sheep number	900	135	175	200	450	100	90	400	200	*2650*
VI. Cattle number	28	7	10	4	7	4	5	8	2	*75*
The result	4.788	1.387	-2.445	3.074	-3.276	-7.514	5.464	-11.556	-890	*-10.968*

The 39th International Session of Scientific Communications of the Faculty of Animal Science, Bucharest, Romania
Scientific papers (seria D; vol. LIII) – Animal Science

STUDIES CONCERNING THE ACCESSION OF STRUCTURAL FUNDS ON PIG FARMS FROM ROMANIA

VLADU MARIUS[1], BĂCILĂ VASILE[2]

Key words: funds absorption, swine farms, NRDP, Measure 121

SUMMARY

Swine grooving is an economic activity whose efficiency is influenced, in addition to biological factors by feeding, care, characteristics of environmental factors etc. In order to improve yields and to increase the efficiency of pig growing, it is important to improve growth technology [3].

The growth of pigs can provide the main source of providing mankind with meat [1].

A great opportunity in this regard is the existence of structural and cohesion funds implemented in Romania since 2007.

Agricultural farm projects are funded through Measure 121 „Modernisation of Agricultural Holdings", which is implemented by PARDF (Payment Agency for Rural Development and Fisheries) [11].

In the present study has analyzed the absorption of structural funds through 121 Measure of NRDP in pig farms.

The primary data representing selected for contracting projects during the 5 sessions for submitting national projects implemented to date have been processed statistically by development regions.

During the study found that in the first 3 sessions at national level was selected a small number of projects, 93,5% of selected projects in the pig farming being selected in the last two sessions.

Region with the greatest number of selected projects was Region 6, here with over 25% of projects in this sector nationally, at the opposite topping Region 5 with only 5,7%.

Through 121 Measure in the swine farms was absorbed unreimbursable funds of 327.575.690 lei representing an percent of 56,77% of eligible value of the selected projects.

It is important to know the situation of funds attracted at the time due in one hand, the allowed funds can be lost if is not attract in the negotiated period and in the other hand, this ensure basis for the next interval national rural development programme planning.

1. MATERIAL AND METHOD

This is a statistically study and was performed for to find situation of attracted amounts in the pig farms through Measure 121 of NRDP.

The researched interval was March 2008 – date of first session of projects appeal – to October 2009 – date of last projects appeal until now.

The basis material for study is represented by the Selection reports published by Contracting authority after each of the 5 sessions developed until now.

The results of the study are reported by the 8 Developing regions established at national level in 2000 (table 1) according to NUTS protocol [10].

Was analyzed numeric and financial situation of the pig farms projects during the interval at regional level.

For to express financial data in euro was utilize the exchange course used by PARDF at each session results.

1 *Facultatea de Agricultură Craiova*
2 *USAMV Bucureşti*

Table 1

Structure of development Region in Romania (after INSSE 2010)

Development Region (number/name)	Surface (ha)		Regional centre (county/city)	Counties
	Totale	Agricultural		
1. North-East	3.684.983	2.127.916	Iași / Iași	Iași, Botoşani, Neamț, Bacău, Suceava, Vaslui
2. South-East	3.576.170	2.332.055	Constanța / Constanța	Constanța, Brăila, Buzău, Galați, Tulcea, Vrancea
3. South - *Muntenia*	3.445.299	2.445.867	Dâmbovița / Târgovişte	Dâmbovița, Argeş, Călăraşi, Giurgiu, Ialomița, Prahova, Teleorman
4. South-West *Oltenia*	2.148.878	1.734.098	Dolj / Craiova	Dolj, Gorj, Mehedinți, Olt, Vâlcea
5. West	3.203.317	1.888.329	Timiş / Timişoara	Timiş, Arad, Caraş-Severin, Hunedoara
6. North-West	3.416.046	2.087.480	Satu-Mare / Satu-Mare	Satu-Mare, Bihor, Bistrița-Năsăud, Cluj, Maramureş, Satu-Mare, Sălaj
7. Center	3.409.972	1.912.007	Alba / Alba Iulia	Alba, Braşov, Covasna, Harghita, Mureş, Sibiu
8. Bucharest - Ilfov	954.435	181.548	Bucureşti	Bucureşti, Ilfov

2. RESULTS AND DISCUSSIONS

In the study interval was open 5 projects appeal sessions under Measure 121 of NRDP starting March 2008, the last being closed in November 2009. In this period were totally recieved 5.600 projects for modernizing agricultural holdings, of which 712 in session 1 – March 2008 (S1) [8], 728 in session 2 – April 2008 (S2) [6], 627 in session 3 – May 2008 (S3) [7], 1.662 in session 4 – November-December 2008 (S4) [5] and 1.871 in session 5 – September-October 2009 (S5) [4].

To be received for evaluate, projects must meet the compliance requirements of the contracting authority, which implies the existence and validity of each piece request by the type of project.

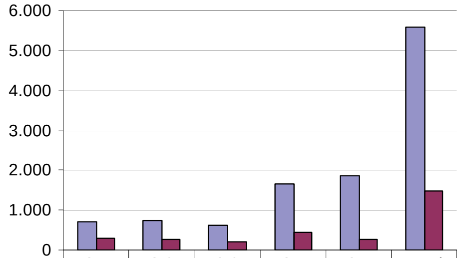
To be selected, each project accepted crosses a strict evaluation process based on several criteria for eligibility on the applicant, project and investment. In the evaluation process, are considered the content of required parts deposit in the file.

At the end of the evaluation process, Contracting authority sort projects eligible according to a simple algorithm with 2 steps: 1. Sort by score decreasing and 2. At equal score, sort by value decreasing.

The list of selected projects is closed when value of public aid available for a session is entirely consumed. The eligible projects unselected are introduced again in the selection process in the next session. If is not selected at the second selection, is declared ineligible and will be give back to the owner.

This measure has enjoyed great popularity among potential beneficiaries, proof being the large number of projects submitted on the 5 sessions. However, following application of selection algorithm mentioned above were selected for contracting a total of 1.487 projects (Fig. 1), representing only an average of 26,55%.

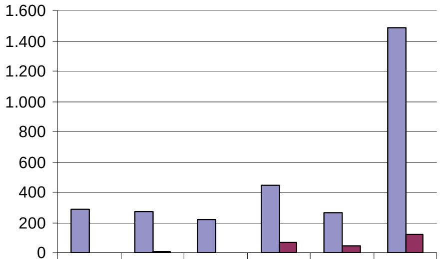
This situation is due in particular mostly to public aid amount allocated for each session.



	S 1	S 2	S 3	S 4	S 5	Total
Total deposed	712	728	627	1.662	1.871	5.600
Total selected	288	271	216	448	264	1.487

Fig. 1 – Situation of projects during March 2008-November 2009 interval under Measure 121 of NRDP

From a total of 1.487 projects selected, on the 5 sessions were selected 123 in pig farms (Fig. 2), representing 8,27%.



	S 1	S 2	S 3	S 4	S 5	Total
Total selected	288	271	216	448	264	1.487
Pig farms	2	5	1	67	48	123

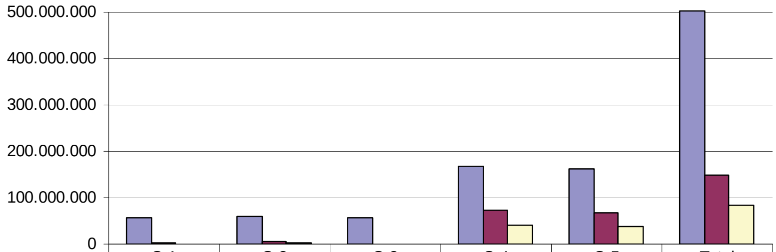
Fig. 2 – Situation of selected projects numbers in pig farms durring March 2008-November 2009 interval under Measure 121 of NRDP

It may be noted that in the first 3 sessions were selected only a small number of projects on pig farms (8 in total) representing only 6,5% of the total projects selected in pig farms and only 1,03% of the total projects selected in those 3 sessions.

This is due mostly to great complexity of a project in this sector which typically is provided with mounting and construction works which require certain approvals and specific licenses from different authorities.

The largest number of projects was selected in session 4 both in terms of total number of selected projects and in terms of projects in the field of swine farm. However, the highest percentage of projects selected in the field of pig farms (18,18%) was recorded in session 5.

Financial situation of the 5 session concluded in this moment is presented in Figure 3.



	S 1	S 2	S 3	S 4	S 5	Total
Total allowance	57.980.252	58.323.642	57.886.112	167.480.435	161.489.793	503.160.234
Pig sector eligible	2.583.756	4.766.602	398.903	72.803.772	67.239.704	147.792.738
Pig sector public help	1.320.407	2.670.978	199.452	41.878.184	37.877.207	83.946.228

Fig. 3 – Financial situation of selected projects in pig farms during March 2008-November 2009 interval under Measure 121 of NRDP (euro)

In the first 3 sessions, the eligible value of selected projects in the pig sector was very small, due the small number of projects selected in this activity sector. In the same time the pig sector was attracted small proportion of public help which reach 2,28% for first session, 4,58% for the second session and only 0,34% in case of the third. The situation radically changed on the last two session where was registered percentage of 25,00% this being maximum value of absorption per session registered in the 5 sessions, respective 23,45% of the public aid allowed, eligible value being also bigger than previous sessions. At national level, from the total amount of public help allowed until now in the framework of 121 measure, an amount of 83.946.228 eur, meaning an average percent of 16,68%, was attracted in pig growing sector.

The regional situation of pig sector projects selected during the study interval is presented in figure 4.

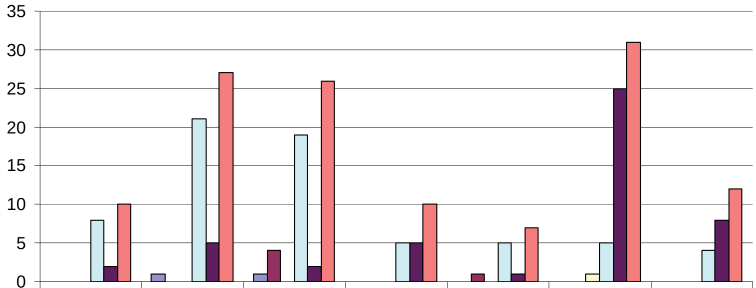
We can see that was register a big heterogeneity concerning number of projects selected in different regions.

Notable is that in region 8 were selected none project in this interval. Exist few serious reasons for that: this region have smallest surface both total and agricultural; in this region is registered the biggest human population and building density national wide; the regulations in animal husbandry concerning animal welfare and pollution prevention is very strict, prohibiting legal authorisations obtain; price of land in this region is higher than in rest of country and, not in the last place, value of public help is smaller with 10% for a project in this region than an similar selected in any other region [2].

The smallest projects selected number in pig sector was recorded in regions 5. It surprise that region 4, a big cereals producer, recorded only 10 projects selected, similar with region 1 which have a relief highly, more proper for fruit and cattle production.

The largest number of projects selected in pigs farms was recorded in region 6 where was selected 25,2% of national number per sector, followed by regions 2 – 21,95% and 3 – 21,14%.

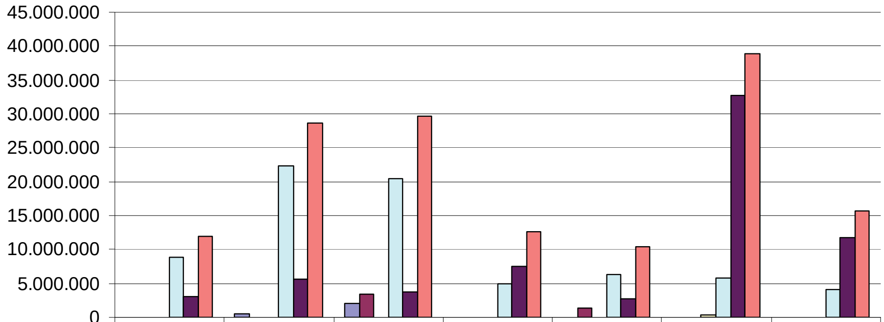
We can mention that in the 1, 4 and 7 regions, durring the first 3 sessions were not select any project.



	R1	R2	R3	R4	R5	R6	R7
S 1	0	1	1	0	0	0	0
S 2	0	0	4	0	1	0	0
S 3	0	0	0	0	0	1	0
S 4	8	21	19	5	5	5	4
S 5	2	5	2	5	1	25	8
Total	10	27	26	10	7	31	12

Fig. 4 – The regional situation of selected projects numbers in pig farms durring March 2008-November 2009 interval under Measure 121 of NRDP

Regional situation of the eligible amount of pig farming project selected in the sessions of NRDP 121 measure are presented in Fig. 5.



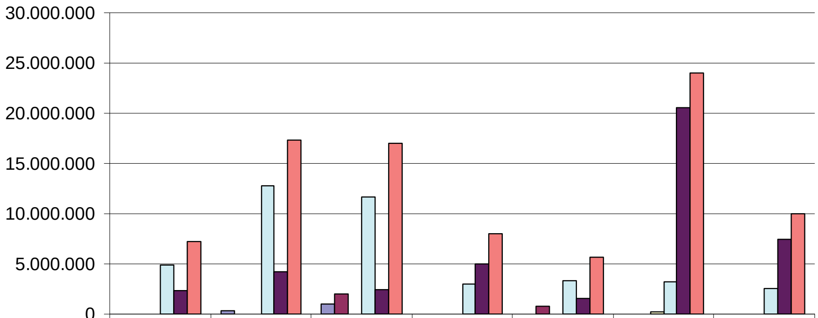
	R1	R2	R3	R4	R5	R6	R7
S 1	0	570.588	2.013.168	0	0	0	0
S 2	0	0	3.402.866	0	1.363.736	0	0
S 3	0	0	0	0	0	398.903	0
S 4	8.795.199	22.365.762	20.496.873	5.012.949	6.324.727	5.764.148	4.044.114
S 5	3.083.703	5.696.111	3.682.790	7.553.205	2.746.257	32.779.525	11.698.114
Total	11.878.903	28.632.461	29.595.697	12.566.154	10.434.720	38.942.576	15.742.227

Fig. 5 – Regional situation of the eligible amount of selected projects in pig farms during March 2008-November 2009 interval under Measure 121 of NRDP (euro)

From the national total of eligible value of projects which was 147.792.738 euro, region 6 with almost 39 millions euro representing 26,35% occupied first place, followed at a relatively large distance of regions 3 (20,03%) and 2 (19,37%). All other regions except region 7 (10,65%) registered below 10% each, their decreasing order being 4 (8,5%), 1 (8,04%) and 5 (7,06%). It is interesting that region 2 having more projects selected than region 3, registered a smaller percent of eligible value with 0,65%, which shows that concerning the funds absorption, number of selected projects is not the best possible indicator.

The regional sessions ranking of this indicator it is more heterogeneous. Thus, in the first two sessions, region 3 registered the large eligible amount, region 6 being one of regions with no project selected. Starting third session, region 6 begins to have selected projects, for in the fifth session to record 48,75% of the total eligible in this activity sector.

Due from the eligible value of a project only a certain percentage represent public aid, in the figure 6 is presented regional situation of public funds attracted in the pig sector on first sessions of NRDP 121 measure.



	R1	R2	R3	R4	R5	R6	R7
S 1	0	313.824	1.006.584	0	0	0	0
S 2	0	0	1.949.581	0	761.245	0	0
S 3	0	0	0	0	0	200.491	0
S 4	4.911.175	12.777.860	11.666.104	3.006.010	3.344.109	3.234.558	2.607.135
S 5	2.305.355	4.258.373	2.426.940	5.004.554	1.579.294	20.579.911	7.409.785
Total	7.216.530	17.350.056	17.049.208	8.010.564	5.684.648	24.014.959	10.016.920

Fig. 6 – Regional situation of the public help absorbed through selected projects in pig farms during March 2008-November 2009 interval under Measure 121 of NRDP (euro)

Region 6 ranks best in this regard absorbing over 26,88% with a value of 24.014.959 euro from a total of 89.342.886 euro at national level. This value was reach especially during the 5 session when region 6 absorbed 47,24% of public help on pig growing sector. Last place considering this indicator is occupied by region 5 which attract only 6,36% of total public help in pig farms. Between that 2 limits, was situated all other 5 regions in the following increasing order: 1 (8,08%), 4 (8,97%), 7 (11,21%), 3 (19,08%) and 2 (19,42%).

It is interesting those regions 2 and 3 register values in concordance with projects number (see also Fig. 2), even if eligible value is reversed. This is due the percent of public help can vary according to specific condition of project.

With a value of 43.564.211 euro, in session 5 was absorbed the largest value of public help in pig growing sector closely followed by session 4 which totalize 41.546.951 euro public help in this activity sector.

Can be mentioned that at county level the limits of analyzed indicators were the follows:

- largest number of projects per county: 13 registered in Sălaj (R 6);
- max. eligible value per one project: 3.044.819 euro registered in Covasna county (R 7);
- max. public help value per project: 1.522.409 euro registered in Covasna county (R 7);
- min. eligible value per one project: 172.243 euro registered in Alba county (R 7);
- min. public help value per one project: 94.733 euro registered in Alba county (R 7);
- max. public help value per county: 8.505.421 euro registered by Satu Mare county (R 6);

- min. public help value per county: 414.703 euro registered in Cluj county (R 6).

We can mention that from 42 counties at national level, were selected projects only in 36 from which in 11 was selected one project each.

3. CONCLUSIONS

NRDP Programme allowed totally 991.827.895 euro public aid through measure 121 "Modernisation of Agricultural Holdings" for the period 2007-2013. 80% of this amount is supported from EC funds, the rest of 20% being allowed by MARD [9].

In the framework of this Measure can be accessed funds for develop or modernize agricultural holdings in vegetal and/or animal sector.

Until now were submitted for evaluation a total of 5.600 projects, 1.487 projects being selected for financing of which, 123, representing 8,27% in the pig farms sector.

The amounts of 500.272.168 euro absorbed through this measure up to present represent 50,44% of the total public aid designated for this measure until 2013 year. Up to this moment, pig growing sector absorbed 16,94% of the total measure disposed funds.

At regional level, development region 6 is on the first place on the top of pig farms sector at totals of all indicators analyzed, last place being occupied by region 5.

In development region 8 was none project selected for financing mostly due to the difficulty of reaching conditions for implement such as project in this area.

A project on this sector can have a big complexity due the diverse type of acquisition possible (animals, buildings, machines for forages crop, machines for production primary processing etc.) requesting a lot of resources human, logistic, material and time. This is the main reason for that in the first sessions the number of projects was small.

For the interval 2010-2013 the percent of public help is lower with 10% than in studied period as was negotiate between representatives of MARD and DG-AGRI of European Commision.

REFERENCES

1. *Dinu I. et. all*, Suinicultură – Tratat de creştere a suinelor, Coral Sanivet, Bucureşti, 2002, 5-6
2. *MADR* - Ghidul solicitantului Măsura 121 Modernizarea exploatațiilor agricole, 2009, 23-26
3. *Vladu Marius*, Zootehnie specială, Volumul II - Cabaline, Porcine, Iepuri de casă, Păsări, Editura Sitech, Craiova, 2007, 44-118;
4. www.apdrp.ro/uploads/Docu%20FEADR/07septembrie02octombrie2009/M123_selectare_RECTIFICAT.pdf
5. www.apdrp.ro/uploads/Docu%20FEADR/Noiembrie+Decembrie/M121_Selectate_nov-ec2008.pdf
6. www.apdrp.ro/uploads/Docu%20FEADR/Aprilie/M121_selectate.pdf
7. www.apdrp.ro/uploads/Docu%20FEADR/Mai/M121_proiecte_selectate_mai.pdf
8. www.apdrp.ro/uploads/Docu%20FEADR/RaportSelectie16.06.08M121bis.pdf
9. www.madr.ro/pages/dezvoltare_rurala/NRDP-consolidated-version-31.03.2009.pdf
10. www.insse.ro/cms/rw/pages/statRegionale.ro.do
11. www.madr.ro/pages/dezvoltare_rurala/NATIONAL_STRATEGY_PLAN_march_2007.pdf.

The 39th International Session of Scientific Communications of the Faculty of Animal Science, Bucharest, Romania
Scientific papers (seria D; vol. LIII) – Animal Science

ACIDIC DAIRY PRODUCTS - A COMPETENT CONSUMER OPINION

IONUT RANGA
”Lucian Blaga” University SIBIU

Key words: dairy products, consumer, milk

SUMMARY

This paper presents a model approach of the author for evaluating the quality level of the acid dairy products. In the situation where most dairy products are now seen only through the view of the chemist analyst, the paper presents in figures the comptetent consumer opinin by means of standards of the sensory analysis. Following an evaluation sensory testing, panelists selected products with the best features, highlighting by scores the correspondence between the theoretical and factual issues related especially to the aroma of a dairy product.

Dairies industry is one of the food industries, which, despite the entry on the market of great international competitors, remained relatively divided and the local and traditional aspects are predominant quite often. Small dairy producers can boast with traditional products or with certain products, which are more or less rightly called, "green". But unfortunately, these producers cannot be proud of a constant quality of their products and more often not even of a higher quality of the industrialized product.

The lack of trained personnel, the desire of some investors to get rich very quickly in this industry or just simply their ignorance are some of the basic reasons for the lack of quality of the dairy products that local companies put on the market.

As part of a more complex study, this paper tries to highlight the importance of the flavor of the dairy products.

Consumers often buy products which are called "tasteless" but in fact, usually, they never ask themselves what it really means "tasteless" and "taste."

We focused our attention on two traditional products, manufactured by the majority of dairy processors: classic yogurt and buttermilk: a thermophilic product and a mesophilic one.

The purpose of the pare is to briefly present a variant of sensory analysis for products with the best outcomes out of the products analyzed, and also to interpret in a few words all the results.

1. MATERIAL AND METHOD

Evaluation sensory testing fits in the category of hedonic analytical tests of direct difference by classification. For all the tested products, the sensory features were: liking level, acidity, texture, surface brightness and smell.

The principle of testing consisted of presentation of samples of one product simultaneously to all participating panelists. Twenty-five panelists participated to this testing. For each analysed organoleptic sensory characteristic was drawn a score scale also called “response scale” (described in Table 1).

Table 1

Rating Scale Used in Sensory Evaluation

Score	Rating	Product features that constitute the basis of assessment of the organoleptic characteristics
5	Very good	Specific product characteristics (texture, flavor, surface brightness, acidity) strong, well defined, no defects
4	Good	Specific product characteristics: positive, pretty well defined, a few small defects
3	Satisfactory	Specific product characteristics: positive, neither well defined but pretty well defined, small defects
2	Unsatisfactory	Characteristics: lacks or defects that determine consumers to reject the product
1	Inadequate	Characteristics: lacks or different evident defects that determine consumers to reject the product

It is worth mentioning that all the panelists participating in the survey are specialists or are presently working in food industry, nine of them even activating milk processing industry.

The present study has considered the following standards (note that the classification within these standards was respected provided that the available space that did not require additional investment): SR ISO 4121:2008 - Sensory Analysis Methodology - Evaluation of food products through the use of scale method or methods by category, SR EN ISO 5492:2009 - Sensory Analysis Vocabulary, ISO 6658:2007 - Sensory Analysis Methodology - General Guide, ISO 11035:2007 - Sensory Analysis. Identification and selection of descriptors for establishing a sensory profile by a multidimensional approach, SR ISO 8589:2008 - Sensory Analysis. General directions for designing the test rooms, SR ISO 8587:2008 Sensory Analysis. Methodology. Classification

The two types of acid milk products were coded, and their service and scoring were done randomly, disregarding the fact that certain products belong to mesophilic or thermophilic category, and this was due to the fact it was also taken into account a competent consumers assessment of their preferences for one or the other category.

2. RESULTS AND DISCUSSIONS

According to the results, we considered representative for the classic yogurt category the encoded product CP03. With a total score of 424 points, it outdid the next product by five points, while standing at a difference of 96 points of the lowest ranked product in the classic yogurt category.

Table 2

Scoring of CP03 product obtained following a sensory analysis

Panelist	Liking Level	Acidity	Consistence	Surface Brightness	Smell	Total Score
1	2	4	4	3	1	**14**
2	4	3	3	3	4	**17**
3	3	4	3	3	3	**16**
4	4	4	4	3	4	**19**
5	3	4	4	3	4	**18**
6	4	4	3	3	4	**18**
7	3	3	3	2	3	**14**
8	3	4	3	3	4	**17**
9	3	4	4	2	2	**15**
10	5	4	5	4	5	**23**
11	3	4	4	3	2	**16**
12	3	2	4	4	1	**14**
13	4	5	5	2	3	**19**
14	5	5	3	3	5	**21**
15	5	4	5	5	5	**24**
16	4	4	5	2	2	**17**
17	3	3	3	2	3	**14**
18	3	3	2	2	2	**12**
19	3	3	2	1	2	**11**
20	3	4	4	2	3	**16**
21	4	5	4	3	4	**20**
22	4	4	3	3	4	**18**
23	5	5	4	3	5	**22**
24	4	3	3	1	5	**16**
25	2	4	2	3	2	**13**
	89	**96**	**89**	**68**	**82**	**424**

Product CP03 has met a maximum score of 25 points, given by one of the panelists, this being also the maximum score met within the sensory analysis of the studied products. There is a relatively homogeneous distribution of the score per characteristics, the most pronounced feature being acidity. Overall the product scored 424 of 625 points possible, thus a percentage of 67.8%. Figure 1 is a graphical representation of the results.

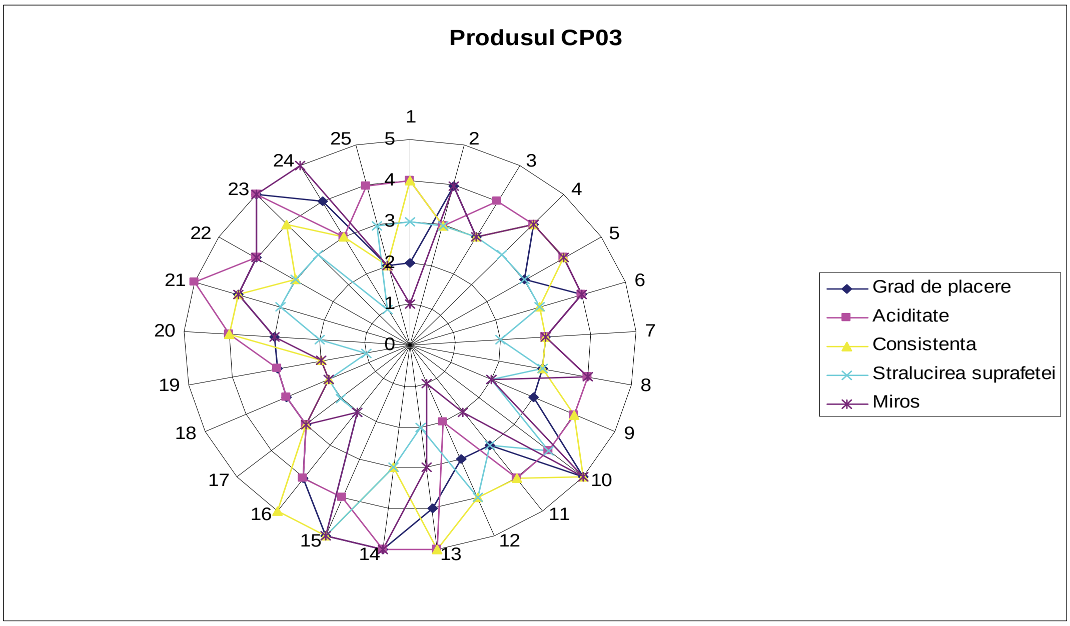


Fig. 1. Graphic representation of the score obtained by product CP03 in sensory analysis

The least appreciated feature of product CP03 was surface brightness. Mediocre scores were met, as well, for smell, consistency and degree of pleasure. However, it cannot be said that any of these features is disappointing, because all of them met over 50% of maximum score possible per feature. The general sensory findings of product CP03 are shown in Figure 2.

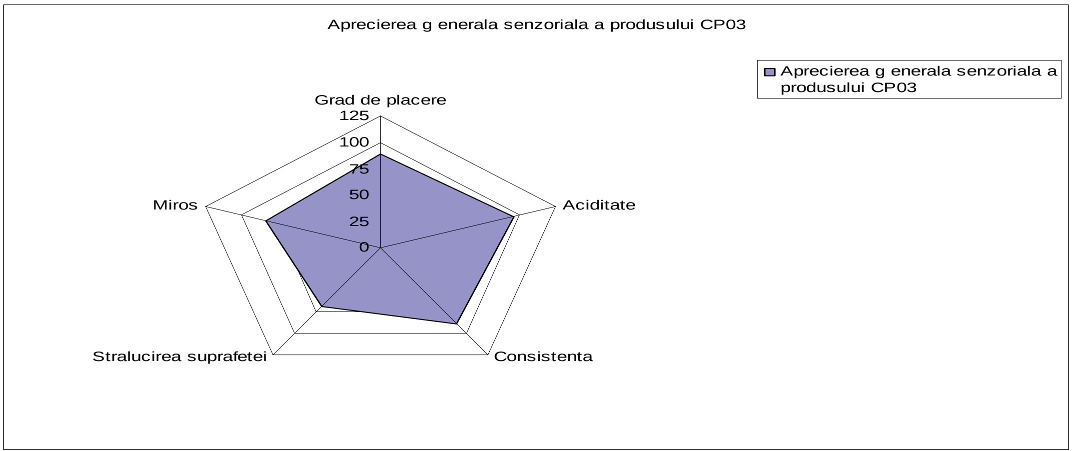


Fig. 2 General sensory findings of product CP03

In the case of mesophilic products (buttermilk), the product encoded BA 05 can be considered representative for its category. With a score of 457 points it was 64 points over the mesophilic product ranked second. Moreover, the difference between the products ranking first and last in this category was of 121 points.

Table 3

Scoring of product BA05 obtained in sensory analysis

Panelist	**Liking Level**	**Acidity**	**Consistence**	**Surface Brightness**	**Smell**	**Total Score**
1	4	4	4	4	5	**21**
2	4	5	3	3	5	**20**
3	3	4	3	4	4	**18**
4	4	4	3	4	5	**20**
5	5	5	4	4	5	**23**
6	4	4	4	4	5	**21**
7	4	4	3	3	4	**18**
8	3	4	2	2	5	**16**
9	4	3	3	2	4	**16**
10	3	3	3	3	3	**15**
11	4	4	3	4	4	**19**
12	5	5	4	4	5	**23**
13	3	4	3	4	4	**18**
14	3	3	4	2	4	**16**
15	4	4	3	3	4	**18**
16	3	3	3	2	3	**14**
17	4	3	4	3	4	**18**
18	4	4	3	3	4	**18**
19	4	5	3	2	4	**18**
20	5	4	4	3	5	**21**
21	4	3	3	4	5	**19**
22	3	4	3	2	3	**15**
23	4	3	3	3	4	**17**
24	4	4	3	3	4	**18**
25	3	3	4	3	4	**17**
	95	**96**	**82**	**78**	**106**	**457**

Product BA05 has met a maximum score of 23 points, given by two of the panelists. The most appreciated feature was the smell, but good scores were also met for the degree of pleasure and acidity. Overall, the product has met 73.1% of the maximum score. In addition it had the best score obtained by a product in these sensory analysis. Figure 3 shows the graphical representation of the scores obtained by product CB04 from each panelist.

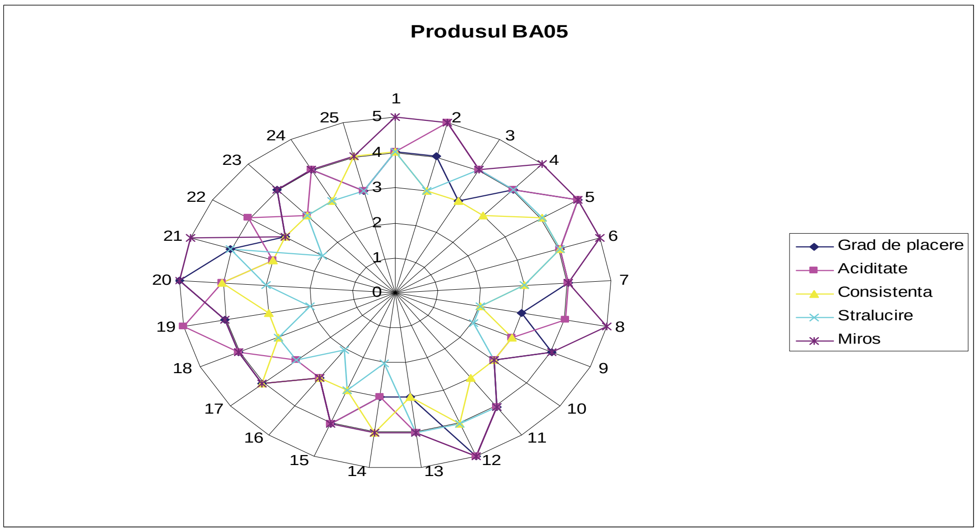


Fig. 3. Graphic representation of the score obtained by product BA05 in sensory analysis

The least appreciated feature of the product BA05 was surface brightness. We can say, however, that for the product category to which it belongs (buttermilk) surface brightness is not a very well-defined feature. The general sensory findings of product BA05 are represented in Figure 4.

At a closer look we notice that the defining characteristic in the case of the thermophilic product is acidity, which is a feature determined actually by the concentration of lactic acid in the product. In the case of mesophilic products, the defining characteristic resulting from the analysis of graphs and tables is the smell, which is determined by specific compounds resulting from the mesophilic fermentation.

Theory is similar to practice in this case. Yogurt is an acid product, but unflavoured, lacking characteristic smell, while buttermilk does not stand out due to its acidity but due to its characteristic smell (and taste, which is unanalyzed here).

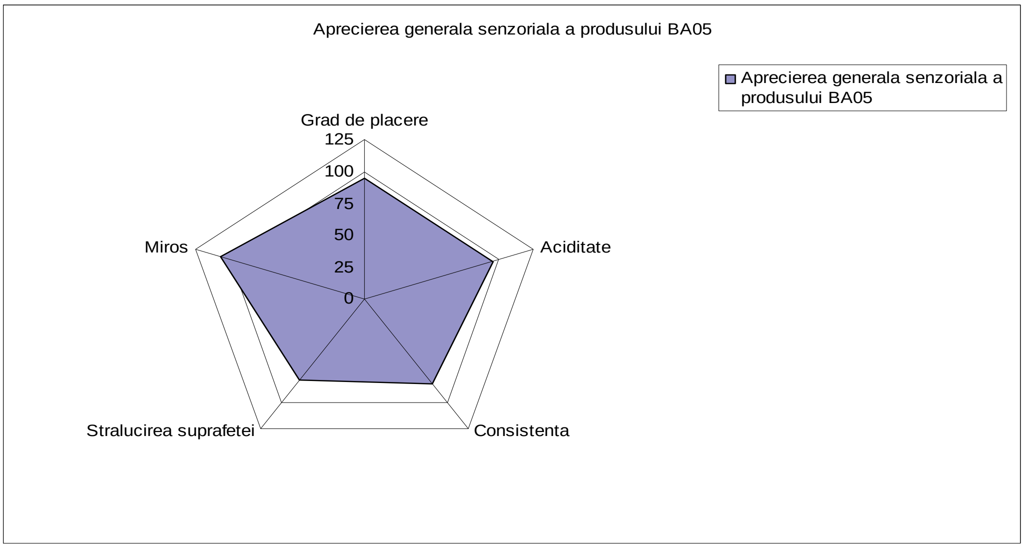


Fig. 4 General sensory findings of product BA05

3. CONCLUSIONS

Unfortunately, we had higher expectations regarding the traditional products analyzed, considering that the test products were supplied by four manufacturers from different regions of the country, two of whom are producers with a long tradition in the field, and two are considered local manufacturers of superior quality products.

The results reveal a known fact, namely that specialists in the field prefer mesophilic products to thermophilic ones, due to the pleasant, characteristic flavor. Note, however, that even a mediocre thermophilic product is less criticized by competent consumers than a mesophilic product, the flavour being more "tasted" than a mere predominantly acid taste.

This test also aimed at pointing out that the taste and aspect of a product matter more than its fat, protein or lactose content. Rather than according to a company's standard or to the desire of the authorities, the consumer appreciates according to what his/her own senses dictate.

REFERENCES

1. *Accolas, J., P., Hemne, D., Desmazeaud, M., J., Vassal, L., Bouillanne, C., Veaux, M.*, 1980, Les levains lactiques thermophiles; proprietes et comportement en technologie latiere, Le Lait, 60, 487-524
2. *Arber, W., Linn, S., S.,* 1989, *DNA modification and restriction*, Annual Review of Biochemistry, 38, 467-500
3. *Botazzi, V.*, 1983, Other fermented products, In: Biotechnology, vol.5, Verlag Chemie, 315-363
4. *Daeschel, M., A.,* 1989, Antimicrobial substance from lactic acid bacteria for use as food preservatives, Food Technology, 1, 164-166

5. *Daly, C., Fitzgerald, G.,* 1986, Mechanism of bacteriophage intensitivity in the lactic streptococci, In: Streptococcical genetics, American society for microbiology, Washinton DC
6. *Davey, G., P., Richardson, B., C.,* 1981, Purification and some proprieties of diplococcin fron Streptococcus cremoris, Applied and Environmental Microbiology, 41, 84-89
7. *Huggins, A., R., Sandine, W., E.,* 1984, Differentiation of fast and slow differential coagulating isolates in strains of lactic strptococci, Journal of Dairy Science, 67, 1674-1679
8. *Juillard, V., Spinner, H., E., Desmazeaud, M., J., Boquien, C., Y.,* 1987, Phenomenes de cooperation et d'inhibition entre les bacteries lactiques utilisees en industrie laitiere, Le Lait, 67,2, 149-172
9. *Limsowtin, G., K., Y., Heap, H., A., Lawrence, R., C.,* 1978, Heterogenity among strains of lactic Streptococci, New Zeeland Journal of Dairy Scienceand Technology, 13, 1-8
10. *Maas, H.,* 1998, Youghurt Report 98.1 – Make your yoghurt products meet your requirements, DMV International Seminar
11. *Marshall, V.M.E., Ttamime, A.Y.,* 1997, International Journal of Dairy Technology, 50, 35.
12. *Mattick, A., T., R., Hirsch, A.,* 1944, A powerfull inhibitory substance produced by group N Streptococci, Nature, 154, 551
13. *McKay, L., L.,* 1983, Functional proprieties of plasmids in lactic Streptococci, Antonie van Leewenhoek, 49, 259-274
14. *Ott, A., Fay, L.B., Chaintreau, A.,* 1997, Journal of Agricultural and Food Chemistry, 45, 850.
15. *Puhan, Z., Flüeler, O., Banhegyi, M.,* 1974, XIX International Dairy Congress, IE, 451.
16. *Sanders, M., E., Klaenhamer T., R.,* 1981, Evidence of plasmid linking of restrictionand modification in Streptococcus cremoris KH, Applied and Environmental Microbiology 42, p 944-950
17. *Schaack, M., M., Marth, E., H.,* 1988, Interaction between lactic acid bacteria and somefood borne patogens: A review, Journal of Cultured Dairy Products, 23, 4, 14-20
18. *Straub, A., M.,* 2004 (iunie), Ustensils in sensory evaluation, The world of food ingredients
19. *Suzuki, I., Watanaba, M., Kitada, T., Kato, S., Morichi, T.,* 1979, Japanese Journal of Zootechnical Science, 50, 796.
20. http://food.oreQonstate.edu
21. www.21stSensory.com
22. www.sensory.com
23. www.uark.edu

The 39th International Session of Scientific Communications of the Faculty of Animal Science, Bucharest, Romania
Scientific papers (seria D; vol. LIII) – Animal Science

BIBLIOGRAPHIC STUDY ON THE EGGS QUALITY OF QUAIL COMPARED TO CHICKEN AND DUCK

LUCIAN IONIȚĂ, ELENA POPESCU-MICLOŞANU, CARMENA ŞERBĂNOIU

Key words: eggs, quail, chicken, duck, characterisics, weight, chemical composition

SUMMARY

The purpose of this study was to know the current state of research on quail egg characteristics and to compare them with those of hen and duck egg, the main species producing eggs for human consumption. It is apparent that quail egg weight varies between 9.3 g / egg and 11.5 g / egg, while the proportion ranges from 51.1% to 59.8% for the albumen, from 29.7% to 32.7% for the yolk and 6.6% to 9.76% for the shell of the whole egg weight. As food, eggs are generally for man a less energetical source of perfectly balanced protein and easily digestible fat as well as of phosphorus and vitamins. The differentiation between eggs of different species of birds (quail, chicken and duck) is difficult. Quail egg contains 13.1% protein and 11% fat, of which 3.6% saturated fat and 1.3% polyunsaturated fats. Have also a high content of Omega-6 fatty acids (940 mg). The cholesterol content is only of 12.1 - 17.8 mg / g yolk. Quail eggs are very rich in vitamin A (543 g UI/100 eggs) and rich in riboflavin, vitamin B12, pantothenic acid and folate. Among minerals, contains very high amounts of selenium (32 g mcg/100 eggs), and a high amount of phosphorus and iron. In terms of chemical composition the quail egg is superior to the chicken egg (higher energy and protein content), it is quait similar to the duck, but in certain vitamins and minerals the duck egg is superior (vitamin A, vitamin E, folic acid, iron, selenium). Regarding the cholesterol content, chicken and duck eggs contain about 8 times more cholesterol than the quail.

Japanese quail breeding has seen a great development in recent decades due to the biological characteristics of this bird, which causes the quail eggs and meat having recognized quality (high biological and nutritional value, taste) and is recommended by natural medicine for their therapeutic effect. The high level of production and its economic efficiency also contributes to the spread of the species.

Comparaison of the quail egg, chicken and duck is difficult given the variability of the data presented by various authors and the answer to the question on the species that produces the best egg for human nutrition as well.

1. MATERIAL AND METHOD

For the preparation of this research literature have been studied several publications (scientific papers, books and journals) on the quality of Japanese quail eggs.

2. RESULTS AND DISCUSSIONS

1. DIMENSIONS AND WEIGHT OF QUAIL EGG

Quail egg is a very valued food. Can substitute chicken egg in numerical proportion of about 5:1.

As in chickens, in quail eggs one can see variations of the weight of eggs from the same bird and for the same food during its life (see Table 1, after *Velcea M.*, *1997)*: the first egg is noticeably smaller than ones layed a few months after the start of laying, and its shall has also similar variations of weight.

Table 1

Dimensions and weight of quail egg

(Velcea M.,1997)

Specification	Longitudinal diameter (mm)	Transversal diameter (mm)	Egg weight (g)
Maximum	32.6	23.6	12.35
Minimum	26.2	20.5	7.55
Average	28.82	22.41	9.77

The white weight remains constant and the yolk has an increasing weight variation. First and last egg weight variation to average egg weight, average weight of the shell and yolk are presented in table 2.

Tabel 2

Initial and final weight of quail eggs during the laying cycle (g)

Average egg weight (g)		Average weight of eggshell (g)		Average weight of yolk (g)	
First egg	Last egg	First egg	Last egg	First egg	Last egg
9.30	9.44	0.724	0.743	2.853	2.890

Quail egg weight and its components, with variations played by various authors are summarized in Table 3.

2. QUAIL EGG WEIGHT, THE WEIGHT OF COMPONENTS AND THEIR SHARE IN PERCENT

In the world have been numerous studies on quail egg weight and its components. Some of the results of these studies are presented below (Table 3).

Table 3

Weight and share of its parts by different authors, quail egg

Specification	*Tarasewicz Zofia et al., 2004*	*Selim K. et al., 2004*	*Baumgartner, J. et al., 2008*	*0dunsi A. A. et al., 2007*	*Alexandru A., 2001*
Egg weight (g)	11.49	11.28	9.60	9.33	13.24
Albumen weight (g)	6.81	6.75	5.75	4.68	7.89
Albumen proportion (%)	58.13 %	59.83 %	59.9 %	51.1%	59.56 %
Yolk weight (g)	3.54	3.69	3.05	3.05	4.07
Yolk proportion (%)	30.19 %	32.71 %	31.77%	32.7 %	29.68 %
Eggshell weight (g)	1.14	0.84	0.78	0.62	1.28
Eggshell proportion (%)	9.76 %	7.47 %	8.13 %	6.6 %	9.68 %

Tarasewicz Zofia et al. (Poland, 2004) on a flock of quail hens variety of Pharaoh, found an average weight of 11.49 g /egg, an average weight of 6.81 g / white, a share of the white of the egg weight of 58.13%, an average weight of 3.54 g /yolk, a percentage of egg yolk of 30.19%, an average eggshell weight of 1.14 g and an eggshell proportion of 9.76%.

Selim K. et al. (Turkey, 2004) established the average weight of the Pharaoh quail egg, of 11.28 g /egg, the average weight of the white of 6.75 g, accounting for 59.83%, an average yolk weight of 3.69 g, with a percentage of 32.71 %, the average eggshell weight of 0.84 g, and thea proportion of the eggshell of 7.47%. The results are similar to those found by researchers in Poland.

Baumgartner J.et al. (Slovakia, 2008), refers to an average weight of Japanese quail egg of 9.60 g, an average weight of 5.75 g of the white, yolk and eggshell of 3.05 g and 0.78 g. *Odunsi. A. A. et al. (Nigeria, 2007)* have established an average weight of 9.33 g /Japanese quail egg, of witch 51.10% was the the white, yolk was 32.7%, while the shell egg represented 6.60%. As seen from the three studies presented, result that as the egg weight is lower, the white and eggshell weight drop, while the yolk remains constant. On chickens eggs, *Saldanha E.S.P.B., et al. (2009)* led to the white proportion of 65.92%, yolk of 24.99% and a proportion of 9.08% egg shell.

Dariusz K. et al. (2007) on ducks eggs, led to the white proportion of 59.4%, 30.7% yolk and an eggshell of 9.8%. *Pande and Srivastava (1987)* argue that the proportion of quail egg yolk /white is 39:6,1, higher than that of chicken.

Teuşan Anca et al. (2009) found on quail eggs the dense layer of albumen height of 4.67 mm, large diameter of the albumen layer 77.17 mm and the small diameter of the albumen layer of 42.50, the yolk height of 10.07 mm and the egg diameter 25.29 mm. Same rearchers have ascertained the white index of 0.0793 mm, and 0.399 mm yolk index.

Saldanha E.S.P.B., Garcia E.A. et al. (2009), on chickens eggs, led to a 0.441 mm yolk index and Haugh index of 86.5. *Dariusz K. et al. (2007)* in an experiment on ducks eggs, caused an yolk index of 0.402 mm and an Haugh index of 79.9.

3. CHEMICAL COMPOSITION OF QUAIL EGG

Pande and Srivastava (1987) mention the next chemical composition of quail egg: 74% water, 13% protein, 11% fat, 1% carbohydrate and 1% minerals. Caloric value is 649 Kj/100 g quail eggs. *Tarasewicz Zofia, Ligocki M. et al. (2006)* led to a pH of 9.17 of the white, while quail egg yolk has a pH close to 50% smaller, namely 6.48. *Hassan A. A. and Okura (2009)* led to a pH of 6.04 to chicken egg yolk. *Dariusz K. et al. (2007)* led to a pH of 5.86 in duck egg yolk. *Teuşan Anca et al. (2009)* led to a pH of egg whites of 8.89, a pH of yolk 6.07 and total egg pH of 7.81. It is considered that the quail egg is rich in fats and vitamins and easily digestible.

4. FAT CONTENT OF QUAIL EGG

As can be seen from Table 4, quail eggs contain 74.3% water, 13.1% protein and 11% fat, of which 3.6% saturated fat, monounsaturated fat 4.3% and 1.3% polyunsaturated fats. They have also a high content of Omega-6 (940 mg) and Omega-3 (44 mg) fatty acids. Caloric value of the quail eggs is of 158 kcal (662 kJ) per 100 g of product.

Quail egg has a caloric value of something larger than a hen's egg (by 15 kcal/100 g), contains 0.5% higher protein and higher fat by 1.1%. From the total fat content, quail egg contains 0.5 grams more saturated fat, monounsaturated fat respectively. Hen's egg contains higher proportions of omega-3 and omega-6 fatty acids.

Table 4

The energy value, protein and fat content of quail egg
(Food and Nutrition Information Center, USDA)

Specification	Quail egg	Chicken egg	Duck egg
Water, %	74.3	75.8	70.83
Energy value (kcal/100 g egg)	158 (662 kJ)	143 (559 kJ)	185 (775 kJ)
Protein, g	13.1	12.6	12.81
Total fat, g, d.c. :	11	9.9	13.77
- saturated fat	3.6	3.1	3.68
- monounsaturated fat	4.3	3.8	6.52
- polyunsaturated fat	1.3	1.4	1.22
Total fatty acids Omega 3, mg	44	74	
Total fatty acids Omega 6, mg	940	1148	
Cholesterol (mg/g egg yolk)	12.1*	79.3**	102.6***

* *Kazmierska et al. (2007); Marshall and Ekpo K.E. (2009);*** Oloyede O. I. (2005)*

USDA National Nutrient Database mentioned in hen eggs a caloric value of 144 kcal /100 egg, a protein content of 12.6% and total fat content of 10%, of which 3.2% saturated fat, and 1.4% polyunsaturated fat. *Matt D. et al. (2009)* determined on chickens eggs fat: 2.5% saturated fatty acids, monounsaturated fatty acids 3.2% and 1.6% polyunsaturated fatty acids.

Kazmierska Malgorzata et al. (2007) determined on quail eggs a cholesterol concentration of 12.1 mg /g egg yolk. *Baumgartner J. et al. (2008)* determined on Japanese quail eggs a cholesterol content of 17.87 mg / g egg yolk. *Oloyede O. I.* Nigerian researcher (2005) resulted in ducks eggs a total colestereol content of 102.6 mg / g of egg yolk. *Marshall and Ekpo K.E. (2009)* determined on chicken eggs a cholesterol concentration of 79.33 mg / g egg yolk.

5. VITAMIN AND MINERAL CONTENT OF QUAIL EGG

Quail eggs have a very high amount of vitamin A (543 UI/ g 100 eggs), a high amount of riboflavin (0.8 mg / 100 g), vitamin B12 (1.6 mg), pantothenic acid (1.8 mg) and folate (66 mcg/100 g). Other vitamins contained by the quail egg are shown in Table 5. Among minerals, quail egg contains very high amounts of selenium (32 g mcg/100 eggs), and a high quantity of phosphorus (226 mg) and iron (3.6 mg/100 g). It also contains relatively high proportions of zinc, sodium and calcium.

Compared with the chicken egg, quail egg contains 10.12% more vitamin A, 35% more vitamin D, 12.7% vitamin E, 40% more vitamin B2 (riboflavin), with 27.3% more vitamin B9 (folic acid). Also, quail egg is richer by 18.8% in calcium, 50% iron, 19.5% phosphorus compared with hen's egg.

In a study on fresh duck eggs, *Hou Xiangchuan (1981)* determined per 100 g: 8.7% protein, 9.8% fat, 1380 IU vitamin A, 0.15 mg vitamin B1, vitamin B2 0.37 mg, 0.1

mg nicotinic acid, 71 mg calcium , 210 mg phosphorus, 3.2 mg iron. The same researcher has determined the following amino acids: 853 mg valine, leucine 1175 mg, 806 mg threonine, 211 mg tryptophan, 595 mg methionine, 704 mg lysine and 379 mg cystine.
Patchreee Ch (1978) stated in chicken eggs (per g protein): leucine 86 mg, 70 mg lysine, 57 mg methionine + cystine, phenylalanine + tyrozină 93 mg, 47 mg threonine, 17 mg tryptophan, 66 mg valine and 22 mg histidine.

Table 5

Content of vitamins and minerals of quail egg compared with chicken and duck egg
(per 100 g egg**)**

Specificare	**U.M.**	**Quail egg***	**Chicken egg****	**Duck egg****
Vitamin A	UI	543	488	674
Vitamin D	UI	55	36	72
Vitamina E	mg	1.1	0.96	1.3
Vitamin B2 (riboflavin)	mg	0.8	0.48	0.4
Folic acid	mcg	66	48	80
Vitamin B12	mg	1.6	1.3	5.4
Vitamin K	mcg	0.3	0.3	?
Vitamin B1 (tiamin)	mcg	0.1	0.08	0.2
Vitamin B3 (niacin)	mg	0.2	0.1	0.2
Vitamin B6	mg	0.2	0.14	0.3
Vitamin B 5 (pantothenic acid)	mg	1.8	1.4	1.9
Vitamin B4 (choline)	mg	263	253	263
Calcium	mg	64	52	64
Iron	mg	3.6	1.82	3.8
Magnezium	mg	13	12	17
Phosphorum	mg	226	182	220
Potassium	mg	132	140	222
Sodium	mg	141	134	146
Zinc	mg	1.5	1.12	1.4
Copper	mg	0.1	0.1	0.1
Manganesse	mg	0.04	0.024	0.38
Selenium	mcg	32	31.6	36.4

* Condé Nast Publications, Nutritiondata
** USDA National Nutrient Database for Standard Reference, 2005.

On duck eggs in the same study, the author mentions the essential amino acids: leucine 66 mg, 62 mg lysine, methionine + cystine 19 mg, 70 mg phenylalanine + tyrozină, 46 mg threonine, 12 mg tryptophan, 52 mg valine and 18 mg histidine.

3. CONCLUSSIONS

The quail egg yolk ratio ranges between 51.1% and 59.8%, the proportion of albumen between 29.7% and 32.7% and the shell between 6.6% and 9.76% of egg weight.

As food, eggs are generally for man a less energetical source of perfectly balanced protein and easily digestible fat as well as of phosphorus and vitamins. Comparaison of the quail egg, chicken and duck is difficult given the variability of the data presented by various authors and the answer to the question on the species that produces the best egg for human nutrition as well.

Quail eggs have a high concentration of monounsaturated fatty acids. The pH is neutral, whilw pH of hen and duck eggs is more acidic. They are very rich in vitamin A, rich in riboflavin, vitamin B12, folic and pantothenic acid. Among minerals, the egg of this species contains very high amounts of selenium, and a high amount of phosphorus and iron. In terms of nutrition, quail egg is superior to the chicken egg (calorid and proteic value), but it looks a lot like duck egg, which is even richer in certain vitamins (vitamin A, vitamin E, folic acid) and minerals (iron, magnesium, potassium , selenium) than the quail egg. It appears that the cholesterol level is higher in duck, next to the chicken egg, while quail egg contains nearly 8 times less.

REFERENCES

1. *Adeogun I.O., Adeoye A.A. (2004):* Heritabilities and phenotypic correlations of growth performance traits in Japanese quails, Anim. Sci. Dep., Obafemi Awolowo University, Nigeria.
2. *Teuşan Anca, V. Teuşan, A., Prelipcean A. (2009)*: Research regarding some physical quality values of japanese quail eggs obtained at the midle of the laying stage, Animal Sciences and Biotechnolgies Scientific Papers, B.U.A.S.V.M., vol 42 (2) : 446-451, Timişoara, Romania.
3. *Alexandru A.(2001)* : „Prepelița, fazanul" (2001), Editura Alex-Alex, Bucureşti.
4. *Baumgartner J. et al. (2008)* : Changes in egg quality traits associated with long-term selection for lower yolk cholesterol content in Japanese quail, Czech J. Anim. Sci., 53, (3): 119–127.
5. *Dariusz K., Zenon B., Henryka Korytkowska (2007)* : Eggshell and egg content in Peking dugk eggs from the P44 reserve flock raised in Poland, J.C. European Agriculture, vol. 8, no. 1 (9-16).
6. *Hou Xiangchuan (1981),* Egg preservation in China, Food Nutr. Bull., Vol. 3, No. 2, April, Japan.
7. *Odunsi A.,A.., Rotimi A.A., E.A. Amao A. E. (2007),* Effect of Different Vegetable Protein Sources on Growth and Laying Performance of Japanese Quails (Coturnix Coturnix Japonica) in a Derived Savannah Zone of Nigeria. World Applied Sciences Journal 3 (5): 567-571.
8. *Oloyede O.,I. (2005)* : A comparative Study on the Cholesterol Content of Product Fractionated from Egg Yolk of Some Birds, Pakistan Journal of Nutrition 4 (5): 310-312, 2005 ISSN 1680-5194.
9. *Kaźmierska Małgorzata, Korzeniowska Małgorzata et al. (2007),* Effect of fooder enrichment with PUFAs on quail eggs, Pol. J. Food Nutr. Sci. , Vol. 57, No. 4(B), pp. 281-284.
10. *Marshall Arebojie Azeke and Kokoete Ekerete Ekpo (2009)* : Egg yolk cholesterol lowering effects of garlic and tea, Journal of Medicinal Plants Research Vol. 3(12), pp. 1113-1117, Dec., Nigeria.
11. *Matt D., Veromann E. and Luik A., (2009)* : Effect of housing systems on biochemical composition of chicken eggs, Estonian University of Life Sciences, Agronomy Research 7 (Issue II) : 662-667.
12. *Panda B., Singh R.P. (1990)* : Development in processing quail, W. P. Sci. J., 46, pp. 219 – 234.
13. *Patchreee Ch. (1978)* : The Role of Protein Quality in The Design Of the Infant Food, Faculty of Science, ChulalongKorn University, Bangkok, J. Sci. Soc. Thailand, 4 (1978) : 90-100.
14. *Naber E.C. (1993)* : Modifying vitamin composition of eggs : A Review, The Ohio Agricultural Research and Development Center. Manuscript number 159-93, J. Appl. Poultry Res. 2 : 385-393.
15. *Pande şi Srivastava (1987)* (www.vethelplineindia.com).

16. *Saldanha ESPB; Garcia EA et al. (2009)* : Effect of organic mineral supplementation on the egg quality of semi-heavy layers in their second cycle of lay, Rev. Bras. Cie. Avic. vol.11 no.4.Dec.
17. *Selim Kul, Ibrahim Seker (2004)* : Phenotypic Correlations Between Some External and Internal Egg Quality Traits in the Japanese Quail (Coturnix coturnix japonica) I.J.P. Sci. 3 (6): 400-405.
18. *Tarasewicz Zofia et al. (2004):* Effect of the origin of quails on their utility type and selected egg quality traits, Electronic Journal. Polish Agricultural. University., Ser. Anim. Husb., *7*, 1–7.
19. *Velcea M. şi col. (1997)* : ”Creșterea prepelițelor japoneze”, Ed. Rantrop and Straton.
20. USDA National Nutrient Database for Standard Reference, Agricultural Research Service, 2005.

The 39th International Session of Scientific Communications of the Faculty of Animal Science, Bucharest, Romania
Scientific papers (seria D; vol. LIII) – Animal Science

DANISH STANDARDS FOR MEAT PROCESSING AT EU LEVEL

LILIANA POPESCU, CRISTINA TINDECHE, ELISABETA SIMA

Key words: cooperative, slaughterhouse, pork, processing, quality, health, veterinary inspection

SUMMARY

The Danish Crown group is an international food producer with production and sales across the world. At present it is the world’s third largest and Europe’s second largest pig slaughtering business and also Europe’s largest meat processing company. The cooperative has achieved this status by setting and observing very high and strict quality standards at all stages in meat processing, which explains why its products are exported all over the world.

1. MATERIAL AND METHOD

The aim of this paper is to present the high quality standards achieved by Denmark in the field of meat processing. Our starting point is The Danish Crown group, an international food producer with production and sales across the world, which is now the world’s third largest and Europe’s second largest pig slaughtering business, Europe’s largest meat processing company, Denmark’s largest cattle slaughterhouse business, one of the two or three largest meat exporters in the world and the world’s largest exporter of pork.

The first Danish co-operative pig slaughterhouse was established in the town of Horsens in 1887. During the following 40 or 50 years a large number of pig slaughterhouses were established around the country. In 1960 the co-operative slaughterhouses began to merge in order to acquire more strength to handle functions such as sale, marketing, and product development. In 1998 Danish Crown and Vestjyske Slagterier merged. In 2002 Danish Crown and Steff-Houlberg merged, and a large proportion of the original co-operative pig slaughterhouses are included in the new Danish Crown.

Danish Crown’s job is to provide its members with the greatest possible returns on their livestock investment. The modernisation of primary land use farming continues apace, and production from co-operatives is now shared among fewer and fewer players. With this in mind it is vital that Danish Crown is seen to be a professional, engaged partner for the modern farmer that talks and listens.

Today they export 92% of their production to the rest of the world. Growth must take place without spreading their resources too thinly, and this will often mean increasing activity in a market where they are already established. That is why expansion in the European meat processing sector is their first priority - although they will still keep their eyes and ears open for opportunities to expand in other areas.

As one of Denmark’s biggest businesses Danish Crown are required to tackle change. They must be willing to implement new approaches in their supply chain and production processes, and flexible attitudes towards work and employment practices help to enable this.

As a global player, they have to be able to manoeuvre and alter their position on both a macro and micro scale. Individual market conditions change constantly, meaning that Danish Crown has to constantly react. This includes production costs and wage structures, which must match varying local and national conditions.

Danish Crown develops more consumer ready-to-eat products, thus keeping as many links as possible in the value chain within the company. Consumers need new inspiration and new foods on their dinner tables that meet match their demands. Constant improvement and development of both raw and processed foods are matched to the needs of individual markets, thus providing consumers with real choice.

Their main markets are the EU, Japan, Russia, and the USA. Danish Crown offers about 200 standard cuts as well as special cuts to the specifications of the customer. Danish Crown pork provides assurance of:

- **Uniform products -** This uniformity has been achieved through more than a hundred years of breeding, which has made Danish pigs world famous for a high meat percentage and a good meat/fat distribution. Uniformity is also achieved by slaughtering the pigs when they are within a narrow weight range, and by carefully sorting the carcasses at the slaughterhouses after slaughtering.
- **Products of high quality -** Quality is the key concept in the production of the farmer as well as when the pigs are slaughtered and processed. The farmer provides optimum conditions for the pigs, resulting in good and healthy growth conditions as well as pork of a high nutritional quality. The slaughterhouses treat the pigs gently, which ensures a high meat quality, and their employees are trained to treat the meat with the utmost care so that it is of pristine quality
- **Products with veterinary approval -** The Danish veterinary inspection is one of the strictest in the world, both in the primary farming industry and at the slaughterhouses. The veterinary inspection at Danish Crown's plants operates independently of the plant, thereby ensuring a strict and objective inspection.

- additional inspection by means of HACCP/in-house inspection - The veterinary inspection is supplemented with in-house inspection according to the HACCP principles. The object is to assure the consumers the maximum hygiene quality, and thus food safety, through preventive measures. All slaughterhouse employees have passed a hygiene course in order to be able to perform the day-to-day in-house inspection.

- dependability of supply - The large tonnage handled by Danish Crown permits them to plan their production accurately and implement efficient logistics, and since they have their own shipping department and co-operate with leading transport companies they are able to assure the customers delivery of the right quality and the volume ordered at the agreed time.

2. RESULTS AND DISCUSSIONS

Pigs are slaughtered mainly in large slaughterhouses around the country. Pig slaughter consists of a long series of processes, as follows:

Transport and lairage. When a farmer is ready to supply pigs for slaughter, he contacts the slaughterhouse about a week before and tells how many pigs he expects to supply. This provides time for the slaughterhouse to plan collection and slaughter. The day of collection by the haulage contractor, or the previous day, he moves the pigs to a special delivery room, which is separated from the other production. The reason is to avoid that the transport driver, who might have other pigs on the lorry, transfers infection to the herd.

It is most common for the slaughterhouse to plan the collection of the pigs. The transport is done by private haulage contractors, but the slaughterhouse will normally plan the route to ensure that the pigs spend as short time as possible on the lorry. Nearly all Danish slaughter pigs spend less that three hours from the farm to the slaughterhouse - the transport will typically last 1-1 1/2 hours. This is far less than the maximum allowed transport time. According to the regulations animals may be transported for up to eight hours before they are fed and watered.

The pigs are transported to the slaughterhouse in special lorries with slip proof flooring, ventilation and division into compartments so that pigs from different herds do not fight. A few farmers choose to deliver the pigs themselves.

At the slaughterhouse the pigs are driven out of the vehicles and checked by a veterinary surgeon to ensure that they are healthy; they are then driven to the lairage pens.

Stunning and sticking. After a couple of hours in the pens the pigs are driven to stunning. They are stunned with carbon dioxide (CO2) by being driven into a 'lift', which subsequently is lowered into a pit with carbon dioxide. The pigs become unconscious by breathing the carbon dioxide. The unconscious pigs are lifted up in a hind leg and conveyed to be stuck in the neck artery and die. They are often stuck with a special hollow knife with a hose attached, so that the blood is collected automatically via the knife. The blood is later centrifuged to separate it into plasma (ca. 60%) and haemoglobin, which are both frozen. The total blood is used directly for the manufacture of blood pudding and sausage, but the blood plasma is used as an ingredient for a number of products. The haemoglobin part (red) is used for example as mink feed.

Unclean slaughterline. After stunning and sticking the first part of the process is the unclean section where the carcasses are scalded. They are pulled through a long vessel with warm water (61oC) where the hairs are loosened. The scalding can also be done with steam; then the carcasses are conveyed through a cabinet, while hot water vapour is blown over them.

The carcasses are then going through the dehairer, where hair and hooves are removed while the carcass passes between two cylinders.

After the dehairer the carcasses are transferred to gambrels with the ends going through each hind leg so the carcass hangs with its head downward. Each gambrel has a number, for example a bar code, a radio chip or a steel plate with punched numbers, which automatically records when the carcass moves through the different processes on the slaughter line.

The carcass is then singed in a kiln with flames that carbonise the outer skin layer. This removes any remaining hairs and contributes to giving the skin the correct texture.

The next stage is the rind treatment, where the black rind from the singeing is scraped off. This is done in several stages - first by the so-called black scraping, which removes the majority, followed by a further scraping and brushing to clean the carcass all over.

The carcass is now ready in the 'unclean' part of the slaughter line and is transferred to the 'clean' part.

Clean slaughter line. The first thing that happens here is that the carcass is 'opened' i.e. cut open with a perpendicular ventral cut. The thorax bone is sawn through so that the carcass is open at the front. The viscera are taken out and divided into pluck (i.e. tongue, oesophagus, heart, lungs, liver and diaphragm) plus stomach and intestines. The viscera are conveyed parallel with the carcass to the veterinary meat inspection.

The carcass is split. First it is cut from the dorsal side at both sides of the spinous processes of the backbone (called 'free cutting'); then it is split with a saw into two halves along its length through the backbone and chest to be joined by the snout only.

The carcass and the viscera are then checked by a veterinarian to ensure that the meat if free of disease. If there is sign of disease, the diseased parts are partly or completely condemned depending on the type of disease. Approved stomachs and intestines are sent to the casing cleaning department, and the other approved parts are being chilled.

Then the carcass is weighed. The supplier's number (i.e. the farmer's number) is registered on a computer together with the carcass weight (carcass without blood and viscera). Then the carcass is classified and is ready for carcass chilling.

Classification and payment. In the classification the lean meat content is measured in each carcass. The meat content ('meat percent') is, in combination with the carcass weight, the basis for the payment to the farmer. He is paid according to the number of kg lean meat in the carcass. Each week the slaughterhouse companies determine their basic price per kg pig meat.

Measurement of the lean meat content in the carcasses has hitherto been done in a special 'classification centre' where probes are inserted into the carcasses and measure - via light reflection - certain fat and meat thicknesses. Based on these measurements the meat percent is calculated for the carcass and for the major cuts. A new equipment for classification, which is based on ultrasound measurements, has been implemented at one slaughterhouse. The advantage is that the measurement can be done without penetrating the carcass.

The farmer gets the basic price for the pig if the carcass has the basic lean meat content (today 60%) and is within a certain weight interval. If the meat content is lower than the basic, there is a deduction from the payment, and if it is higher, the payment is increased up to 65%, where the payment is not increased further.

If the carcass weight is lower or higher than the optimum interval (typically between 67 and 81-82 kg) there is a gradual reduction in the payment.

If the farmer produces special pigs (for example pigs with a special good eating quality or ethical quality) he gets a special addition to the basic price.

The slaughterhouses determine the criteria for payment according to the qualities required by the markets. It is important for the farmers to supply the pigs for slaughter when the meat content and carcass weight is at the optimum level in order to achieve maximum payment.

Once a year the slaughterhouses pay an additional 'after-payment' to their members; this means that the annual profit is distributed according to the carcass weight supplied.

Health stamps. The last process is to apply health stamps onto the carcasses to certify that they have been checked and to be able to trace back in case of problems.

Meat from slaughterhouses authorised for export, i.e. slaughterhouses fulfilling especially high hygiene requirements, will be stamped with oval stamps (at least 6.5 x 4.5 cm), which among other things show the plant's authorisation number. Meat from plants not authorised for export ('home market plants') are marked with a round stamp, which also contains the authorisation number of the plant.

In addition to the official health stamps, the plants often apply their own quality stamps, for example for the selling classes that are marked A1, A and B.

Chilling. When the slaughter processes of the carcass have been completed, it has to be chilled. The temperature of the carcass is approximately 30^{o}C after slaughter, and it must be chilled to a temperature below 7^{o}C within 24 hours.

The purpose of the carcass chilling is to arrest the bacterial development in order to improve the shelf-life and safety of the meat. The chilling also contributes to a reduction of the evaporation, so that the carcasses do not lose so much weight.

At the start of the chilling the carcasses are conveyed through the blast tunnel - a long corridor where very cold air (between -20 and -300^{o}C) is blown onto the carcasses to provide rapid cooling. The surface is actually frozen while the interior is still warm.

After the chilling tunnel the carcasses are taken into a chill room at a temperature of 5^{o}C. They hang here while the temperature in the muscles and the carcass equilibrates to a maximum of 7^{o}C in the interior.

It is often discussed whether the powerful chilling in the blast tunnel results in a poorer meat quality than a slower chilling in a chill room. Several investigations, e.g. by the Danish Meat Research Institute, have shown, however, that meat chilled correctly in a blast tunnel is at least as good as other meat.

Carcass cutting. The day after slaughter, when the carcass has been cooled, it will be cut. First the head and feet are cut off - this completes the separation of the carcass into its two halves. Each of the carcass halves is then cut into three parts: Fore-end, middle and hind leg. The middle is often cut into loin and belly. These primal cuts constitute the basis for the further cutting and boning of the meat according to the customers' specifications.

The Danish pig meat export consists mainly of fresh (chilled) or frozen cuts. The fore-ends are for example sent to Germany and Russia, the middles are cut and exported to Great Britain and Japan and the hind legs are trimmed and/or boned and exported to France, Italy and Sweden.

The cuts are mainly used for further processing in the import countries; for example into cured and cooked meat products.

Processing. Part of the pig meat is used for various processed meat products; for example bacon, cold cuts, sausages, cooked hams and various types of canned meats.

Hygiene. A good hygiene is a prerequisite for healthy products of good quality. The hygiene is influenced by many factors during slaughter, chilling, cutting, boning, processing, retailing and storage in the consumer's home. All links in this chain must understand the necessity of good hygiene.

Basically hygiene is to avoid contamination of the meat with undesired bacteria and to avoid growth of microorganisms. Hygiene is also aesthetics/appetising conditions. Few people will accept that food is made or handled in unappetising conditions.

Living animals have a natural flora of microorganisms on the skin, in the nose, pharynx, intestinal tract and around anus and the genitals. Muscles and organs are, on the contrary, normally sterile. Microorganisms can occur in blood and tissues during infections, but the body's immune defence will normally combat them.

During slaughter the interior of the carcass will be contaminated due to cutting and handling. Knives, saws and other equipment transfer microorganisms from the surface to the interior of the carcass. Contamination of the meat with bacteria from the pharynx and intestines, where pathogens can occur, is particularly critical. Continuous disinfection of knives and equipment, careful handling of the carcasses during the different slaughter processes and effective chilling are preconditions for a good hygiene with minimum microbiological contamination of the meat. It is not possible completely to avoid bacteria on the meat. However, the bacteria are only on the surfaces of the meat - not inside the muscles.

During cutting and boning further bacteria are transferred to the meat from the equipment and the handling of the products. The shelf-life is reduced because many new surfaces are created. Particularly when the meat is minced, where the surface is increased a lot and good conditions are created for bacterial growth.

Bacterial activity, and thus the quality and shelf-life of the products, is first and foremost controlled by the temperature. An unbroken chain of refrigeration, i.e. a constant low temperature during production, storage, distribution and holding in the shop and at the consumers' homes is a precondition for maintaining a good quality and obtaining a reasonable shelf-life of the meat.

Control. The control of hygiene and health is done by the public veterinary inspection and by the slaughterhouse.

3. CONCLUSIONS

Processed meat products are a broadly composed group ranging from whole muscle products such as cured pork loin, cured veal or marinated chicken portions to comminuted products, for example sausages, and from uncooked products to canned meats. Common for them all is that they have been exposed to a process. The processed meat products comprise cold cuts, sausages, canned products etc.

Raw materials. The raw materials for the processed products come from all parts of the carcass. For the expensive products, whole meat pieces are normally used; this is for example the case for bacon, cooked ham, cured pork loin and smoked loin. The processing is often curing and possibly smoking and heat treatment.

Comminuted meat products are made from chopped/minced raw materials. The raw materials are often smaller meat and fat pieces, which are cut off during trimming and boning of the cuts. The less valuable parts of the carcass, for example jowls and shank muscles, are also often used for comminuted products.

During the comminution of the meat, various ingredients are added; for example salt, phosphates, proteins, starch and spices. The meat mixture is used for making sausages and canned meat products, for example luncheon meat (a typical export product).

Curing. During curing, sodium chloride (NaCl) is added, often together with water, nitrite salt (i.e. salt with 0.6% sodium nitrite), phosphates, ascorbate etc.

The curing has several purposes: To provide flavour and juiciness and to improve the shelf-life. The salty flavour is important for the correct taste of the products. Investigations have shown that approximately 2% salt is suitable for the majority of modern consumers. Many products were more salty earlier, but the focus in recent years on the unfortunate effect of salt on the blood pressure has contributed to a reduction of the salt content.

Curing is an old method for food preservation. The salt inhibits the growth of many bacteria and stops some of the enzymes in the meat that contribute to its breakdown. In modern meat products the salt content is, however, so low that the shelf-life is prolonged through refrigeration, packaging etc.

Smoking. Smoking is an old traditional preservation method. Smoking will preserve the surface of the product by inhibiting the growth of the bacteria. In addition a drying can occur; this will also contribute to a longer shelf-life. Finally the smoke provides colour and flavour - this is today the main reason for the smoking of meat products.

Smoking can be done in three ways depending on the temperature and time for the smoking:

- Cold smoking, where the temperature is 20-30oC, i.e. where the smoke is cooled. Cold smoking is for example used for salami sausages. Cold smoking is often done over an extended time period from some days to several weeks.
- Semi-warm smoking, where the smoke temperature is ca. 40oC. This smoking method is used for bacon, cured pork loin and various cold cuts.
- Hot smoking, where the products are heated to 70-90oC; the products are therefore cooked and can be eaten without further heat treatment. The process typically consists of drying, smoking and cooking. Hot smoking is for example used for Vienna sausages.

Heat treatment. Many processed meat products are heat treated (cooked) as part of the process. Most cold cuts receive a mild heat treatment equal to pasteurisation, i.e. a heating to a core temperature of at least 75oC. Depending on the packaging method, on whether the products are sliced or sold as a piece, on the storage temperature (maximum 5oC) etc., the typical shelf-life ranges from some weeks to a couple of months.

Perishable canned meats are products that are cooked in an impermeable pack and have a shelf-life of at least six months when refrigerated. When the pack is opened, the shelf-life is only a few days or weeks under refrigeration.

Fully stable canned meats are products that are heat treated to have a shelf-life of at least one year at room temperature - in practice often considerably more. Heat treatment is done in an autoclave (an industrial 'pressure cooker'), where the core temperature in the products reaches 120-122oC. Canned meats are nearly always packed in metal cans.

Additives. Various additives are used for processed meat products. Statutory regulations determine the permitted types and quantities of additives for each product.

Preservatives are used to increase the shelf-life. For meat it is mainly nitrite, which inhibits the growth of bacteria. Nitrite is used as nitrite salt; a mixture of salt and 0.6% sodium nitrite.

Emulsifiers, stabilisers and thickening agents. Emulsifiers are compounds that make it possible to produce a stabile mixture of fat and water that does nor separate. Some proteins, e.g. soy and milk proteins, are used in comminuted products to prevent fat separation during cooking. Polyphosphates also have an emulsifying effect. Stabilisers and thickening agents bind water and contribute to a firm texture of the products.

Colouring matters are only used in certain products, i.e. salami, Saveloy sausage and hot dog sausages ('red sausages'). The similar products without added colour are South Jutland salami, meat sausage and Vienna sausages.

Various are compounds that do not come in the other groups of additives. This includes flavour enhancers, e.g. 'the third spice' (mono sodium glutaminate) that enhances the flavour of meat products without itself having any taste. Other compounds are glucona-delta-lactone, which is used to regulate the acidity (pH) and ascorbic acid (vitamin C), which for example stabilises the colour in meat products.

REFERENCES

1. *Gunter Heintz, Peter Hautzinger* – Meat Processing Technology for Small – to Medium – Scale Producers, FAO, 2007
2. www.thepigsite.com
3. www.danishcrown.dk
4. *Hansen, P-I. E.,.* Introduction of cleaner technology in Danish slaughterhouses, 1996
5. COWI Consulting Engineers and Planners AS, Denmark, 1999. Internal data

The 39th International Session of Scientific Communications of the Faculty of Animal Science, Bucharest, Romania
Scientific papers (seria D; vol. LIII) – Animal Science

THE EVALUATION OF FOOD PRODUCTS DERIVED FROM GENETICALLY MODIFIED PLANTS AND CONSUMER'S ACCEPTANCE DEGREE

GALIŞ ANCA-MARIA, ILIE LUCIAN

Key words: genetically modified plants, food safety, consumer, potential effects, human health.

SUMMARY

Due to the fact that GM plants and the food products obtained by their utilization are considered novel foods and that the level of knowledge about their safety is still too low, there is the necessity of their safety assessment, detection and evaluation of their characteristics, in order to protect the health of the consumers and the biodiversity of the plants. The consumers' perception and beliefs are negative towards this type of products, due to the little knowledge and the trade policy. When evaluating the risks of GM foods, detection and quantification analysis is required, in this direction being elaborated a series of techniques that are successfully used, such as PCR and ELISA, and permitting the researchers to obtain results that specifically show the unknown characteristics and allowing them to foresee any issues in the future.

1. ACTUAL STATUS OF GENETICALLY MODIFIED PLANTS

Using the genetic engineering tools, genes can be introduced into the same plant or animal species or into plants of animals that are not sexually compatible. This type of technology permitted the commercial production of genetically engineered crops on approximately 125 millions hectares in 25 countries[1].

The subject of genetically modified organisms has been intensely debated all around the world, due to the fact that the nature of DNA modification do not present total safety when speaking about the co-existence with the same type of organism (conventionally bred) – non-GM – and cannot assure that the derived products and food products obtained from animals fed with forage derived from transgenic plants, and consumed by the human being do not present any risk. In addition, this subject was not the topic of recent scientific studies performed to assure that products derived from transgenic plants do not present any risk for the environment, as well as for animals (forage) or the final consumer, the human being. In this moment, considering the European legislation, a series of transgenic plants are authorized for cultivation and processing in order to obtain food products and feed. Table 1 includes the main genetically modified plants authorized or subjected to authorization renewal.

However, a number of Member States invoked the „safeguard clause", included in Art.23 of Directive 2001/18/EC, which restricts or prohibits the use and/or sale of the genetically modified product on its territory: Austria, France, Greece, Hungary, Germany and Luxembourg.

Food and feed derived from genetically modified plants must carry a label which refers to the presence of the genetic modification. The exception from this rule is

[1] Stein, A., Rodriguez-Cerezo, E. – 2009 – The global pipeline of new GM crops – Implications of asynchronous approval for international trade, JRC Scientific and Technical Reports.

applied when the food or feed ingredients have a proportion of genetic modification of no more than 0,9 %. Labeling is mandatory and provides information for consumers, thus allowing them to make an informed choice.

The traceability is another issue when considering the transgenic plants, being considered a very important topic. Traceability represents the ability to track the transgenic plants and food/feed obtained from transgenic plants at all stages of the food chain. This permits to monitor the potential effects on the environment and on health and if necessary to withdraw the products if considered with risk. It is mandatory for operators (suppliers) to provide the following information: (a) indication that the products/ingredients contain or consist of transgenic plants and (b) information on the unique identifier for the transgenic plant. Having the obligation of ensuring that the development of modern biotechnology and especially GMOs takes place in complete safety, the European Union has established a legal framework and the main legislative document is represented by EC regulation 1829/2003, which provides the general direction for regulation of food and feed in EU member states. The main objective of this framework is to ensure a high level of protection for human life, health and welfare, environment and consumer interests, without affecting the internal market. Traceability and labeling of genetically modified organisms are subject of Regulation 1830/2003, when placing any derived product on the market, while Directive 2001/18/EC regulates experimental releases and the placing on the market of genetically modified organisms in the EU.

2. POTENTIAL EFFECTS OF GENETICALLY MODIFIED PLANTS ON THE ENVIRONMENT, ANIMALS AND HUMAN BEING

Ever since the emergence of the products obtained from the genetically modified plants, there has been a continuous concern for the potential effects that they might have on the health status of the consumers. In a review article published in Biomedicine & Pharmacotherapy magazine, a team of researchers have established a series of biological and biochemical aspects of genetically modified food[2]. The main risks for the human being are the potential allergenicity along horizontal gene transfer (HGT). HGT refers to the exchange of gene s between two different organisms, without reproduction, opposite to vertical gene transfer, that occurs when involving sexual reproduction. By allowing the transfer of genes between unrelated species, HGT determines an increase of genetic diversity, speeding up the genome innovation and evolution. The general concern consists of a hypothetical danger that refers to the release of genetically manipulated organisms and the possibility of an uncontrolled gene transfer to other organisms. For example, microorganisms have three different mechanisms for HGT: (1) transformation, the uptake and incorporation of naked DNA; (2) conjugation, a

---

[2] P. Celec et al. – 2005 - Biological and biomedical aspects of genetically modified food, Biomedicine & Pharmacotherapy 59 (2005) 531–540

cell contact-dependent DNA transfer mechanism and (3) transduction, the host DNA being encapsuled in a bacteriophage which acts as a vector for its injection into a recipient cell.

The issue of allergies in relationship with GM foods is actual and very important since 1-2 % of adult population suffers from food allergies. The main concern is related to the possibility of a change in the expression of the allergen already expressed in the host plant. An important example in this situation is the GM soy bean with transferred 2S albumen protein from the Brazil nut. The purpose for this modification was to improve the content of soybean with cysteine and methionine, and one of the side effects was that the persons allergic to Brazil nuts were allergic to the modified soybean also.

Concerning the effects of the genetically modified plants on the environment, the risks include plant invasiveness or dispersal of the plant itself into the native ecosystem causing indirect impacts on the diversity of crops, gene flow through pollen transfer or HGT with associated microorganisms, development of resistance in target organisms and non-target effects of native flora and fauna including effects on the biodiversity of beneficial and antagonistic microorganisms.

3. DETECTION AND QUANTIFICATION METHODS FOR GM CROPS-FOOD PRODUCTS

Both labeling and traceability of GM crops are current issues considered in trade and regulation. The implementation and maintenance of regulations necessitates sampling protocols and analytical methodologies to allow accurate determination of the content of GM organisms in food and feed samples. The challenge of GMO detection includes the detection of transgenic material in materials with varying chromosome numbers. For most DNA-based detection methods, the polymerase chain reaction is employed, while for the protein-based methods, enzyme-linked immunosorbent assays are used.

The determination of the content of GMOs in raw materials is subjected to errors during the various stages of the diagnostic operation. Sampling strategies have to take a wide variety of parameters into account, like the nature of the food and the distribution in the bulk.

Talking about the analysis, GMOs are usually defined as living organisms whose genetic composition has been altered by means of gene technology. This involved the DNA isolation and the transfer of it into the genome of the target organism. The most direct detection methods are those that target the genetic modification itself, i.e. the modified DNA. At the present moment, the most commonly used DNA-based methods involve amplification of a specific DNA with the PCR technique. The identity of the amplified DNA may be verified afterwards by DNA sequencing or digestion, using restriction enzymes, followed by fragment analysis to determine the size of the resulting fragments. Gel electrophoresis is normally used for a qualitative detection of PCR-amplified DNA, while real time-PCR is generally used for quantification. For the latter, the amount of product synthesized during the PCR is measured in real time by detection of fluorescence signal produced as a result of specific amplification. RT-PCR requires specific thermal cycles and usually the addition of specific fluorescent probes.

4. RISK EVALUATION OF GM CROPS

Current policy concerning GM crops includes analyses based on the international principles of food safety. In order to evaluate the safety of GM crops-containing food, there were developed a series of test methods: (1) characterization of primal original plant, determining: the identity, phenotype, agronomic performance, geographical distribution, history of use and compositional analysis of nutrients, anti-nutrients, toxins and allergens; (2) characterization of donor organism and delivery process: classification, taxonomy, definition of possible toxicity, allergenicity or pathogenicity, and vector, transgene delivery, inserted DNA sequence and insertion site; (3) Gene product safety test: structure identity, mode of action, specificity, toxicity and allergenicity; (4) direct testing of GM crops-derived food products: identity, phenotypic and agronomic analysis of GM crops, compositional analysis, nutrient analysis and safety analysis of food based on animal studies.[3]

In a study related to the safety assessment of foods derived from GM crops, a team of researchers has established the method of "substantial equivalence"[4]. The concept of this method requires the comparison of the GM crop and an appropriate "safe" comparator according to the agronomical and morphological characteristics and chemical composition. This allows identification of significant differences between the GM crop and the comparator, usually a traditionally bred crop. This approach recognizes that foods are complex matrices, containing tens of thousands individual constituents, and their safety assessment therefore requires a comparative study focusing on those parameters considered as indicatives of the normal functioning of the plant and its metabolism (here including biosynthesis of any compound that might be a danger for the human health). Thus, the assessment helps to determine whether the GM crop is "as safe as" its conventional counterpart.

5. CONSUMER'S ACCEPTANCE DEGREE OF GM CROPS-FOOD PRODUCTS

Due to the fact that democracy is wide spread all over the world, people will only choose to consume food products that they associate with some positive attribute. There are a lot of factors that influence directly the public attitude and risk perception when considering GM crop-food products. Beliefs that there exists a potential for negative environmental impact associated with production processes or agricultural practices and the perception that there is uncertainty with unintended human or animal health effects are included in recent studies on this topic.

---

[3] P. Celec et al. – 2005 - Biological and biomedical aspects of genetically modified food, Biomedicine & Pharmacotherapy 59 (2005) 531–540

[4] Konig A. et al – 2004 – Assessment of the safety of foods derived from genetically modified (GM) crops, Food and Chemical Toxicology 42, 1047-1088.

The range of concerns voiced by consumers is remarkably constant over fields of application. Some of these concerns relate to the technology itself and others seem to be expressions of worry about risk. An example is the fact that GM crops-food products are not "natural" and concerning worries about risk, people seem to believe that the studies conducted recently or not entirely finalized do not assess correctly and completely the wide range of issues and factors that determine whether the GM food products are risk free or not. People also tend to reject any economic arguments and ask for more details when choosing a certain food products containing GMOs. For consumers, labeling is a primary source of information about food products. More than this, consumers expect an elaborated assessment of known or potential risks and a precautionary management of these risks if there is proof that they exist, before granting approval for marketing. Another tendency of the public was to ask for the development of a specific and strict mechanism of traceability, considering that labeling would not be effective enough by its own.

In the case of GM crop-food products, communication efforts have focused on adverse health effects, whereas public concern has been much broader, focusing of risks, benefit and need. The actual situation is characterized by a general distrust in the motives of institutional actors and other stakeholders perceived to be interested in promoting the GMO technology and the derived products.

6. CONCLUSIONS

The subject of GM foods is still a very intensely debated one all over the world, and the main interest is that the safety assessment to be done strictly and correctly in order to maintain the health status of the population who chooses to consume such food products. Even though the apparition of the GM food products has taken place years ago, consumers are still hostile and need a lot of information in order to make an informed choice about these food products, and this fact leads to mistrust and confusion among them. Nevertheless, scientists developed analysis techniques which target the transformed DNA, making the safety assessment easy and trustful for all individuals. Moreover, there has been elaborated a scheme for risk evaluation of GM crops that includes several steps and makes the food products obtained all along the food chain to have a better traceability and to gain trust among the consumers.

REFERENCES

1. *Belcher, K., Nolan, J., Phillips W.B.* – 2005 – Genetically modified crops and agricultural landscapes: spatial patterns of contamination, Ecological Economics, 53, 387-401.
2. *Celec, P. et al* – 2005 – Biological and biomedical aspects of genetically modified food, Biomedicine & Pharmacotherapy 59, 531-540.
3. *Cellini, F., et al.* – 2004 – Unintended effects and their detection in genetically modified crops, Food and Chemical Toxicology, 42, 1089-1125.
4. *Chiter, A., Forbes, M., Blair, E.* – 2000 – DNA stability in plant tissues: implications for the possible transfer of genes from genetically modified food, FEBS Letters 481, 164-168.
5. *Deisingh, K.A., Badrie, Neela* – 2005 – Detection approaches for genetically modified organisms in foods, Food Research International, 38, 639-649.

6. Engel K.-H., Moreano F., Ehlert Alexandra, Busch U. – 2006 – Quantification of DNA from genetically modified organisms in composite and processed foods, Trends in Food Science & Technology, 17, 490-497.

7. Frewer, L. et al. – 2004 – Societal aspects of genetically modified foods, Food and Chemical Toxicology, 46, 1181-1193.

8. König, A. et al – 2004 – Assessment of the safety of foods derived from genetically modified (GM) crops, Food and Chemical Toxicology, 42, 1047-1089.

9. Lemaux, Peggy – 2008 – Genetically Engineered Plants and Foods: A Scientist's Analysis of the Issues (Part I) – Annual Review of Plant Biology, 59, 771-812.

10. Miraglia, M. et al – 2004 – Detection and traceability of genetically modified organisms in the food production chain, Food and Chemical Toxicology, 42, 1157-1180.

11. Pingjian, D. et al. – 2008 – Edible safety requirements and assessment standards for agricultural genetically modified organisms, Food and Chemical Toxicology, 46, 1414-1436.

12. Purchaise I. – 2005 – What determines the acceptability of genetically modified food that can improve human nutrition?, Toxicology and Applied Pharmcology, 207, S19-S27.

13. Saher Marieke, Lindeman Marjaana, Hursti Koivisto Ulla-Kaisa – Attitudes towards genetically modified and organic foods, Appetite, 46, 324-331.

14. Stein, J.A., Cerezo-Rodriguez E. – 2009 – The global pipeline of new GM crops – Implication of asynchronous approval for international trade, JRC Scientific and Technical Reports.

15. Tenbült, Petra et al. – 2008 – Acceptance of genetically modified foods: The relation between technology and evaluation, Appetite, 51, 129-136.

16. Van de Eede, G., et al. – 2004 – The relevance of gene transfer to the safety of food and feed derived from genetically modified (GM) plants, Food and Chemical Toxicology, 42, 1127-1156.

THE ANIMAL SCIENCE ENGINEER ROLE TO INNOVATIVE REALIZATION OF ANIMAL PRODUCTS BIOTECHNOLOGIES AND BIOENGINEERING, NECESSARY OF HUMANITY IN 2020-2050-2100 PERSPECTIVE BASED ON ECOECONOMY AND BIOECONOMY NEW PARADIGMS.

BOGDAN ALEXANDRU[1)], VAN ILIE[2)], MARIN MONICA[2)], TĂPĂLOAGA PAUL[2)], DIACONESCU DENIS[3)], CHELMU SORIN[4)], BURLACU RADU[2)], BOBOC VIORICA[2)], POPA DANA[2)], IŞFAN NICOLETA[2)], AMALIA GIANINA STRĂTEANU[1)]

[1)] Romanian Academy, National Institute for Economical Research (INCE)-Center for Agroforestry Biodiversity Study and Research (CSCBA) - Postdoctoral School for Livestock Biodiversity and Food Biotechnology , Bucharest, Romania; cscbas@yahoo.com; [2)] University of Agricultural Sciences and Veterinary Medicine, Bucharest, Romania; [3)] GNIR Holding S.A., Bucharest, Romania; [4)] Ministry of Agriculture.

Keywords: sustainable development, animal production, farm animal biodiversity, bioeconomics, ecoeconomics, animal science engineer.

SUMMARY

In the future, demand for livestock products will be influence by socio-economic factors, such as human health concerns and changing socio-cultural values. The humanity will be preoccupied for how know what eat and who can satisfy this demand and answer to this question. Today, on a global level livestock management is a multifunctional activity which has a direct role to generating food and income, can be a valuable asset, serving as a store of wealth, collateral for credit and an essential safety net during times of crises; livestock are also central to mixed farming system.

The study from this scientifically paper is based on specific literature presented on the end of paper, and especially of own studies and researches of authors working group made inside the Post-Doctoral School financed by European Union for project with topics: ”**The Post-doctoral School of livestock Biodiversity and Food Biotechnologies based on Ecoeconomy and Bioeconomy for Ecosanogenesis”**. Are presented more new concepts, terms and methodologically schemes about sustainable development of rural farms. GNIR Holding develops these innovative ideas in context of knowledge based on bioeconomy for a most priority strategic national project and integrated through recently objectives of Lisabona 2020 strategy for smart, sustainable and inclusive growth. Beside, it is underline the role of the animal science engineer, very complex and involves a great responsibility. This fact means that the animal science engineer must be able to create and develop bioengineering and biotechnologies which can solve the food problem both aspects: quantitative and qualitative.

DOCUMENTATION SOURCES AND INNOVATIVE CONCEPTS

It is a known fact that population statistics is well established on scientific basis and as such we will present graphics and tables with the dynamic of global population levels (fig.1), on the basis of the highest bibliographical sources authorized by known scientific documentation (for example the United Nations Organization -Department for Population, Food and Agriculture Organization of the United Nations - FAO, etc.).

World population rises from 6.1 billion persons in 2000 to a maximum of 9.2 billion persons in 2075 and after that will decrease to 9 billion persons in 2100.

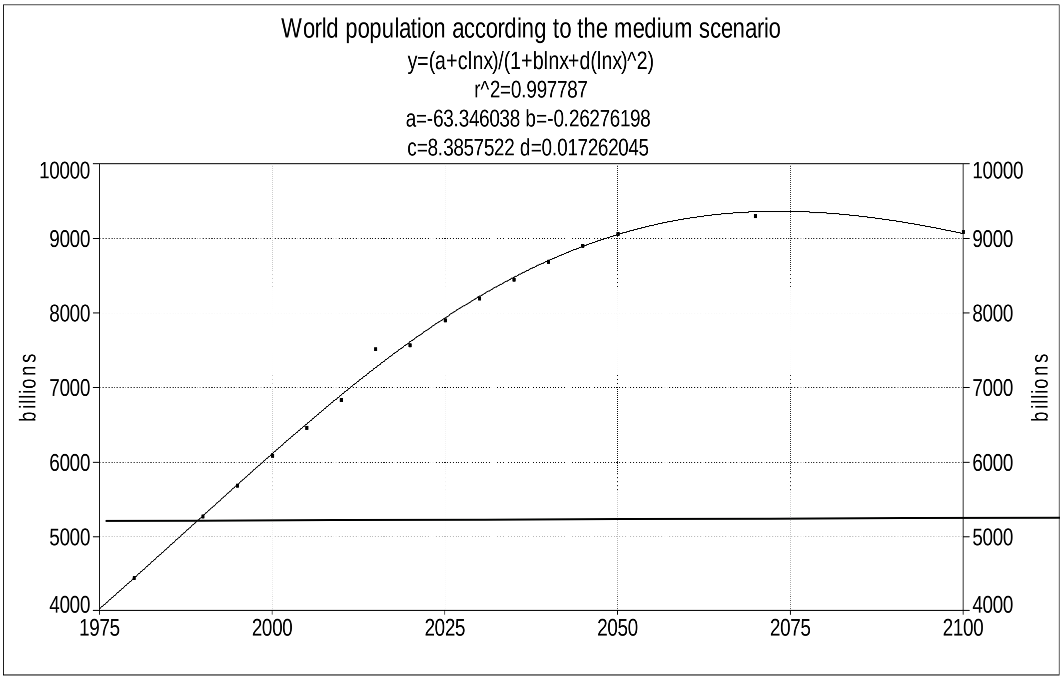


Fig.1 Population development 2100
(Correlation calculates by our working group from CSCBA, using United Nation report, 2007. World Population Prospects)

In the same sense, world livestock production has been analyzed in parallel with the official statistical data regarding the consumption of agro food products and nutrients respectively, as forecast up to 2050–2100 and correlated with population growth, production and consumption demands for animal food products, level of poverty and risks on other vulnerabilities: economic, social, environmental, reduction of natural resources, all correlated with farm production (table 1).

From dates presented in table 1, we can observe that the consumption increase from 2411 total food/kg/person/year (1971) to 3130 total food/kg/person/year (2050), at the world level, in the same time with other farm products. For example, in developing countries the meat consumption (expressed in carcass weight increase from 10.7 kg/person/year to 44 kg/person/year, in 2050; and in industrial countries, from 69.7 kg/person/year to 103 kg/person/year, in 2050; the milk and dairy product increase in developing countries almost 3 times, in 2050 in comparison with ’70 years (28.6 kg/person/year in ’70 years to 78 kg/person/year, in 2050).

Table 1

Change in the commodity composition of food by major country groups
(Synthesis by our working group made from Development Economics Office, P. Thornton, M. Herrero, 2010)

Consumption/kg/person/year	**1969/71**	**1979/81**	**1989/91**	**1999/01**	**2030**	**2050**
WORLD						
Milk and dairy, excl. butter (fresh milk, eq.)	75.3	76.5	76.9	78.3	92	100
Other food (kcal/person/day)	216	224	241	289	325	340
Total food (kcal/person/day)	**2411**	**2549**	**2704**	**2789**	**3040**	**3130**
DEVELOPING COUNTRIES						
Meat (carcass weight)	10.7	13.7	18.2	26.7	38	44
Milk and dairy, excl. butter (fresh milk, eq.)	28.6	34.0	38.1	45.2	67	78
Other food (kcal/person/day)	123	140	171	242	285	300
Total food (kcal/person/day)	**2111**	**2308**	**2520**	**2954**	**2960**	**3070**
INDUSTRIAL COUNTRIES						
Meat (carcass weight)	69.7	78.5	84.3	90.2	99	103
Milk and dairy, excl. butter (fresh milk, eq.)	189.1	201.0	211.2	214.0	223	227
Other food (kcal/person/day)	486	500	521	525	565	580
Total food (kcal/person/day)	**3046**	**3133**	**3292**	**3446**	**3520**	**3540**

Table. 2

Past and projected trends in consumption of meat and milk in developing and developed countries (World Agriculture towards 2030-2050, Interim report, 2006)

ANNUAL PER CAPITA CONSUMPTION				**TOTAL CONSUMPTION**	
		Meat (kg)	**Milk (kg)**	**Meat (Mt)**	**Milk (Mt)**
Developing	**1980**	14	34	47	114
	1990	18	38	73	152
	2002	28	44	137	222
	2015	32	55	184	323
	2030	38	67	252	452
	2050	44	78	326	585
Developed	**1980**	73	195	86	228
	1990	80	200	100	251
	2002	78	202	102	265
	2015	83	203	112	273
	2030	89	209	121	284
	2050	94	216	126	295

The growth in per capita food consumption was accompanied by significant change in the commodity composition, at least in the countries that experienced such growth. Much of the structural change in the diets of the developing countries concerned the rapid increases of livestock products (meat, milk, eggs).

The major structural changes that characterized the historical evolution of the world livestock economy, particularly in the 1990s, are likely to continue, though in somewhat attenuated form. These changes are the growing role of the poultry sector in total meat production, and the growing share of trade in world output and consumption.

In the table 3, our working group from CSCBA, synthesized, on scientifically papers (Rosegrant, 2009) number of bovines, sheep and goats, pigs and poultry; it's easy to observe that at the global level, the numbers of those farm animal will increase from 1498 billion heads to 2636 billion heads for bovine, for poultry the number will doubling, for sheep and goats the number increase 1.56 times and for pigs 1.07 times, respectively.

Table 3

Bovines, sheep and goats, pigs and poultry numbers for the reference run, by region (billion heads) (Rosegrant et al, 2009)

Bovines	**2000**	**2010**	**2020**	**2030**	**2040**	**2050**
CWANA	0.124	0.162	0.192	0.218	0.237	0.248
ESAP	0.578	0.745	0.911	1.055	1.165	1.209
LAC	0.349	0.430	0.507	0.566	0.610	0.627
NAE	0.268	0.288	0.306	0.311	0.304	0.282
SSA	0.179	0.219	0.253	0.273	0.278	0.270
GLOBE	**1.498**	**1.844**	**2.170**	**2.423**	**2.593**	**2.636**
Sheep*	**2000**	**2010**	**2020**	**2030**	**2040**	**2050**
CWANA	0.403	0.491	0.556	0.597	0.614	0.601
ESAP	0.723	0.871	1.008	1.115	1.184	1.210
LAC	0.116	0.136	0.154	0.168	0.175	0.174
NAE	0.195	0.218	0.235	0.244	0.244	0.231
SSA	0.271	0.346	0.406	0.443	0.459	0.457
GLOBE	**1.707**	**2.061**	**2.359**	**2.566**	**2.677**	**2.673**
Pigs	**2000**	**2010**	**2020**	**2030**	**2040**	**2050**
CWANA	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
ESAP	0.539	0.622	0.669	0.664	0.627	0.558
LAC	0.080	0.096	0.110	0.119	0.123	0.122
NAE	0.274	0.295	0.307	0.304	0.290	0.262
SSA	0.019	0.024	0.029	0.032	0.034	0.034
GLOBE	**0.912**	**1.038**	**1.115**	**1.121**	**1.076**	**0.978**
Poultry	**2000**	**2010**	**2020**	**2030**	**2040**	**2050**
CWANA	1.449	1.677	1.901	2.108	2.306	2.424
ESAP	7.478	10.112	12.979	15.712	18.168	19.687

LAC	2.286	2.893	3.531	4.151	4.762	5.245
NAE	4.180	4.677	5.180	5.542	5.780	5.750
SSA	0.784	0.991	1.170	1.306	1.407	1.445
GLOBE	**16.178**	**20.350**	**24.760**	**28.819**	**32.423**	**34.551**

CWANA – Central and West Asia and North Africa; ESAP – East and South Asia and the Pacific; LAC – Latin America and the Caribbean; NAE – North America and Europe; SSA – Sub-Saharan Africa; *Sheep and goats

In the table 4 the workgroup of Studies and Research Center for Agricultural and Forest Biodiversity show how the meat population consumption in present and projections for 2030 and 2050 years. Pork and Poultry industries could prosper with financial assistance and good advisory services, but cattle breeding and sheep breeding require changing the mindset of many people. The first able to penetrate the EU market are the buffalo and sheep products.

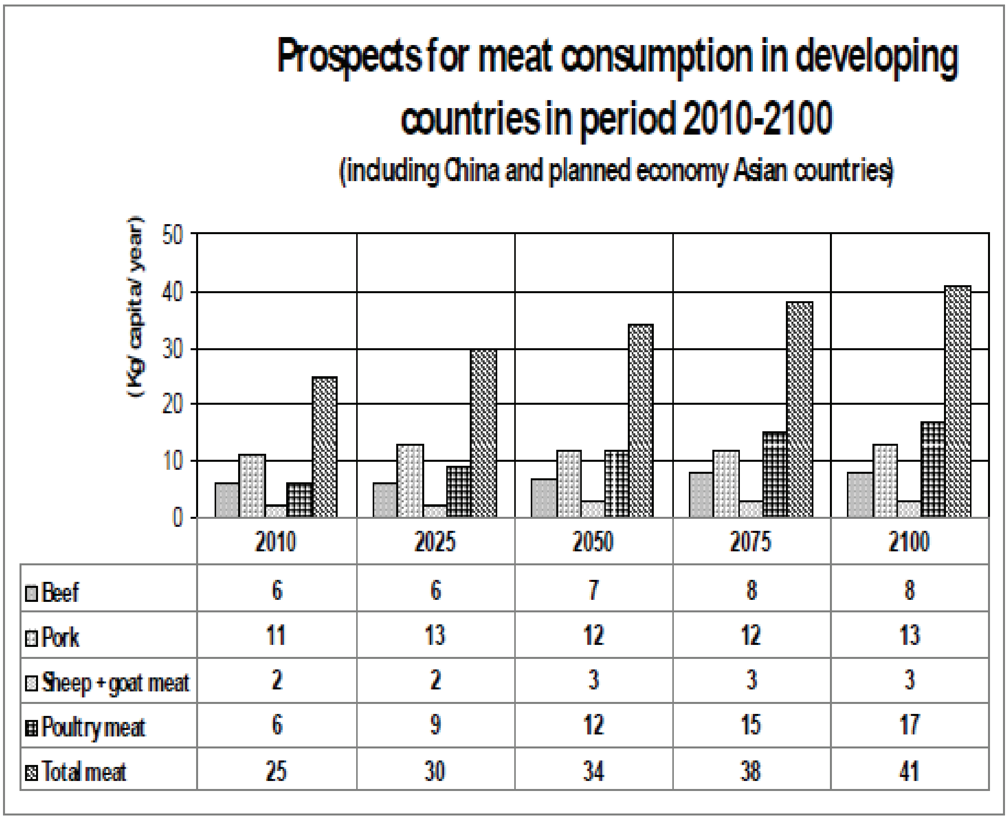


Fig. 2. Prospects for meat consumption (kg/capita/year) in developing countries in period 2010-2100
(correlation calculate by our working group, using data base on *The State of Food Insecurity in the World, 2004*)

Prospect for meat consumption (kg/capita/year) in developing countries in period 2010-2100 (fig. 2) was presented this year at international symposium “PROSPECTS FOR THE 3RD MILLENIUM AGRICULTURE” (USAMV Cluj-Napoca, Aula Magna) by A.T. Bogdan, where underline how will increase the total meat consumption from 2010 to 2100, with species differences. The highest consumption will be register for poultry meat (from 6 kg/capita/year in 2010 to 17 kg/capita/year, in 2100).

Table 4

Meat consumption – present and future

(Thomas E. Elam, Projections of Global Meat Production through 2050)

Year	Population	Total meat (t)	Per capita meat (kg)
2010	6.842.923	296.199	43,3
2030	8.199.104	447.475	54,6
2050	9.075.903	624.530	68,8
TOTAL INCREASE (%)			
2005-2050	**40,4%**	**135,5%**	**67,7%**

In the table 4 is presented the situation of the meat consumption, in present and for future. When world population will increase with 40.4% in 2050, the meat consumption will increase with 135.5% and meat consumption per capita with 67.7%.

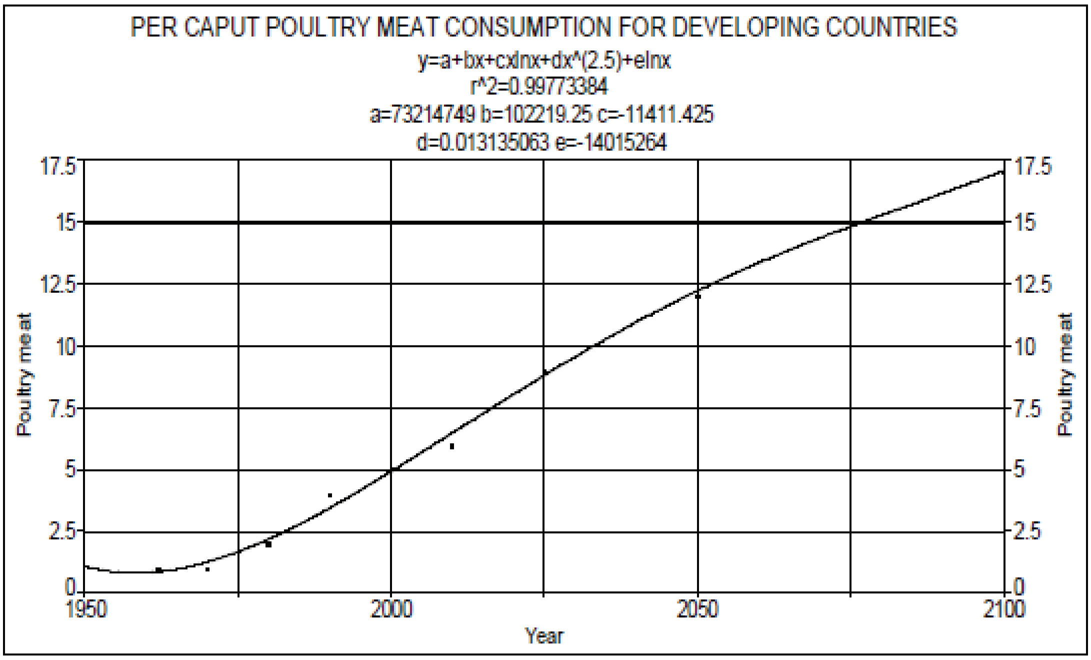


Fig. 3. Regression curve to describe the dynamic of poultry meat consumption for developing countries (correlation calculate by our working group, using data base on *The State of Food Insecurity in the World, 2004*).

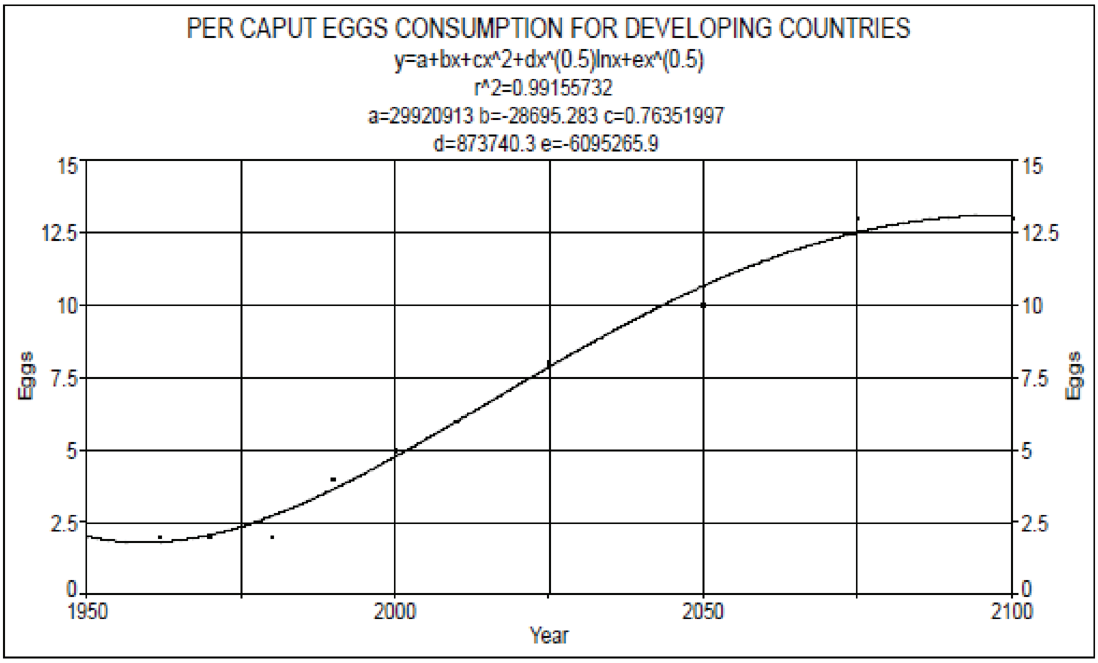


Fig. 4. Regression curve to describe the dynamic of eggs consumption for developing countries (correlation calculate by our working group, using data base on *The State of Food Insecurity in the World, 2004*)

Those regression were presented this year at international symposium “PROSPECTS FOR THE 3RD MILLENIUM AGRICULTURE” (USAMV Cluj-Napoca, Aula Magna) by A.T. Bogdan, in the scientifically paper “PROSPECTS FOR DEVELOPMENT LIVESTOCK PRODUCTION BETWEEN 2010-2100 BASED ON INTEGRATED RURAL BIOECONOMICS AND ECOECONOMICS” where shown how increase the consumption for poultry meat and eggs from 2010 to 2100. For this husbandry sector, will be a permanently demand (fig.3, fig.4.)

Based on those two clear conditions (world population dynamics and increasing of the population consumption per capita), our working group imagines a diagram (fig. 5) which illustrate very well the linkage between population increase rate, demand of farm animal product demand, the role of education in forming the high specialized human resources which can respond of this demand with quantitative and qualitative food, according to European Strategy (2020).

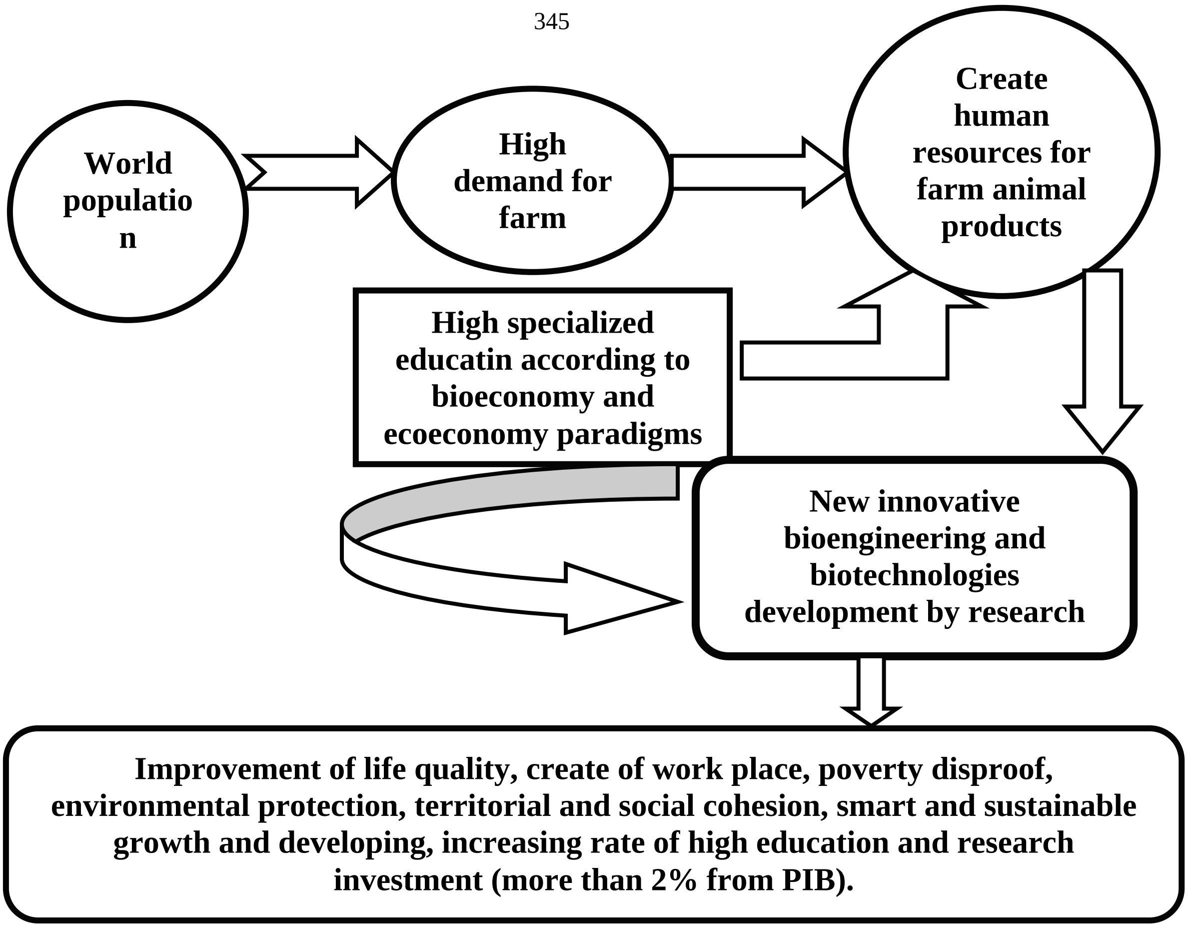


Fig.5. The impact of the world population dynamic of animal science human resources (orig).

About Romania, we can observe (table 5) that the total population number will decrease from 22480 million inhabitants in 2005 to 14769 millions in 2100, in the same time with fertility and medium population density. On the other part, the male and female expectancy at birth will increase to 81.7 years for male and 86.6 years for women.

According to the data registered in the Romanian statistical yearbook for 2002, when the latest animal count was taken in Romania, the animal production development in EU member countries, estimated by the number of cattle and pigs and by the milk production per inhabitant, stood as presented in table 6. Data in the table show remarkable differences in the animal production levels of the EU countries. The quantitative target for the domestic market is to attain a mean production level per inhabitant as reached by the 27 EU member countries. Romania has the necessary human and material resources to hit this target.

Table 5

Aspects of dynamic of Romanian population and projection for a medium scenario 2050-2100 (Synthesis by our working group from CSBAS from European Commission Communication, Europe 2020, Bruxelles, 2010)

Year / **Specification**	***1950-1955***	***2000-2005***	***2050-2055***	***2100-2105***
Total population, medium scenario (millions)	16311	22480	18063	**14769**
Total fertility (children/woman)	2.87	1.320	1.900	**2.066**
Male life expectancy at birth (years)	59.4	67.0	75.2	**81.7**
Female life expectancy at birth (years)	62.8	74.2	80.8	**86.6**
Population density, medium scenario	71	98	78	**64**
Median age of population, medium scenario	26.1	34.7	47.4	**42.2**

Table 6

Sinthesis of economical development regional dynamic of some indicators used for evaluation of sustainable zootechnicall process in Romanian agriculture* (orig.)

No.	**Economic development region**	**Agricol surface[ha.]**	**Pasture [ha.]**	**Zootechnicall process**		
				LU** [no.]	**Bovine** [no.]	**Sheep** [no.]
l.	North-East	2 122 157	695 325	1 751 031	754 494	1 853 865
2.	North-West	20 577 703	998 398	1 333 566	571 836	1 260 572
3.	West	1 921 304	800 336	804 399	480 339	2 303 819
4.	South-West	1 874 721	466 841	1 298 211	562 084	1 254 005
5.	South	2 422 484	315 750	1 607 264	683 458	1 638 551
6.	Bucharest***	113 055	2 439	65 596	40 409	46 273
7.	South-East	2 244 578	387 625	1 208 091	586 478	2 528 100
8.	Centre	1 838 316	1 095 152	949 802	537 073	2 133 269
	TOTAL	**14 594 318**	**4 761 876**	**9 017 960**	**4 216 171**	**13 018 454**

* A.T.Bogdan et all, Chapter "Husbandry progress and rural development in Romania", in the book "Rural world, today and tomorrow", 2006; **LU= Livestock unit; ***Bucharest and neighborhoods.

For example, we have the largest agricultural and pasture surface in North-East (2.122.157 ha, agricultural land and 695.325 ha pasture land) with a major potential for exploited farm animal and maintaining working active population long time. At the economic development region level, we have possibilities to extend the innovative research in bioengineering and biotechnologies for growing and exploiting farm animals, according to environmental protection, welfare and resources capacity.

We consider that thru sustainable development of zootechnicall Romanian agriculture (table 6) can indisputable obtain positive social and economic effect for development of the rural space and for those complexes activities which demand continuous efforts, the specialists in animal science are a "sine-qua-non" condition for developing research-developing-innovating activities to sustain the bioconversion of vegetable material in animal products and food industry.

We must underline that application of numerous and different technical progresses resulted from animal sciences development, as well as practically realization of the sustainable zootechnicall process in Romanian agriculture, demand to forming very good farmers who permit the private initiative and who will be the real engine for revival the Romanian economy.

Table 7

Exemple for zootechnicall process in agriculture, for different Europen countries*
(orig.)

U.E COUNTRIES	POPULATION ('000 persons)	BOVINE		PIG	
		Total ('000 heads)	Nr. heads/ inhabitant	Total ('000 heads)	Nr heads/ inhabitant
U.K	59,50	11 133	0,18	6 482	0,10
Austria	8,11	2 153	0,26	3 519	0,43
Belgium	10,25	3 288	0,32	7 406	0,72
Denemark	5,34	1 850	0,34	11 551	2,16
France	58,89	20 527	0,34	14 635	0,24
Germany	82,18	14 658	0,17	27 049	0,32
Holland	15,91	4 097	0,25	13 139	0,82
Spain	39,47	6 203	0,15	23 682	0,60
Ireland	3,79	6 708	1,76	–**	–
Czech Republic	10,27	1 574	0,15	3 688	0,35
Poland	38,65	6 083	0,15	17 122	0,44
Hungary	10,02	–**	–	5 335	0,53
Bulgaria	7,95	–**	–	1 512	0,19
Romania	**22,44**	**3 051**	**0,13**	**5 848**	**0,26**

* A.T.Bogdan et all, Chapter "Husbandry progress and rural development in Romania", in the book "Rural world, today and tomorrow", 2006.

In comparison with other Union European countries, Romania is on last place at bovine heads/inhabitant and on the last four place at pig heads/inhabitant, although the population counted 22.44 million inhabitants (table 7).

A sustainable economy respects the sustainable yield of the ecosystems (fig. 4) on which it depends: fisheries, forests, rangelands and croplands. As long as the harvest does not exceed the sustainable yield, it can be sustained in perpetuity. In a world where the demands of the economy are pressing against the limits of natural systems, relying on distorted market signals to guide investment decisions is a recipe for disaster. Setting out from these facts of bioeconomy, Lester Brown, founder of the Washington-based World Watch Institute, currently director of the Earth Policy Institute, developed a new concept, Eco-Economy – Building an Economy for the Earth. This new fundamental concept considers that modern economy must be based on the fundamental rules of natural and artificial (anthropized) eco-systems. That is why, in several successive books, Lester Brown triggers strong alarms for rescuing a planet under stress and a civilization in trouble.

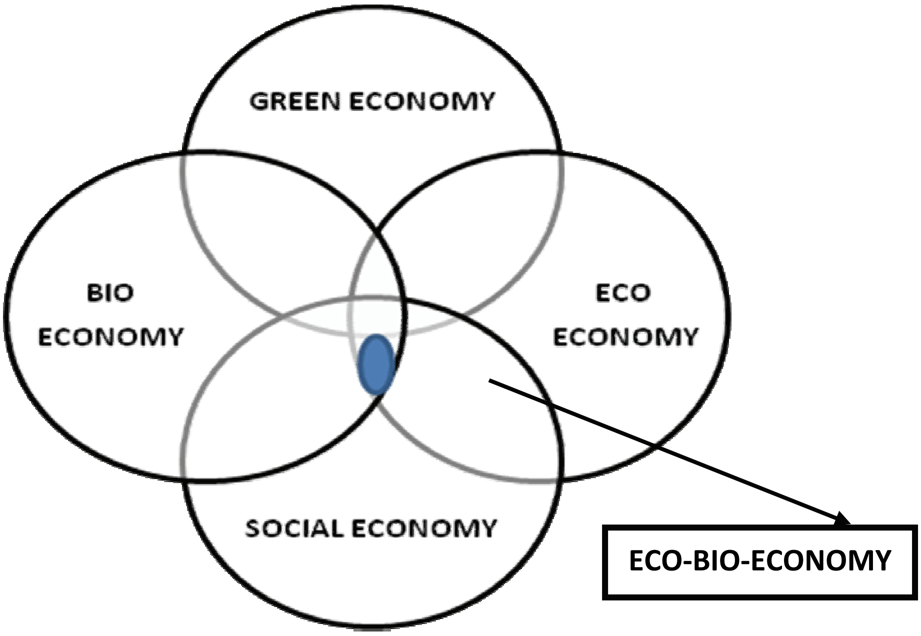


Fig. 6. Complex interrelations between the terms: green economy, ecoeconomy, bioeconomy and social economy, to define the new paradigm "**ecobioeconomy**" by A.T. Bogdan and our working group (2009–2010), with social significations (orig.)

In this context, *Nicolas Georgescu-Roegen's* world-wide-known bioeconomics paradigm (fig. 6) of improving the agricultural efficiency becomes most topical, particularly as mankind's limited natural resources are being depleted. In Romania, *Drăgănescu Condrea,* introduced the term of "**applied ecology**" for animal science, where underline why farm animals exploitation must be applied according to environment sustainability.

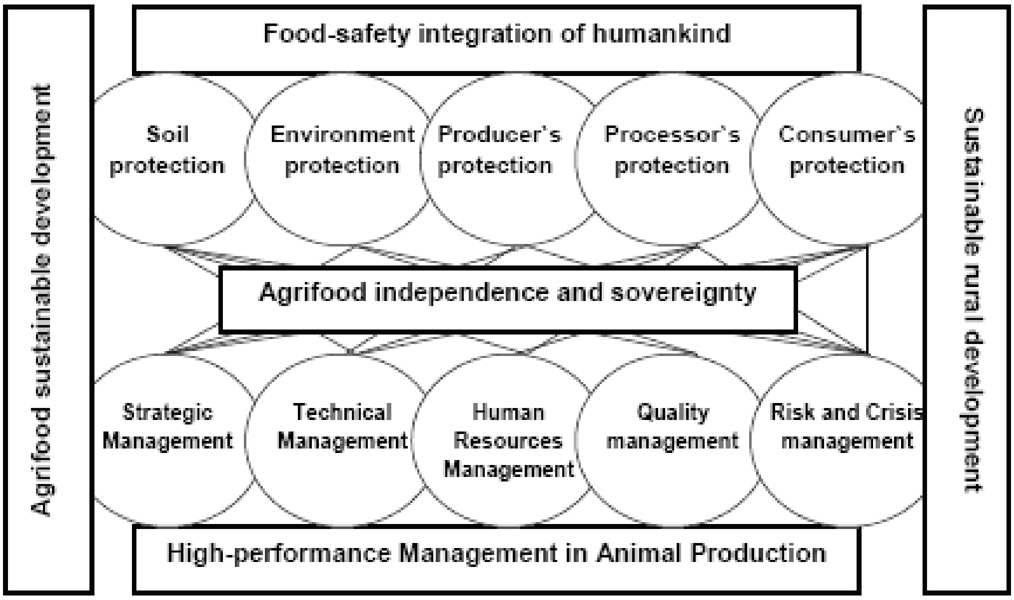


Fig. 7. The complex nature of the principles, targets and consequences for the concepts of agrifood independence and sovereignty (orig.)

It is obvious that a sustainable economy of the future has to become a bio-economy, adapted to the rural area and based on a large biodiversity that will create first of all an opportunity for more producers of primary organic synthesis and further on for a longer line of consumers up to the final state of dead organic matter that must be mineralized.

Sustainable rural bioeconomicy and ecoeconomicy are translated in high performance in animal production (fig. 7) which is demand by food/safety integration of humankind. Under the circumstances, the new fundamental concept **ecobioeconomy** consider that *the modern sustainable economy must be based on the fundamental rules of natural and artificial (anthropized or anthropic) ecosystem, in order to save the biodiversity, endangered planet and its civilization.*

For all those reasons, the role of the animal science engineer is very complex and involves a great responsibility because he must respond to animal products population and market demands. This fact means that the animal science engineer must be able to create and develop bioengineering and biotechnologies which can solve the food problem both aspects: quantitative and qualitative. The dynamic of food‘s world population projection to 2020-2050-2100 years and consumption dynamic of animal products (meat, milk, eggs) must respect international standards of food safety and security; the known European principles “from the farm to the fork” and “from the farm to the plate” which have restricted rules established by European Food Safety Authority.

Field competences of animal science engineering are following: **reproduction; genetics; animal breeding; nutrition; growth technologies; feed production and conservation; process of farm animal products; management of a farm animal**

exploitation; technopathology; bioengineering technology; biotechnology; scientifically research; public administration; professional organization; private firms; animal science consulting, and others which are require in the future.

Many developed countries will see a continuing trend in which livestock breeding focuses on other attributes in addition to production and productivity, such as product quality, increasing animal welfare, disease resistance and reducing environmental impact, and the animal science engineer will become one of the most requires specialist on the work market in Romania and world, also.

CONCLUSIONS

1. Most of the expected population increase between 2000 and 2100 occurs in the less developed regions, whose population rises from 4.9 billion in 2000 to 9 billion in 2100.

2. The growth in per capita food consumption was accompanied by significant change in the commodity composition, at least in the countries that experienced such growth. Much of the structural change in the diets of the developing countries concerned the rapid increases of livestock products (meat, milk, eggs), as sources of food calories.

3. Pork and Poultry industries could prosper with financial assistance and good advisory services, but cattle breeding and sheep breeding require changing the mindset of many people. The first able to penetrate the EU market are the buffalo and sheep products. The contribution of the increase in the number of animals will remain an important source of growth, but less so than in the past. In the meat sector, higher carcass weights will play a more important role in beef production and higher off take rates (shorter production cycles) in pig and poultry meat production.

4. About Romania, we can observe (table 5) that the total population number will decrease from 22480 million inhabitants in 2005 to 14769 millions in 2100, in the same time with fertility and medium population density. On the other part, the male and female expectancy at birth will increase to 81.7 years for male and 86.6 years for women.

5. Romania has the largest agricultural and pasture surface in North-East (2.122.157 ha, agricultural land and 695.325 ha pasture land) with a major potential for exploited farm animal and maintaining working active population long time. At the economic development region level, we have possibilities to extend the innovative research in bioengineering and biotechnologies for growing and exploiting farm animals, according to environmental protection, welfare and resources capacity.

6. In comparison with other Union European countries, Romania is on last place at bovine heads/inhabitant and on the last four place at pig heads/inhabitant, although the population counted 22.44 million inhabitants

8. The role of the animal science engineer is very complex and involves a great responsibility because he must respond to animal products population and market demands. This fact means that the animal science engineer must be able to create and develop bioengineering methods and biotechnologies which can solve the food problem both aspects: quantitative and qualitative.

9. The animal science engineer profession covering the following fields of competence: scientifically research, public administration, professional organizations or

private firms and it is been coming in the fore in: reproduction, genetics, breeding, nutrition of farm animal, management of husbandry exploitations, growth technologies, feed production and conservation, process of farm animal products, management of a farm animal exploitation, technopathology, bioengineering technology, biotechnology, animal science advising.

10. In the future, many developed countries will see a continuing trend in which livestock breeding focuses on other attributes in addition to production and productivity, such as product quality, increasing animal welfare, disease resistance and reducing environmental impact, and the animal science engineer will become one of the most requires specialist on the work market.

REFERENCES

1. *Agricultural Organization of the United Nation* (2006), World agriculture towards 2030-2050, Interim report – Global perspective studies Unit Food and, Rome.
2. *Bogdan, A.T. et all,*(2009), More animal production in agrifood green power development, a new paradigm of concepts regarding sustainable rural bioeconomics and eco-economics, *Bulletin UASVM, nr. 66 (1-2)/2009, Veterinary Medicine, Bucharest.*
3. *Bogdan, A.T. et all,*(2010) Prospects for Development of Livestock Production between 2010–2100 based on Integrated Rural Bioeconomics and Ecoeconomics, Bulletin UASVM Animal Science and Biotechnologies, 67(1-2)/2010, Cluj-Napoca.
4. *Bogdan, A.T. et all,* (2010) Prospects of Agrifood Green Power in 2050 and Forecasting for 2100 with Sustainable Solutions Based on Ecobioeconomics new Paradigm, Bulletin UASVM Animal Science and Biotechnologies, 67(1-2)/2010, Cluj-Napoca.
5. *Bogdan, A.T.,. B., Pasarin, S., Chelmu, Amalia, Străteanu, I., Surdu, M.Th, Paraschivescu* (2009). "Positioning livestock sciences based on the original concept development as a priority of Romania's European food green power" (Romanian)–Presentation National Scientific Symposium "Modern animal Science-Science, creativity and innovation", U.S.A.M.V. Iasi, Romanian Academy Publishing House, Bucharest.
6. *Bouwman A.F*, (1997), Long - term scenarios of livestock – crop – land use land interactions in developing countries, FAO, Land and Water Bulletin 6, Roma.
7. *Communication of the Europe 2020 Commission,* A European strategy for an intelligent, ecological growth and favorite to inclusion, Bruxelles, 2010.
8. *Drăgănescu, C.* (1984) – Exploatarea animalelor – Ecologie aplicată, Ed. Ceres, Bucureşti.
9. *European Commission* (2005b), Prospects for Agricultural Markets and Income 2005 – 2012: Update for the EU-25, Bruxelles (December).
10. *Monica Marin, Laura Urdes, Elena Pogurschi, Dumitru Dragotoiu (2010),* Research concerning the influence of the reducing level of the compound feed on the performances of the pigs for fattening, Scientific papers, Animal sciences and Biotechnologies, 43 (1), Timişoara.
11. *Rosegrant, M.W., J. Huang, A. Sinha, H. Ahammad, C. Ringler, T. Zhu, T.B. Sulser, S. Msangi, and M. Batka* (2008). Exploring Alternative Futures for Agricultural Knowledge, Science, and Technology *(AKST)*. ACIAR Project Report ADP/2004/045, International Food Policy Research Institute, Washington, D.C.
12. *Tăpăloagă P., Tăpăloagă Dana, Mitrănescu Elena, Chesa, E., (2010),* Comparative researches concerning two reproductive systems in swine breeding, Bulletin UASVM Animal Science and Biotechnologies, 65/2010, Cluj-Napoca.
13. *Thornton, P., Herrero, M.,* The inter-linkage between rapid growth in livestock production, climate change and the impact on water resources, land use and deforestation, The World Bank, Development Economics Office, 2010.
14. *United Nations, Department of Economic and Social Affairs*, (2007), World Population Prospects: the 2006 revision. Population Division, New York.

BREAD-BAKING UNITS – WAYS OF RISING ECONOMIC EFFICIENCY

TINDECHE CRISTIANA, POPESCU LILIANA, SIMA ELISABETA

Key words: management activity, bread-baking units, economical financial indices, ways for improving economic efficiency

SUMMARY

There are some ways to improve the activity of the company as follows developing a marketing department, identifying the constant clients which respect the deadlines for the payment allocating a considerable budget for the commercial activities and for the publicity employing young staff; training the staff for applying for an upper level; introducing a motivating programme.

This study has been developed at the level of representative company from S.C. LUJERUL S. A.

1. MATERIAL AND METHOD

In order to make this study, some accounting data from the Accounting Department of the company for the period 2005-2009 were used.

The economic and financial indicators were calculated for the analysed period using the existing methodology for economic and financial analysis. The decision factors can decide on the appropriate measures to improve the management activity and the profitableness of the company, taking into consideration the values of these indicators.

2. RESULTS AND DISCUSSIONS

Table 1

The evolution of profit and turnover during 2005-2009

- lei-

Specification	Years				
	2005	2006	2007	2008	2009
Turnover	1831530	5000000	14000000	13788502	16077344
Profit	104555	300000	900000	536304	212847
Percentage the turnover in the profit	5,5	6,00%	6,40%	3,90%	1,32%

Analysing the data from the table, we notice a decreasing evolution of these indicators beginning with 2008, situation which needs radical measures to make the company more profitable.

Table 2

Financial profitableness rate in the period 2008-2009

Indicators	Year 2008	Year 2009
Income	18429858	21800300
Total assets	5531121	5539302
Proper capital	3588119	3769002
Net profit	536304	212847
Financial efficiency	14,94%	5,64%
Assets rotation speed	3,29%	3,93%
Financial lever	1,54	1,46
Net profitableness of income	0,029	0,009

A significant decrease with 9,3% of the financial profitableness rate was registered in comparison with the previous period.

Table 3

The situation and dynamics of the income, expenses and profit in the 2008-2009 period

Indicators	Year		2009/2008
	2008	2009	%
Turnover	13788502	16077344	116,59
Brought to day turnover	1516735	1125414	74,19
Other sources of income	10868	23795	218,94
Overall exploitation income	18358256	21654914	117,95
Overall exploitation expenses	17202488	21186598	123,16
Gross margin from exploitation	1155768	468316	40,51
Exploitation expenses -human resources -others	17202488 3416367 15095	21186598 3491381 11715	123,16 102,19 77,60
Financial expenses	34673	169252	488,13
Exceptional expenses	224482	87228	38,85
Exploitation result	1155768	468316	40,51
Financial result	7705	-	-
Exceptional result	-	27133	-
Overall income	18429858	21800300	118,28
Overall expenses	17461643	21443078	122,80
Profit before taxation	968215	357222	36,89
Profit tax	431911	144375	33,42
Net profit	536304	212847	39,68
Brought to day net profit	5899344	1489929	25,25

In conclusion, in the last years, S.C. LUJERUL S.A. made profit, but both the turnover and the profit obtained in 2009 are situated under the values from the preceding year.

Table 4

Financial profitableness rate in the period 2008-2009

Indicators	Year 2008	Year 2009
Income	18429858	21800300
Total assets	5531121	5539302
Proper capital	3588119	3769002
Net profit	536304	212847
Financial efficiency	14,94%	5,64%
Assets rotation speed	3,29%	3,93%
Financial lever	1,54	1,46
Net profitableness of income	0,029	0,009

Table 5

Indicators used for debts –obligations diagnosis

Indicators	2008		2009	
	Thousand lei	%	Thousand lei	%
Turnover	1378502	100	16077344	116.6
Debts	563101	100	377970	67.12
Obligations	2744704	100	2420882	88.20
Debts/obligation relation	0.20		0.15	

In conclusion, in the analysed period, the debts and obligations decreased, while the turnover increased, which favourably influenced the flow of reserves. This influence is also showed in the debts /obligations relation.

Table 6

The situation of the liquidity and solvency indicators

Indicators	2008	2009
General liquidity	0,56	0,63
Immediate liquidity	0,36	0,29
General solvency rate	2,84	3,12

The size and the evolution of the indicators show that, the company while regarding the solvency is in a better situation, the values of the liquidity indicators show an alarming situation**.**

Taking into consideration the values of the economic and financial indicators determined through the known methodology and information picked up on an interview basis at the level of the company a few recommendations can be made regarding the aspect of improving the activity of the company in order to increase its profitableness.

Recommendations for improvement

Among the proposals which could immediately be solved are:

-creating a new marketing department;

-finding new clients who will increase the production orders towards a maximum capacity;

- modernisation and development of the distribution and selling system;

-developing the base for materials, additional materials and auxiliary materials coming from importation

-implementing new and efficient motivating methods

-promotion on a competence basis;

- increasing the budget for advertising the products and for publicity;

Research and development

-organizing activities with a main concern on:

-creating new products and technologies;

-implementing new technologies and using substituted and value added products;

3. CONCLUSIONS

1. Employing new qualified staff in the company's departments represents a necessity within S.C. LUJERUL S.A.

2. What is really in order to promote a modern management, is implementing new, efficient motivating methods

3. Modernizing and completing the management instrument, anew quality at the decision level needs a radical transformation and reconsideration of the range of the management methods is needed as well as real methods of utilization at the level of all organization phasing within the companies

4. Increasing the budget for the advertising the products and for publicity represents a solution for earning new clients and regain the market

5. Developing the base for raw materials, additional materials and auxiliary materials coming from importation is a very important issue in a strategic supplying with material resources

REFERENCES

1. ***Allaire, Y and Farsitoru, Mihaela*** – 2008, Strategic management-the strategies of success. Economica Publishing House, Bucharest
2. ***Botezat Elena***- 2005, *Management strategies in agrofood companies.* Economica Publishing House, Bucharest.
3. ***Margulescu D., Staneascu C, David*** *I.*- 2009, Economic and financial analysis. OscarPrint Publishing House, Bucharest.

The 39th International Session of Scientific Communications of the Faculty of Animal Science, Bucharest, Romania
Scientific papers (seria D; vol. LIII) – Animal Science

INFLUENCE OF RAW AND AUXILIARY MATERIALS USED TO PRODUCE „SALAM ARDELENESC" AND PHYSIC-CHEMICAL AND ORGANOLEPTICAL CHANGES THAT MAY OCCUR DURING STORAGE

BERBENTEA FLAVIUS, DAVID IOAN, GEORGESCU LUCIAN, RĂDOI BOGDAN, BORDEA ADRIAN, TRAŞCĂ TEODOR

Key words: meat products, preservation, storage, physic-chemical changes, organoleptic changes

SUMARRY

In this paper, the authors have set out to determinate the influence of raw and auxiliary materials on the final product taken in analysis and the main physic-chemical and organoleptical changes occurring in the product because of its storage.

The traditional methods to improve meat preservation applied empirically were based on salting, drying and smoking. Other methods involved the use of microorganisms, which, besides increasing the duration of storage, affect the texture and flavor of the finished product, making it distinct from the sensory characteristics of raw material.

1. MATERIAL AND METHOD

For analysis were used lactic acid bacteria starter culture in the production process of „Salam Ardelenesc", from raw material pork thing (two samples: sausage A – CPL 80:20 and sausage B – CPL 70:30). We used the percentage of starter culture, 5%.

1.1. CHANGES IN FAT CONTENT

In the fermented products studied, the degradation of lipids involves: a lipolysis due to their raw and auxiliary enzymes; a lipase activity of lipolysis due to spontaneous microflora of the sausages or due microflora added as starter cultures of lactic bacteria (Pediococcus pentosaceus and Microccocs varians). Consequences of lipid degradation on the product quality are: increasing product acidity through the fatty acids released and formation of flavor compounds that contribute to the overall quality of the flavorings of the fermented products.

1.2. CHANGES IN NaCl CONTENT

Sodium chloride, dissolved in water of meat, extract the sarcoplasmatic proteins remaining after this removal (where this operation exists) and a certain quantity of microfibrilar protein that come in contact with meat and fat (bacon) particles through the division operation. With pasta acidification, extracted proteins are denatured and transiting from state of solution into a gel that binds the individual particles of whole meat and fat (bacon). NaCl contributes to the swelling of meat particles that link better between them. NaCl concentration is differentiated in layers, especially in products in final drying-maturation stage.

At the end of drying-maturation, NaCl tends to migrate from areas with high concentration in areas with lower concentrations.

1.3. HUMIDITY VARIATION

Water is an important component of food systems influencing product characteristics, chemical changes in food (denaturing proteins, enzymatic activity), being simultaneously a determining factor in rheological behavior. During storage, water is involved in chemical change, physical, nutritional and microbial.

Elimination of water during the drying process gradlue ually leads to the strengthening of the sausage that becomes compact.

Eliminating humidity should be at optimal speed and constant. If water is removed at a rate to high, undesirable phenomena can happen, namely: to restore the initial pH value due to proteolytic activity of the microflora, the result being soaking product, although already denatured proteins can not be rehydrated. This occurs during the warm season, when raw sausages are prematurely removed from th drying-maturation operation. A similar situation is happening and if the oven product is cooled quickly, in which case the lactic bacteria are stopped from leaving their development to acting psychotropic proteolytic bacteria.

1.4. PH VARIATION

The pH value of meat naturally varies from 7.0 as is immediately after slaughter, up to 5.0. Lower values are unfavorable to microbial development. PH value promotes conservation, through water retention and dense texture.

2. RESULTS AND DISCUSSIONS

2.1. CHANGES IN FAT CONTENT (*Table 1*; Figure 1)

The experimental data presented in *Table 1* and Figure 1 in terms of changes in fat content during storage of sausage A shows that there aren’t great differences (slight decrease) in terms of fat content. Lipolysis occurs mainly during the maturation period (up to decrease the number of micrococcus from inside).

As for the sausage A and sausage B is observed that the variation of fat content is reduces during storage.

Table 1

Changes in fat content (sausage A - CPL 80:20 and sausage B - CPL 70:30)

Starter culture %	Days						
	15	30	45	60	75	90	115
1.5 A	40.67	40.38	40.26	40.23	40.06	40.05	40.06
1.5 B	41.81	41.76	41.69	43.81	43.16	41.04	41.02

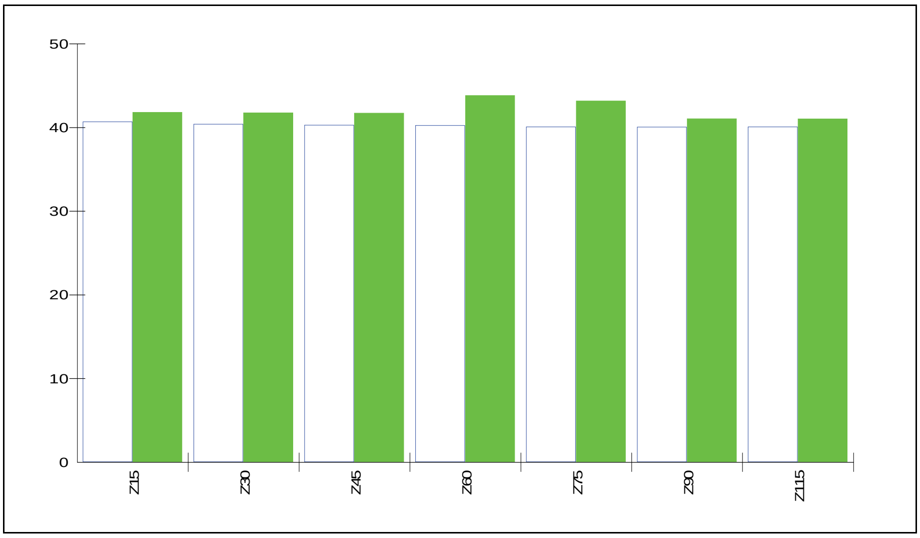


Fig. 1. Graphic representation of changes in fat content
(sausage A – CPL 80:20 and sausage B – CPL 70:30)

2.2. CHANGES IN NaCl CONTENT (*Table 2*)

The experimental data presented in *Table 2* shows a small decrease in the amount of salt existing in examined sausages during storage.

Table 2

Changes in NaCl content (sausage A - CPL 80:20 and sausage B - CPL 70:30)

Starter culture %	Days						
	15	30	45	60	75	90	115
1.5 A	3.71	3.7	3.69	3.61	3.6	3.61	3.6
1.5 B	3.71	3.7	3.69	3.61	3.6	3.61	3.6

2.3. HUMIDITY VARIATION (*Table 3*; Figure 2)

The experimental data presented in *Table 3* and Figure 2 shows that during sausage storage water losses are considerable.

Table 3

Humidity variation (sausage A - CPL 80:20 and sausage B - CPL 70:30)

Starter culture %	Days						
	15	30	45	60	75	90	115
1.5 A	30.85	28.54	24.62	23.79	19.6	18.78	15.56
1.5 B	30.59	26.81	26.24	23.91	18.16	16.4	15.91

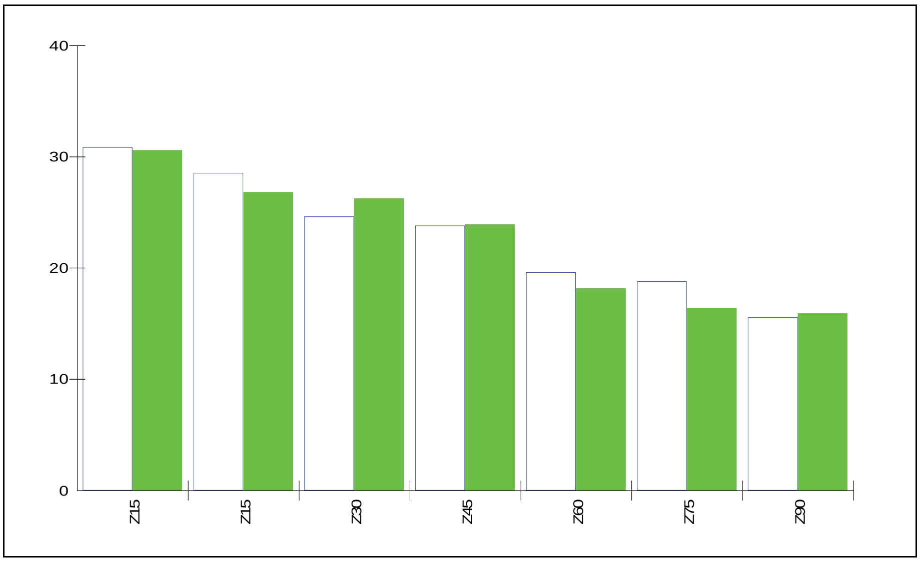


Fig. 2. Graphic representation of humidity variation
(sausage A – CPL 80:20 and sausage B – CPL 70:30)

It can be concluded that in all cases studied for sausage A (20% fat) removing water is done slowly and evenly, the average humidity of the product for 30 days is 33% and after 120 days of storage (under favorable conditions) humidity reaching 17% (on average).

The experimental data presented above shows that during storage of sausage B, water losses are considerable.

It can be concluded that in case of sausage B (with 30% fat) the elimination of water is less uniform sausage A (with 20% fat), in both cases there is a sudden decrease in water content between 60 and 80 days from 24% to 18% (on average).

2.4. PH VARIATION (*Table 4*; Figures 3 and 4)

The experimental data presented in *Table 4* shows that in early days the pH drops sharply, then stabilized and maintained throughout the storage period.

Table 4

PH variation (sausage A - CPL 80:20 and sausage B - CPL 70:30)

Starter culture %	Days										
	1	2	3	4	5	6	7	30	60	90	115
1.5 A	5.73	5.6	4.74	4.81	4.8	4.74	4.74	5.03	5.02	5.01	5.01
1.5 B	4.87	4.9	5.02	5.10	5.13	5.03	5.07	5.04	5.02	5.02	5.02

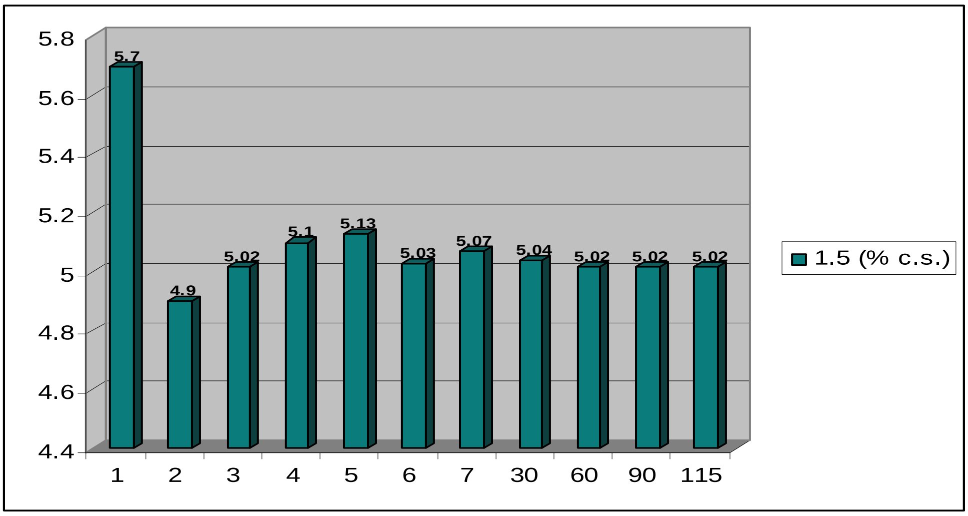


Fig. 3. Graphic representation of pH variation (sausage A)

In case of sausage A, the pH decreases after three days of maturation from 5.73 to 4.74 and kept the same amount until the 30th days, after 30 days to reach pH 5.01 and is maintained at the same level until the end of the study (115 days).

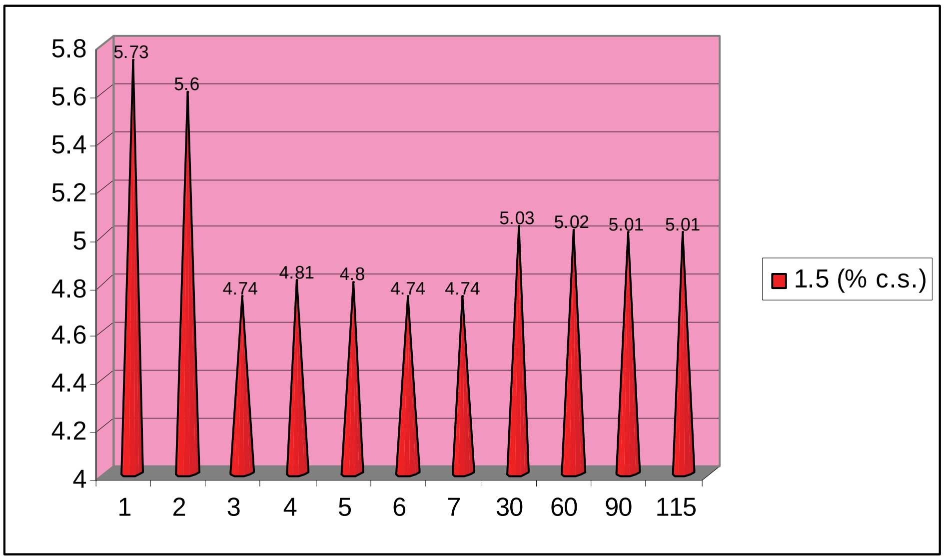


Fig. 4. Graphic representation of pH variation (sausage B)

In case of sausage B, pH range from 4.87 (first day), 4.9 (second day) to 5.02 (third day), a maximum recorded in the five day (5.13), then decreased to 5.03 and is maintained at the same level (slight variations) until the end of the drying-maturation operation (115 days).

3. CONCLUSIONS

- Experiments were conducted on two types of sausages, one having a concentration of 20% fat an the other of 30%.
- To achieve the objectives have been carried out a series of determinations that aimed the influence of raw and auxiliary materials used to produce sausage "Salam Ardelenesc" and physic-chemical and organoleptic changes that may occur during storage.
- In terms of changes in fat content of sausages A and B during storagecan be seen that there aren't great differences (slight descrease) in terms of fat content. Lipolysis occurs mainly during the maturation period (up to decrease of the number of micrococcus from inside).
- It can be observed a small decrease in the amount of salt existing in the examined sausages during storage.
- In all studied cases for sausage A (20% fat) the water remove slowly and evenly, the average humidity of the product after 30 days is 33% and after 120 days of storage (under favorable conditions) reaching the amount of 17% (on average).
- In case of sausage B (30% fat), the elimination of water is less uniform sausage A.
- In the early days the pH drops sharply, then stabilized and maintained throughput the storage period.

REFERENCES

1. *Dan. V.,* Flavoning oil effect son food protection, Ştiinţe şi tehnologii alimentare, vol.3, p. 18-23, 1995
2. *Dan, V.,* Microbiologia produselor alimentare, vol. I şi II, Editura Tennică Alma, Galaţi, 1999, 2000
3. *Dan, V.*, Microbiologia alimentelor, Ed. Alma, Galaţi, 2001
4. *Demeyer, D.*, Comparison between calculated and measured values of water activity in dry sausage, Fl.W.S. vol. 59, nr.7, p. 973- 974, 1979
5. *Demeyer, D. I., Verplaetse, A., Ghistelinck, M.*, Fermentation of meat: an integrated processes, Proc.32th EMMRW Ghent, vol.1, p.241 - 247, 1986
6. *Demeyer, D., Claeys, E., Ötles, S., Caron, L., Verplaetse, A.*, Effect of meat specie son proteolysis during dry sausage fermentation, Proceedings 38th ICOMST, Clermont Ferrand (France), vol.4, p775-778, 1992
7. *Djevizon, St.*, R.T.V.A., 103, p.26, 1974
8. *Effenberger, G.*, Kunstdarm für Rohwürste, in: Wursthüllen Kunstdarm – Herstellung, Eigenschaften, Anwendung, Schrifenreihe Fleischforschung und Praxis – Band4, p. 105-109, 1991
9. *Eklund, M. W., Wieler, D. I., Poysky, F. T.*, J. Bact., 93, p.1461, 1967
10. *Frentz, J.C.*, Salami, in: I'Encyclopedie de la charcuterie, p. 622- 626, 1982
11. *Genigeorgis, C.*, J.A.V.M.A., 169, p.1220, 1976

CONSIDERATIONS REGARDING THE IMPORTANCE OF LOCAL PRODUCTS FOR THE PRESERVATION OF NATURE

STANCIU MIRELA*, SĂVOIU GHEORGHE**,
VLAD IULIAN***, SAND CAMELIA*
*"Lucian Blaga" University from Sibiu, **University from Pitesti, *** USAMV Bucuresti

Key words: traditional, local product, preservation of the nature, indicators

SUMMARY

The paper present the concept of of High Nature Value (HNV) farmland in his evolution. The local products are named in the specific terminology like important products for the preservation of nature, or High Nature Value Products. The local products represent an important principle of the development of local economy.

The quality food products for consumers, nice landscape for tourists, rich biodiversity for those who want to preserve nature, innovative business opportunities for farmers, all these represent high nature value farming.

In the marginal areas of our country (mountain area for example) with semi-natural vegetation, "areas of natural value" as they are called in the EU, because they allow natural biodiversity and conservation, must be encouraged, even subsidized extensive maintenance and development of operating systems animals. It is primarily grazing (swing, transhumance, sedentary) and the so-called organic agriculture ("green", "organic", etc.) and forms agriculture of subsistence.[5] [1]

The century of hypermarkets brings forth one matter that has never been classified definitively-the growth of population and the diminution of food resources, while the traditional fairies remain visible reference point and a strong support of the rural memory of our rural environment, like the beacon hit by strong waves of the sea and even of the tempests of our human species….

However the renaissance time of the Romanian traditional were numerous…but always depended on agriculture. Farmers are the keepers of the agricultural areas of great value and of the culinary art.

The Concept of High Nature Value (HNV) farmland has been evolving over the last fifteen years in Europe. In the European Union this has been closely linked to the aim of integrating environmental concerns in the Common Agricultural Policy. The idea that nature values, environmental qualities, even cultural heritage are linked to or dependent on farming, also underlies and supports the concept of a multifunctional European model of farming which provides benefits beyond food production. The "High Nature Value farming" idea thus ties the preservation of biodiversity and wildlife value of the countryside to the need to safeguard the continuation of farming in certain areas with

[5] The paper is the result of the project "Mountain Resources and Sustainable Development", 2009-2010, financed by the Governments of Iceland, Lichtenstein and Norway, through the Financial Mechanism of the European Economic Area (EEA).

maintenance of specific farming systems associated to the long-term management of these areas.[2]

High Nature Value farmland is defined as “those areas in Europe where agriculture is a major (usually the dominant) land use and where agriculture sustains or is associated with either a high species and habitat diversity, or the presence of species of European conservation concern, or both”.

In many areas across Europe, agricultural productivity is geographically and economically marginalised due to natural disadvantages. Such areas are defined as ”Less Favoured Area” (LFA). Farmers in LFAs are supported by payments from the EU Rural Development Regulations, with the aim to ‘contribute, through continued use of agricultural land, to maintaining the countryside as well as to maintaining and promoting sustainable farming systems’ (EC No. 1698/2005). [3]

Farmland supports many habitats and species of European conservation concern. In 2003, Europe's environment ministers agreed to identify all farmland areas with high nature value and take conservation measures. This report shows that these areas cover roughly 15-25 % of the European countryside and suffer from land abandonment and intensification. Current policy measures appear insufficient to prevent further biodiversity decline. [4]

Agriculture in these HNV farmland areas is usually extensive and vulnerable to change. HNV areas are often under severe pressure due to a vulnerable economy and depopulation. Predominant agricultural trends are, on one hand, intensification, and land abandonment on the other. Both are considered detrimental to biodiversity value.

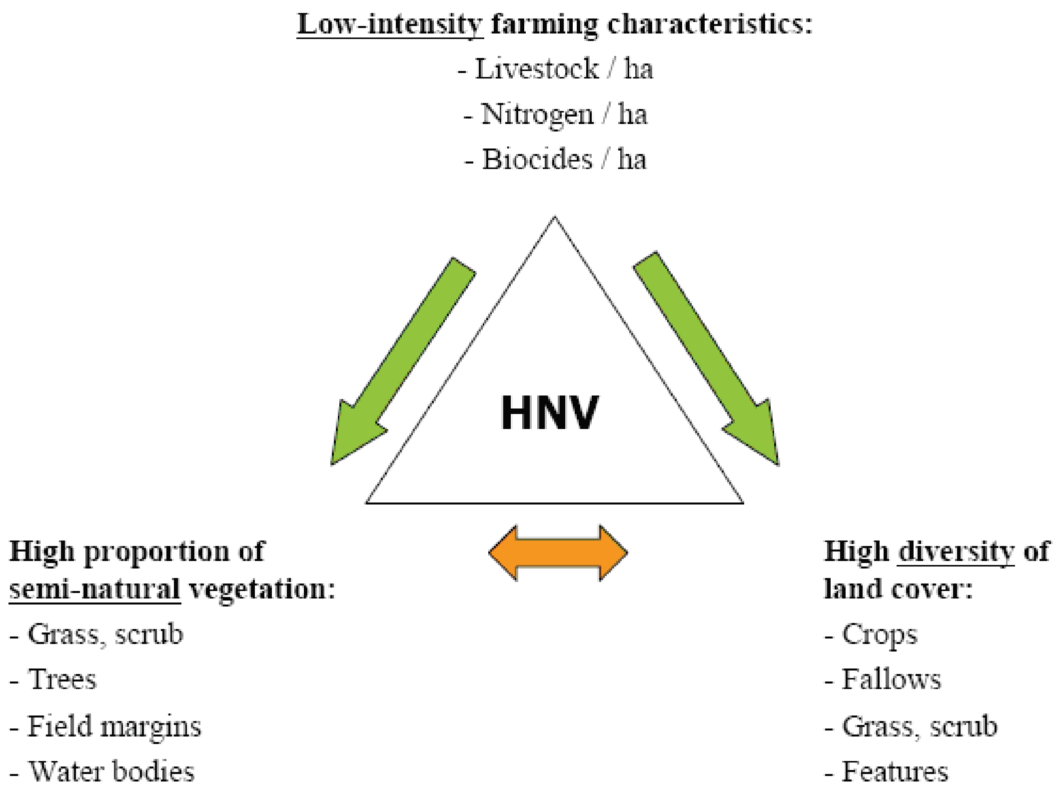
High Nature Value farmland comprises biodiversity ”hot spots” in rural areas and is usually characterized by extensive farming practices. Its conservation value is acknowledged in several EU policy documents, such as the EU Regulation on rural development (EC 1257/1999). HNV farmland areas will be one of the indicators (IRENA 26) to assess the Rural Development Community Strategy (programming period 2007-2013) and particularly one of the three priorities of axis 2 “biodiversity and preservation of high nature value farming and forestry systems”.

The HNV farmland methodology distinguishes the following types of High Nature Value farmland [5]:

- Type 1: Farmland with a high proportion of semi-natural vegetation.
- Type 2: Farmland where low intensity agriculture or a mosaic of semi-natural and cultivated land and small-scale features are dominant.
- Type 3: Farmland supporting rare species or a high proportion of European or world populations.

TYPES OF HIGH NATURE VALUE FARMLAND

Support to HNV and low input farmland systems by the implementation of the measures of the first and second CAP pillars are also part of the Biodiversity Action Plan (COM 2001 – 162). In their ”Kyiv Resolution”, the European Environment Ministers agreed to complete the identification of all high nature value areas in agricultural ecosystems in the pan European region areas, applying common criteria previously agreed upon. By 2008, financial subsidy and incentive schemes for agriculture will be under biodiversity-sensitive management through the implementation of appropriate mechanisms such as rural development instruments, agro-environmental programs and organic agriculture to among others, support their economic and ecological viability (EEA/UNEP, 2004).



IEEP (2007) Guidance document to the member states on the application of the high nature value indicator. Report for DG Agriculture, Contract notice 2006-G4-04

These characteristics WHICH are represented in this figure are discussed below. [6]

1. Low intensity farming characteristics - biodiversity is usually higher on farmland that is managed at a low intensity. The more intensive use of machinery, fertilizers and pesticides and/or the presence of high densities of grazing livestock, greatly reduces the number and abundance of species on cropped and grazed land.
2. Presence of semi-natural vegetation - the biodiversity value of semi-natural vegetation, such as unimproved grazing land and traditional hay meadows, is significantly higher than intensively managed agricultural land. In addition, the presence of natural and semi-natural farmland features such as mature trees, shrubs, uncultivated patches, ponds and rocky outcrops, or linear habitats such as streams,

banks, field margins and hedges, greatly increases the number of ecological niches in which wildlife can co-exist alongside farming activities.

3. Diversity of land cover - biodiversity is significantly higher when there is a “mosaic” of land cover and land use, including low intensity cropland, fallow land, semi-natural vegetation and farmland features. Mosaic agricultural habitats are made up of different land uses, including parcels of farmland with different crops, patches of grassland, orchards, areas of woodland and scrub. This creates a wider variety of habitats and food sources for wildlife and therefore supports a much more complex ecology than the simplified landscapes associated with intensive agriculture.

Indicator	**Measurement**
Indicators for the identification of HNV farming may be based on 3 core characteristics (low intensity, semi-natural vegetation and diversity of land cover) for: semi-natural forage V arable NV permanent cropping Use of species indicators where appropriate.	Possible quantitative measures of HNV farming: Number of hectares of semi-natural land used for grazing and/or mowing Number of hectares of forage declared by holdings in the appropriate range of livestock densities per hectare of forage Number of hectares of arable land with a proportion of fallow and semi-natural vegetation within defined thresholds Number of hectares of HNV permanent cropland with trees in production over a defined age threshold and with a semi-natural under storey Number of hectares of farmland with a density of semi-natural features within defined thresholds Number of hectares of HNV farmland which harbor populations of certain tax of conservation concern, or European or global populations.

Indicators for the identification of HNV features.	Quantitative estimates of extent of HNV features, (for example): Length of HNV hedgerows or other semi-natural field margins (quality must be defined) Area of HNV water-bodies (quality must be defined).

In order to monitor qualitative changes in HNV farming, two aspects need to be addressed:

- Changes in HNV farming practices
- Changes in the ecological condition (species populations and habitats) of HNV farmland.

The dominant characteristic of HNV farming is its low-intensity. A significant presence of semi-natural vegetation is also essential. In situations where the proportion of land under semi-natural vegetation is reduced, a high diversity of land cover (mosaic) under low-intensity farming may enable significant levels of biodiversity to survive, especially if there is a high density of features providing ecological niches. A high diversity of land cover alone does not indicate HNV farming.

The most valuable high nature value farming are recognized for the diversity of the rural environment and for the preservation of a rich biodiversity, by the multifunctional agricultural systems, which take into consideration the well being of animals, of the natural evolution of the crops and of an own approach of the farmer, far from the intense practices.

These agricultural systems are very important because they promote the care for natural resources, which in many countries of the European Union have been neglected and lost. Also, they help to inform about the crucial role that the farmer has in the maintenance of the natural and cultural treasury by the traditional method that he uses to work his land , by the traditional way that he has for the preparation of food and he continues to make superior quality products by multiplying and sharing with the following generations the traditions and customs related to the nature, this way of living leading to the preservation of rural landscapes and the protection of natural resources.

The European policy commitments to High Nature Value farming

The EU and all its Member States have committed themselves to three distinct actions concerning HNV farming: [7]

1. Identifying HNV farming.
2. Supporting and maintaining HNV farming, especially through Rural Development Programmes (RDPs).
3. Monitoring changes to the area[1] of land covered by HNV farming, and to the nature values associated with HNV farming, as part of their monitoring of RDPs

HNV farms, moreover, are characterized by smaller economic size and a greater dependence on subsidies than non-HNV farms. Subsidies to HNV farms are therefore needed to maintain their viability and their provision of public goods over time. This should be realized through a proper and well targeted support scheme, even drawing from the available tools properly reshaped and targeted on HNV farming. Possible policy measures are those rewarding farmers' maintenance of the so called "unfarmed features" (hedgerows, stonewalls, buffer strips, ponds, small area of woodland and ecological corridors), or the restoring of ecological structure in intensively managed areas.

WHAT IS IN FACT A LOCAL PRODUCT?

The specific terminology entitles them important products for the preservation of nature, or High Nature Value Products. These are the products that help to maintain the natural landscapes in the rural areas, by the continuous agricultural practices of farmers for the growth of animals, and the works of the land. The local products also represent an important principle of the development of local economy. [8]

In an attempt of defining them we can say that they are food products, services obtained and consumed at the local area. Food products and agricultural practices by which the land pastures, orchards and hay field are dealt with, but also the way in which animals are being used and kept , play an important role in the maintenance of local culture, of the landscape, but especially for human health and that of the children.

A local important product for the preservation of the nature is that who helps to the preservation of biodiversity of the rural space –species of plants and animals that depend on this kind of environment- the preservation of habitats and rural landscapes, as well as the protection of natural resources- by the usage of friendly environment practices; the development of local economy, supporting farmers from semi-sustenance, by maintaining the agricultural activities in farm systems.

The local products important for the preservation of the nature must:

- support the local economy- by the proper valuation of the local products, the obtained incomes must return to the farmers and this way the help to support his future activity and the maintenance of farm systems
- preserve and maintain the local cultural treasury and help to the maintenance of the cultural identity of rural areas, by promoting local traditions and customs, local celebrations where customs, habits and way of dressing are being promoted, but also the practice of grazing, a traditional job transmitted form generation to generation
- contribute to the preservation of rural landscapes, by the preservation of biodiversity –species of plants and animals, habitats and natural resources, due to a reduced involvement of human interventions
- help to maintain the agricultural traditional practices
- extensive agriculture, the main type of using the lands and fields
- the use of organic manure, according to the fertilization requests
- the reduced density of animals, having in consideration the natural capacity of production of the pastures; (grazing can be made with max 1 UVM /hectare)
- reduced human intervention
- reduced existence of technology, the use of manual practices

Thus the obtain and sale of local food products represents an important factor for the maintenance and development of the community, and in the main time a source of sustainable benefits for local economy.

Local products are an important principle of local economic development. An attempt to define qualifies them as food, goods and services produced and consumed at local level. Food and agricultural practices through the land, pasture, fields and orchards are household, but also how animals are raised and cared for, played a key role both in creating and maintaining local culture, landscape, and especially to human health and children. Thus, obtaining and marketing of local foods is a catalyst for maintaining and developing community and at the same time, a source of sustainable benefits for local economies.

An important local product for nature conservation is that product that helps at:

- the countryside biodiversity (species and associations of plants and animals dependent on that environment);
- conservation of habitats and rural landscapes and natural resources protection (by using environmentally friendly practices);
- local economy development, supporting semi subsistence farmers by maintaining agricultural activities in the system of farm/household;
- preserve and perpetuate patrimony and cultural traditions in these rural areas.
  Local fairs have a major importance for the valorization of the local products.

REFERENCES

1. *Andersen, E*. (ed.) (2003) Developing a high nature value farming area indicator. International report. EEA, Copenhagen
2. *Drăgănescu Condrea*, Dezvoltarea durabilă Si problema unei strategii naționale pentru dezvoltare durabilă a producției animale, Revista de Zootehnie V.1.martie 2008:7-16
3. http://www.environmental-expert.com/resulteacharticle.aspx?cid=27957&codi=26300
4. http://www.birdlife.org/eu/EU_policy/Agriculture/eu_agriculture6.html
5. http://www.panda.org/ro/about_wwf
6. http://ec.europa.eu/agriculture/rurdev/eval/hnv/guidance_annexes_en.pdf
7. http://www.efncp.org/high-nature-value-farmland/european-policy
8. http://www.eea.europa.eu/publications/report_2004_1

STUDY REGARDING THE MEAT CAPABILITY AND PROCESSING ON ROMANIAN DEVELOPMENTAL REGIONS

GABRIELA MALOŞ, MALOŞ IULIU GABRIEL,
DANIELA MOTRIUC, CRISTINA GÎRLEA

Key words: processing/slaughterer capability, achieved production, developmental regions

SUMMARY

The paper has as main aim the establishment and elucidation of current status regarding the territorial repartition, on developmental regions, of investments achieved in meat processing/slaughterer industry as well as their utilization, to establish the interests areas for new investments in this field of activity, respectively upstream and downstream of it: units for livestock rearing and meat processing.

1. MATERIAL AND METHOD

Primary data (designed capability of licensed economical agents, production achieved in 2009, on main species) have been taken over from informations put at disposal by County Agricultural Directorates, during 2009 - 2010. They are processed on counties and subsequently on Romanian developmental regions, following percental repartition on regions and species for investments and their utilization.

2. RESULTS AND DISCUSSIONS

Analyzing the obtained values, synthesized in table 1, some very interesting aspect are underlined. These aspects characterize the current status in processing/slaughterer link of meat flux, namely:

A. – at entire country level, the designed capability exceeds presently 1370000 tons, but it is utilized only of 45.5% of it, better said, the slaughters-houses function, on average, at less half of their capability.

- territorial repartition, on developmental regions, of the achieved investments is extremely ununiform (fig. 1), respectively by only 92 thousands tons in the South-western region (Oltenia), over 295 thousands tons in Western Euroregion (Banat, Crişana)
- on developmental regions, the status of processing capability utilization is the following:
  - below national average in South, South-west, West (Oltenia, Banat), where one can observe an utilization below 40 % of slaughter-houses capability;
  - at the level of national average, in the Northern regions: North-east, North-west (Maramureş and Moldavia);
  - at approximately 49 % in Center region(Transylvania);
  - exceeds 63 % in South-east region, Dobrudja – Bărăgan.

B. – as regards the achieved production repartition, on cattle livestock, on developmental areas one can ascertain the following aspects:

- production achieved at the country level is of 123157.0 to, representing 9 % of total designed capability.
- on developmental regions, the production achieved is:

- below 5% threshold of designed capability per developmental area is found only in South area;

- between 5 – 10% threshold, this is found in Center, West and South-west developmental regions;

- over 10% threshold, the slaughterer production is found in Northern and South-eastern developmental regions: North-west, North-east and South-east, the highest being registered in North-west.

C. The slaughterer production in sheep is of 7665.4 to, representing 0.6% of the designed production capability:

- maximum production being registered in South-eastern and North-western developmental areas.
- productions are subunitary, excepting those of South-east and North-west.

D. in the case of poultry processing, the achieved production is dispersed uniformly on entire country, excepting South developmental area, where the production is below 10% threshold.

- total achieved production is of 210006.7 to, representing 15.3% of total capability designed at the country level.

E. The pigs represents the species with a production which exceeds 20% of the designed capability, maximum productions being registered in South-east (32.4%) and South (25.9%) developmental areas.

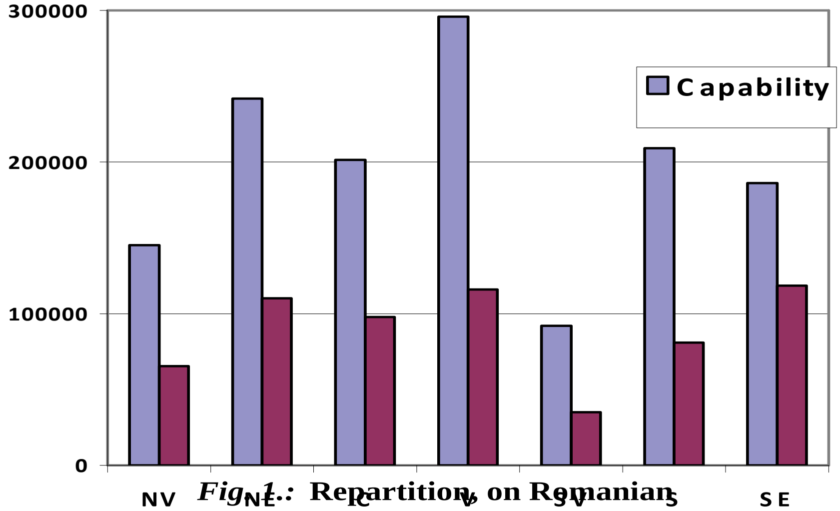


Fig. 1.: **Repartition, on Romanian developmental regions, of utilized processing capability (tons)**

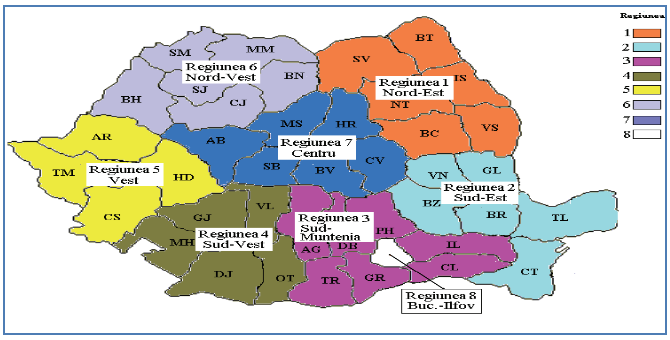


Fig.2.: Romanian developmental regions

Table 1

State of meat processing and capability, on Romanian developmental Euroregions

SPECIFICATION		Designed capability (tons)	Achieved production, of which:		Cattle production		Sheep production		Poultry production		Pigs production	
			(tons)	%	(tons)	%	(tons)	%	(tons)	%	(tons)	%
EUROREGIONS	N-V	145251	65488,5	45,1	27505,0	18,9	2486,0	1,7	15929,2	11,0	19568,5	13,5
	N-E	241877	110222,8	45,6	26861,6	11,1	975,0	0,4	44101,0	18,2	38285,0	15,8
	C	201339	97777,8	48,6	16325,0	8,1	305,8	0,2	39831,0	19,8	41316,0	20,5
	V	295878	116083,0	39,2	17037,0	5,8	522,0	0,2	43008,0	14,5	55516,0	18,7
	S - V	91944	35091,2	38,2	7297,3	7,9	11,4	0,1	13552,5	14,7	14230,0	15,5
	S	209138	80902,9	38,7	6347,1	3,0	470,5	0,2	19985,0	9,6	54100,5	25,9
	S-E	186050	118514,0	63,7	21784,0	11,7	2895,0	1,6	33600,0	18,1	60235,0	32,4
	B	0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
Total RO		1371477	624080,1	45,5	123157,0	9,0	7665,4	0,6	210006,7	15,3	283251,0	20,7

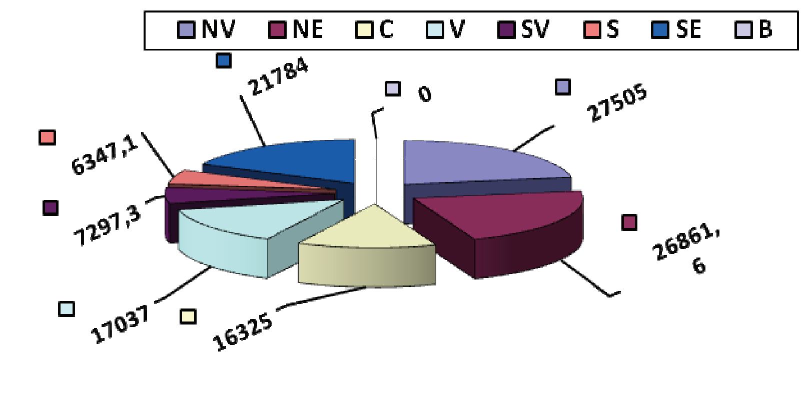


Fig 3. **Repartition of production in cattle on developmental areas**

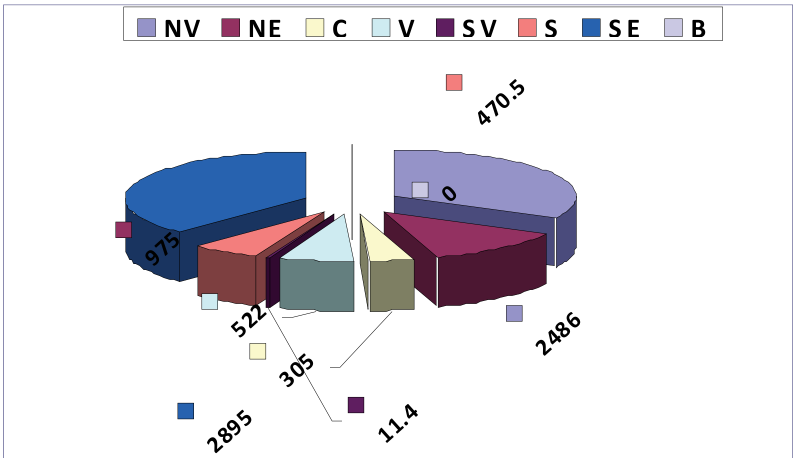


Fig. 4. **Repartition of production in sheep on developmental areas**

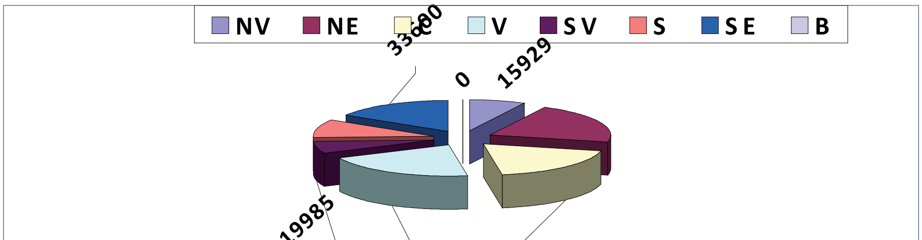


Fig. 6. **Repartition of production in poultry on developmental areas**

3. CONCLUSIONS

- Designed capability is utilized only in percentage of 45.5 %, better said the slaughter-houses function, on an average, at less of half capability;
- There is large variation regarding the production on species, the lowest ones being registered at ruminants, of 9.0 respectively 0.6% from designed capability;
- productions achieved with values which exceeded 30% threshold were registered in South-east developmental area, in pigs and in Center developmental area in poultry;
- areas with the highest production capabilities are: North-east, West and South-east, these being characterized by production closed of Romania average value;
- according to statistical data (Romanian Statistical Institute), such as population of 2008 and – meat average consumption of 66.6 kg per same year, designed production capability does not cover totally the meat need, this being of 1 431 900 tons versus current one, of 1 371 477 tons;
- investments in this field of activity were performed without taking into account the livestock rearing potential of areas;
- synergy between agro-food industry and primary production represents the vector of economical development;
- it is necessary a re-evaluation of these investments, especially for the development of small and big ruminants;
- future investments must be done only in area which ensure raw matter;
- financial subsidy to achieve investments in modernizing and restructuring units of agro-food industry by European funds (NRDP) and other budgetary funds;
- reinforcement of this industry is performed through programs released by MARD, following on one hand, increasing product’s competitivity and on the other hand, setting up of new agro-food industry units in rural area, supporting a share of stakeholders investment projects.

REFERENCES

1. Institutul National de Statistica –Anuarul Statistic 2009,
2. Date operative DADR- uri judete.

The 39th International Session of Scientific Communications of the Faculty of Animal Science, Bucharest, Romania
Scientific papers (seria D; vol. LIII) – Animal Science

CHARACTERIZATION OF MYOFIBRILLAR FISH AND BEEF PROTEINS AND OBTAIN THE COMESTIBLES FILM

FLORICEL CERCEL, MARIANA STROIU, PETRU ALEXE

Key words: fish myofibrillar proteins, beef myofibrillar proteins, alkaline pH method, comestibles film, film's microstructure, functional proprieties, solubility, foam capacity and emulsion capacity.

SUMMARY

The present work deals with study of extraction and characterization of myofibrillar proteins from fresh fish (carp) and fresh beef. There were used methods of extraction alkaline pH method and determination of physico-chemical properties of myofibrillar protein concentrate. Also we study functional properties of concentrate myofibrillar proteins: solubility, foam capacity and emulsion capacity. The fish and beef myofibrillar proteins was used to obtain the comestibles films and we studied film's microstructure.

Edible packaging films are alternatives which are used increasingly more, mainly for environmental reasons. They can be formed from edible biomaterials, such as polysaccharides, proteins or fats. A movie is good if it has the properties: cheap, biodegradable, biocompatible and non-toxic for consumption.

Polymer films, synthesized chemical widely used in food packaging because they are easy and cheap to produce, are uniform, flexible and durable. A serious disadvantage of these films is that they are not biodegradable. Components are biodegradable edible films and presents substantial opportunities for consolidation and quality of food (and Watcharaporn Pongkongkaew Pannipa Onseng, 2009). Furthermore, the use of biodegradable films significantly reduce packaging waste (and Mariniello al., 2003). We investigated the possibility of biodegradable edible films using myofibrillar protein.

1. MATERIAL AND METHOD

1.1. GETTING MYOFIBRILLAR PROTEIN CONCENTRATE (FRESH CARP AND BEEF)

The protein extraction we used myofibrillar chosen from red meat. The meat was shredded with a Braun mixer, then homogenized with distilled water for 5 min., Adjust pH to 10.8 with 1N NaOH to solubilise myofibrillar protein. I left an hour rest we 3200rot/min centrifuged at for 15 min. After centrifugation supernatant was collected and fell residue (sarcoplasmatic protein, connective tissue and other components). The supernatant is treated with 1N HCl to precipitate the protein (pH-5, 4), then centrifuged, the supernatant is removed and the residue is washed twice with saline solution. After each homogenization is a centrifuge and remove the residue before the last centrifugation (third wash) is passed through fine silk mesh to remove remaining stromal proteins. Following centrifugation to obtain myofibrillar protein concentrate .

All operations were performedat low temperature 0:4°C.

1.2 **CHARACTERIZATION OF MYOFIBRILLAR PROTEIN**

1.2.1 **CHEMICAL COMPOSITION**

In order to solve the experimental part the following analysis were performed:

- humidity drying chamber at 100-104 ° C Until the constant mass in accordance with the method STAS 9065/3-1975 (termobalance precise XM 60);
- total nitrogen. The Determination of the total nitrogen content by the Kjeldahl method performed WAS (STAS 9065/4-1981). The proteins global were calculated by the multiplication the total nitrogen by the factor 6.25;
- determined the grease content by the Soxhlet method WAS by the Organic Solvents extraction (STAS 9065/2-1973);
- ash-determined by calcination at 550°C., the furnace model LMH07/12-LAC.

1.2.2 **FUNCTIONAL POPERTIES OF MYOFIBRILLAR PROTEIN**

1.2.2.1 **FOAMING CAPACITY, FOAM STABILITY AND COLLAPSE**

Morra Method 1985.

Proteins have the ability to form foam(the foam) by incorporating air bubbles a matrix protein.

1.2.2.2 **EMULSIFYNG CAPACITY**

Method of Pearce and Kinsella, 1978

Emulsifying capacity is a method that establishes "ability" to bind protein in the processes of food oil.

1.2.2.**3 SOLUBILITY**

Of all the functional properties of proteins, solubility is a property that affects other functional properties: emulsification, foaming and gellification. Protein solubility is different for different values of pH.

Soluble protein at different pH's was determined by Kjeldahl method.

1.2.3 **MICROSTRUCTURE OF MYOFIBRILLAR PROTEIN CONCENTRATE**

To concentrate protein characterization by electron microscopy, special procedures are required training (Langton and Hermansson, 1993). Protein concentrate was evenly spread on a steel plate (3x3 cm) thin layer. Surface morphology was studied without coating and without special drying samples using baleaj electron microscopy, Quanta 200 (Philips).

1.3 **FORMATION OF EDIBLE FILMS**

Edible films have been prepared in accordance with a modeling technique is followed by preparation of a filmable hard application and drying.

Edible films were obtained from a colloidal solution of 5.15 g g proteină/100 filmable glicerol/100 g and 50 g protein (acting as a plasticizer), which adjusts the pH value 7.0 1N HCl (Merck). Check the pH was made with Checker pH meter (HANNA Instruments). Then the solution was thermally treated filmable (356 H-type water bath), solution temperature gradually increased 1°C per min., 70°C which was maintained for 30 min. Thermal treatment was aimed to distort the protein. Distortion causes disruption tertiary structures, secondary and quaternary protein structure does not produce any change in the primary, being disposed of disulfide bridges, hydrogen and ionic bonds in the protein molecule. After cooling to 20°C filmable 50 ml was transferred to a rectangular area of 260 cm 2 and dried at room temperature.

1.3.1. **DETERMINATION OF FILM THICKNESS**

The volume of solution was poured on the plate calculated to obtain a uniform thickness, determined with micrometer, by averaging the five different measurements.

1.3.2 **MICROSTRUCTURE OF EDIBLE FILMS**

Surface structure of films was investigated using electron microscopy baleaj, Quanta 200 (Philips). 5x1 mm samples were then applied on a metallic surface. The surface coating film was studied without evidence and without special drying. Numerous research involves assessing the edible films using SEM (Rhim and al., 2006, Chen and Lai, 2009; Garcı'a et al., 2009, Souza and al., 2010).

2. RESULTS AND DISCUSSIONS

2.1. **CHEMICAL COMPOSITION**

Chemical composition of raw materials and miofibrilar protein concentrate obtained is presented in:

	UM	fish (carp)			Beef (round)		
		Raw material	Myofibrillar protein concentrate		Raw material	Myofibrillar protein concentrate	
Humidity	%	79,24	81,97		74,42	85,786	
Protein	%	16,86	15,10	83,749	24,5	12,953	91,128
Fat	%	0,70	0,48	2,662	0,60	0,31	2,180
Ash	%	0,693	0,55	3,050	0,80	0,54	3,799

2 2 **FUNCTIONAL POPERTIES OF MYOFIBRILLAR PROTEIN**

2.2..1 **FOAMING CAPACITY, FOAM STABILITY AND COLLAPSE**

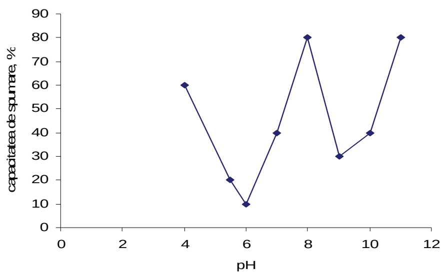


Fig.*1*. Foaming capacity- carp

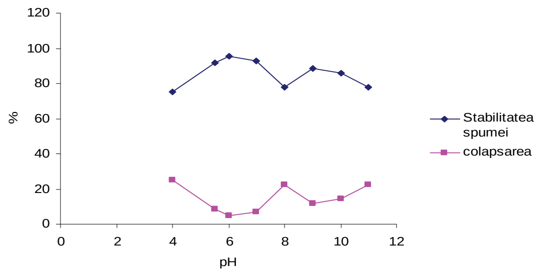


Fig.*2*. Stability foam and collapse

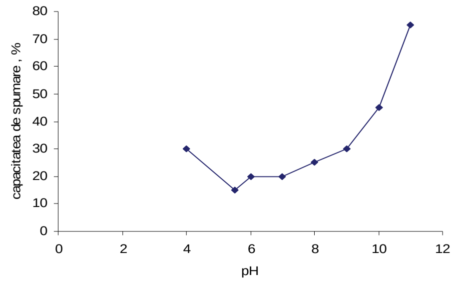


Fig.3. Foaming capacity- beef

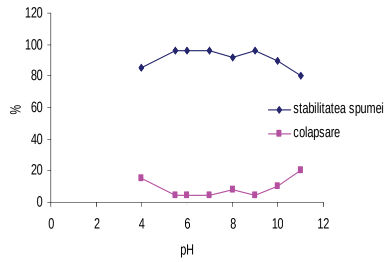


Fig.*4.* Stability foam and collapse

Foaming capacity and foam stability were determined by the method Sathe and Salunkhe (1981).

Coffman & Garcia, 1977, Sze-Tao & Sathe, 2000, Vani & Zavas, 1995 have used 2% protein.

Another method for determining the foaming capacity and foam stability was developed in 1996 by Wild and Clark.

In our case, whatever type of meat used or extraction method used is noted that we have a minimum foaming capacity isoelectric pH (5.4 to 6).

The fresh carp, foaming capacity is greater in the acid pH, isoelectric point decreases. Starting at pH 6.0, was found to increase the foaming capacity at pH 8.0, where there is a maximum, then a decrease at pH 9.0 after which an upward trend.

Foam stability is increased around 5.5 and 6.0 pH values, because the foaming capacity is minimal.

The same type of variations have been observed by other researchers. Also, they observed: the concentration of protein increases myofibrillar slurry increases the foaming capacity (Wild and Clark, 1996). The analysis performed indicates that any type of meat used for this study, the foaming capacity is minimal isoelectric pH, increasing the values of acidic and alkaline pH's. This is because the protein isoelectric pH myofibrillar have minimum solubility, so they do not incorporate air. The foaming of the hydrophobic proteins bound to the air and the hydrophilic to the water.

2.2.2 **EMULSIFYNG CAPACITY**

Emulsifying capacity, protein myofibrillar fish (carp fresh), beef, is pH dependent. Buffer solutions have pH between 4 and 11. At acidic pH (4.0) have a maximum, then decreases to a minimum at pH 5.5, 6.0, and then emulsifying capacity increases with pH up to 9.0.

The same also identified Chove, Gradinson & Lewis (2001) further studies. Other similar studies have been made and Taneyama Aoki & Inam (1980).

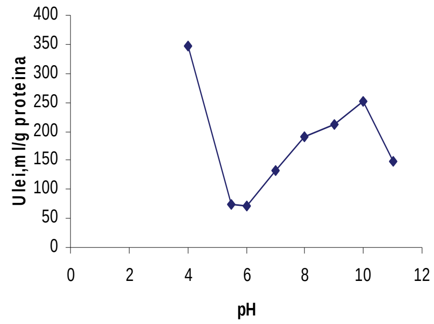


Fig.*5*. Emulsifying capacity from carp

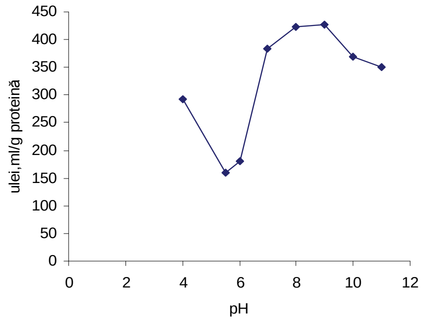


Fig.*6*. Emulsifying capacity from beef

2.2.3 **SOLUBILITY**

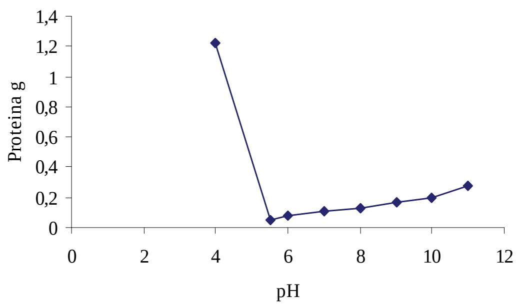


Fig.*7*. Myofibrillare protein solubility curve obtained from carp

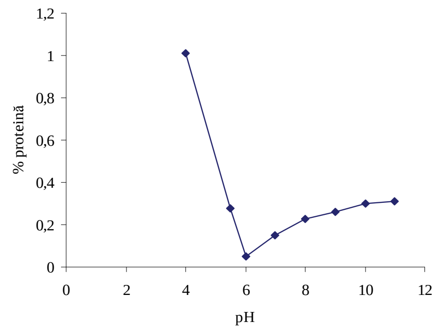


Fig.*8*. Myofibrillare protein solubility curve obtained from beef

Protein solubility was determined as early as 1940 (Robinson & Hodgen). Protein content in supernatant was determined using biuret method. Total protein content of the test sample was determined after solubilization in 0.5 N sodium hydroxide.

In the analysis performed, we found the following:

- Myofibrillare protein extraction of crap we used a method based on protein solubilization at alkaline pH and isoelectric precipitation, solubility is highest in the acid lowers the isoelectric pH and is minimum, and has slightly upward at alkaline pH.

2.3.**MICROSTRUCTURE OF MYOFIBRILLAR PROTEIN CONCENTRATE**

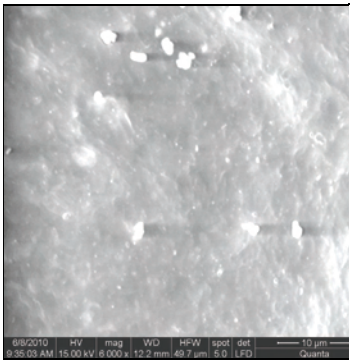


Fig.*9*.Photomicrograph of carp myofibrillare protein concentrate
6000X

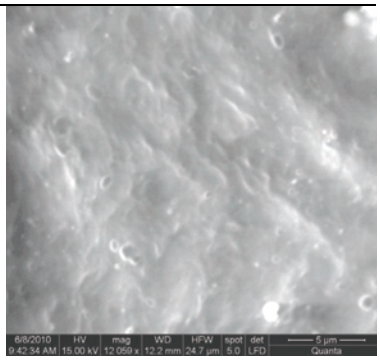


Fig.*10*. Photomicrograph of carp myofibrillare protein concentrate
12000X

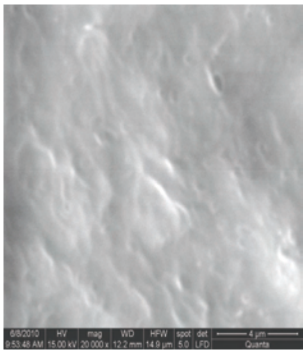


Fig.*11* Photomicrograph of carp myofibrillare protein concentrate
20000X

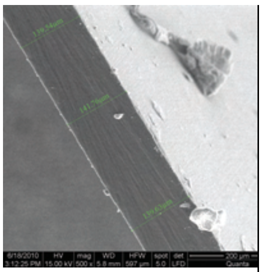
2.4.1 **DETERMINATION OF FILM THICKNESS**

Film	1 cattle	2 carp
Thickness, µm	130	76

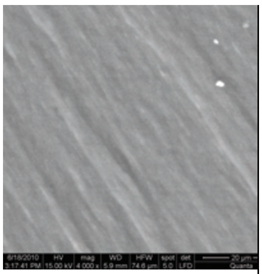
Film no.1 (beef)

Film no.2 (carp)

2.5.**MICROSTRUCTURE OF EDIBLE FILMS**

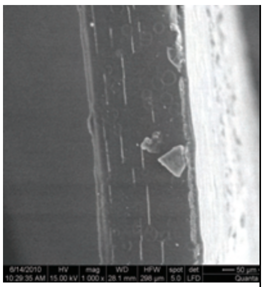


500x

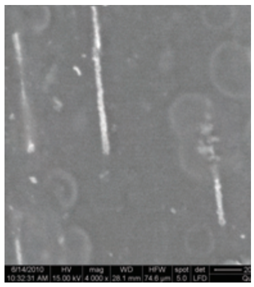


4000x

Film nr.1 (beef)



1000x



4000x

Film nr.2 (carp)

Microphotographs made the cross-section showed a thin structure, smooth and compact protein matrix, which may explain the mechanical properties, water vapor permeability and solubility.

Surface microphotographs showed a less homogeneous external structure, even if it is dense and cohesive. This heterogeneity is probably due to channels formed within the film structure, the water, drying, forming pores superficial, surface.

In addition to these channels, the matrix protein have been observed several white dots that could be some insoluble particles in low concentration saline solution. There were also observed, some discontinuity in the protein network, some cracks could be caused by treatment that includes a vacuum applied to the sample, in preparation for microscopy, vacuum can not remove the glycerin is completely miscible myofibrillare protein.

The presence of cracks and pores in the film structure may compromise the structural integrity of the film and could cause changes in their functional properties.

Another phenomenon that can be explained by the migration of moisture during drying is the appearance of crystals on the surface of the film, visible in some regions they are not present throughout the area. This migration of salt takes place in parallel with the migration of moisture, is a mosaic. Salt crystals are visible in cross-section microphotographs of the film made. As illustrated, the salt crystals are visible inside the film to the surface as insoluble particles and proteins within the network with a large number of cavities, which may be gaps previously occupied by the glycerol fraction.

Similar results were also observed in the work of other researchers: Yang and Froning, Sobral, Menegalli and Souza.

3. **CONCLUSSIONS**

Whatever type of meat used to extract proteins miofibrilare and whatever method of extraction, protein solubility is minimal at their isoelectric pH's.

REFERENCES

1. *Petru Alexe*, "Unconventional protein sources," Academic Publishing, Vol, Lower Danube University of Galati.

2. *Constantin Banu*, *Aurelia Ionescu*, "Handbook of Practical Work in Technology and equipment for meat and fish", Galati 1984.

3. *Constantin Banu* ,Technology of meat and by-Didactic and Pedagogic Publishing House, Bucharest 1980.

4. *Cagri, A., Ustunol, Z., Ryser, ET* Antimicrobial edible films and coatings, Journal of Food Protection Pannipa Pongkongkaew and Watcharaporn Onseng, Preparation and Properties of Porcine Plasma Proteins-Polysaccharide Composite Films Thammasat Int. J. Sc. Tech., Vol 14, No.2, April-June 2009

5. *Mariniello, L., Di Pierro, P., Esposito, C., Sorrentino, A., Masi, P., & Porta, R.* (2003). Preparation and mechanical properties of edible pectin-soy flour films obtained in the Absence or Presence of transglutaminase.Journal of Biotechnology, 102, 191-198.

6. *Coffmann & C.W. Coffmann and V.V. Garcia*, Functional properties and amino acid content of the protein isolated from mung bean flour, Journal of Food Technology 12 (1977), pp 473-484.

7. *Sze-Tao & Sathe K.W. Sze-Tao and S.K. Sathe*, Functional properties and in vitro digestibility of almond (Prunus dulcis L.) protein isolated, Food Chemistry 69 (2000) (2), pp 153-160. Abstract | View Record in Scopus | Cited By in Scopus (17)

8. *Vani & Zayas B. Vani and J.F. Zayas,* foaming properties of selected plant and animal proteins, Journal of Food Science 60 (1995) (5), pp 1025-1028.

9 Wild and Clark, P.J. Wild and D.C. Clark Foam formation and stability. In: G.M. Hall, Editor, Methods for testing protein functionality, Blackie Academic and Professional, London, England (1996), pp 110-148.

10 *Taneyama Aoki, & Inam* (Emulsifying properties of soy protein: Proteins and characteristics of. The first published online: 25 aug. 2006

11. *Sober ,Menegalli and Souza.* Characterization of Some functional properties of edible films based on muscle proteins of Nile Tilapia

12. *Paschoalick TM, Garcia FT, Sobral and AMQ*. Received 19 July 2002 Revised 18 November 2002 Accepted 11 December 2002. , Available online 28 March 2003.

13. *Gontard, N., and S.Guilbert*.in Food Packaging and Preservation. By Ed M. Mathlouthi, pp 159 181.Blackie Academic & Professional, Glasgoww 1994

14. *Krochta, J. M., E.A. Nisperos-Carriedo and Baldwin M.,* and Coatings to Improve Food Edible Films Quality.Techonomic Publishing Company, Lancaster, Pennsylvania in 1994

15. *Cuq.B., N. Gontard and S. Guilbert*, in: Active Food Packagings.Ed. by MLRooney: pp 111-142.Blackie Academic & Professional, Glasgoww 1995.

16. *S. Guilbert, B. Cuq. and N. Gontard*, Food Add. Cont.60 (1997) 741-751.

17. *Cuq.B., N. Gontard and S. Guilbert*, Cereal Chem.75 (1998)

18. *S. Guilbert, N. Gontard* and in Foods and Packaging Materials-Chemical Interactions.Ed. by P. Ackermann, M. and T. Ohlsson Jägerstad. pp.159-168.The Royal Society of Chemistry. Cambridge 1995.

19. *Wu, Hettiarachchy, & Qi U. Wu, S. Hettiarachchy and M. Qi,* Hydrophobicity, solubility, and emulsifying properties of soy protein peptides papain Prepared by Modification and ultrafiltration, Journal of American Oil Chemical Society 75 (1998) pp 450-845.

20. *David W. Stanley, Ashley P. Stone, Herbert O. Hultin* Chicken Beef and Solubility of Myofibrillar Proteins in Low Ionic Strength Media J. Agric. Food Chem., 1994, 42 (4), pp 863-867 Publication Date: April 1994

21. *Bernard Cuq, Nathalie Gontard, Jean-Louis Cuq, and Stéphane Guilbert* Ecole Nationale Superieure Agronomique of Montpellier, 2 Place Viale, 34060 Montpellier Cedex 1, France, ENSI-SIARC, 1101 Avenue Agropolis, BP 5098, 34033 Montpellier, France, and Laboratoire Food Genie biologique et des Sciences, University of Montpellier II, Place Eugène Bataillon, 34095 Montpellier, France), J. Agric. Food Chem., 1997, 45 (3), pp 622-626 Publication Date (Web): March 17, 1997 Copyright © 1997 American Chemical Society

22. *Kinsella (1976) J.E. Kinsella,* Functional properties of proteins in foods: A survey, CRC Critical Reviews in Food Science and Nutrition 7 (1976) (3), pp 219-280

23. -*Vani & Zayas (1995) B. Vani and J.F. Zayas*, Foaming properties of selected plant and animal proteins, Journal of Food Science 60 (1995) (5), pp 1025-1028

24. *Yang and Ffroning* –Evalution of protein in functionality Alkali Processed Surimi.

The 39th International Session of Scientific Communications of the Faculty of Animal Science, Bucharest, Romania
Scientific papers (seria D; vol. LIII) – Animal Science

CHARACTERIZATION OF MYOFIBRILLAR PORK PROTEINS FOR OBTAIN COMESTIBLES FILM

FLORICEL CERCEL, MARIANA STROIU, PETRU ALEXE

Key words: pork, myifibrillar protein, comestible film

SUMMARY

The present work contains studys of extraction and characterization of myofibrillar proteins from fresh pork meat. There were used several methods of extraction of myofibrillar proteins and the protein concentrat myofibrillar was analysed physico-chemical . Also we study functional properties of concentrate myofibrillar proteins: solubility. ,foam capacity and emulsion capacity The results showed that the best method for extraction and characterization of pork myofibrillar proteins is the alkaline pH method . The pork protein concentrat myofibrillar was used to obtain comestibles films and we studied film's microstructure.

Key words: pork myofibrillar proteins, alkaline pH method, comestibles film, microstructure film's, functional proprietes, solubility, foam capacity and emulsion capacity.

Edible films have gained popularity worldwide in recent years, being used as a means of food preservation, they are biodegradable, have low costs, increase the duration of the fresh produce.

Edible films or coatings can be used to prevent exposure of food to a number of conditions that can cause changes in food quality and safety.

Research on the use of edible films as packaging materials continues because of the potential for these films to improve food quality, food safety and product durability. Besides acting as a barrier against mass diffusion (moisture, gases, and volatile), edible films can serve as support for a wide range of food additives, including flavorings, antioxidants, vitamins, and colorants. (Cagri, A., Ustunol, Z., Ryser,E.T.)

1. MATERIAL AND METHOD

1.1. GETTING MYOFIBRILLAR PROTEIN CONCETRATE

The protein extraction we used myofibrillar chosen from red meat. The meat was shredded with a Braun mixer, then homogenized with distilled water 5 min., Adjust pH to 10.8 with 1N NaOH or to pH 1.5 with 1N HCl to solubilise myofibrillar protein. It was left to stand an hour after that centrifuged at 3200rot/min, 15 min. After centrifugation supernatant was collected and the residue was removed (sarcoplasmatic protein, connective tissue and other components). The supernatant is treated with 1N HCl or 1N NaOH to precipitate myofibrillar protein (isoelectric pH-5, 4), which is washed twice with saline solution. Following centrifugation to obtain protein concentrate myofibrillar. All operations were performed at low temperature 0: 4°C.

The methods of extraction with distilled water or phosphate buffer and EDTA chosen to use the red meat, shredded, it was homogenized 5 min. distilled water or PBS and EDTA, left to stand 1 hour, then centrifuged and the residue is washed three times. Before the last centrifugation the suspension is passed through fine silk mesh to remove remaining stromal proteins. The operations were performed at low temperature 0: 4°C.

1.2 **CHARACTERIZATION OF MYOFIBRILLAR PROTEIN CONCENTRATE**

1.2.1 **CHEMICAL COMPOSITION**

In order to solve the experimental part the following Analysis Were Performed:

• humidity drying chamber at 100-104 ° C Until the constant mass in accordance with the method STAS 9065/3-1975 (term balance precise XM 60)

• nitrogen-total. The Determination of the total nitrogen content by the Kjeldahl method Performed WAS (STAS 9065/4-1981). The proteins global Were Calculated by the multiplication the total nitrogen by the factor 6.25;

• content-the grease WAS Determined by the Soxhlet extraction method by the organic solvents (STAS 9065/2-1973);

• ash-determined by calcination at 550 ° C., the furnace model LMH07/12-LAC.

1.2.2 **FUNCTIONAL POPERTIES OF MYOFIBRILLAR PROTEIN**

1.2.2.**1 FOAMING CAPACITY, FOAM STABILITY AND COLLAPSE**

Morra Method 1985.

Proteins have the ability to form foam (the foam) by incorporating air bubbles in a matrix protein. (Sathe & Salunkhe, 1981)

1.2.2.2 **EMULSIFYNG CAPACITY**

Method of Pearce and Kinsella, 1978

Emulsifying capacity is a method that establishes "ability" to incorporate protein processes of oil in the food industry.

1.2.2.3 **SOLUBILITY**

Solubility is a property that influences other functional properties of proteins miofibrilare: emulsification, foaming and jellification. Protein solubility is different for different values of pH.

Soluble protein at different pH's was determined by Kjeldahl method.

1.3.**FORMATION OF EDIBLE FILMS**

The protein solution was obtained filmable myofibrillar, glycerin and gelatin, pH adjusted to 7.0 (pH check was done with a pH meter-checker HANNA Instruments).

Filmable solution was heat treated (356 H-type water bath) to 70 ° C which was maintained for 30 min. Distortion causes disruption tertiary structures, secondary and quaternary protein structure does not produce any change in the primary, being disposed of disulfide bridges, hydrogen and ionic bonds in the protein molecule. After cooling to 20 ° C filmogenic 50 ml was transferred to a rectangular area of 260 cm2 and dried at room temperature.

1.3.1 **DETERMINATION OF FILM THICKNESS**

Film thickness was measured with micrometer, by averaging the five different measurements.

1.3.2 **MICROSTRUCTURE OF EDIBLE FILMS**

Surface structure of films was investigated using electron microscopy, Quanta 200 (Philips). 5x1 mm samples were then applied on a metallic surface. The surface coating film was studied without evidence and without special drying.

Numerous research involves assessing the edible films using SEM (Rhim and al., 2006, Chen and Lai, 2009; Garcı'a et al., 2009, Souza and al., 2010).

2. RESULT S AND DISCUSSION

2.1 **CHEMICAL COMPOSITION**

The chemical composition of protein concentrate obtained myofibrillar is shown below:

Chemical composition	UM	Protein solubilization at alkaline pH	Protein solubilization at acide pH	Extraction with distilled water	Phosphate extraction buffer
Humidity	%	83,55	85,05	86,15	82,69
Protein	%	15,01	13,41	12,61	16,37
Fat	%	0,32	0,33	0,33	0,300
Ash	%	0,085	0,096	0,092	0,101

2 2 **FUNCTIONAL POPERTIES OF MYOFIBRILLAR PROTEIN**

2.2..1 **FOAMING CAPACITY, FOAM STABILITY AND COLLAPSE**

Foaming capacity

Stability foam and collapse

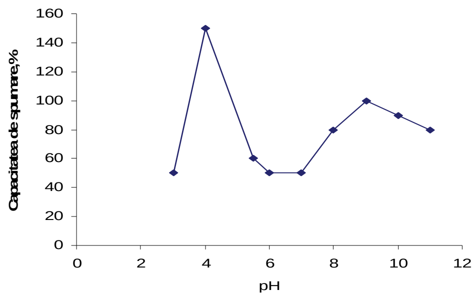


Fig. 1.Protein solubilization at alkaline pH

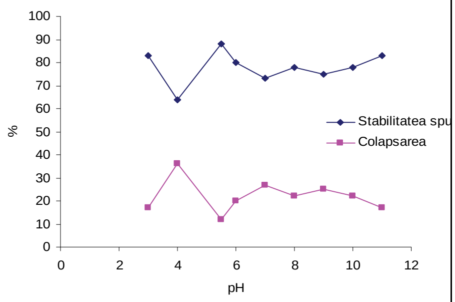


Fig. 2.Protein solubilization at alkaline pH

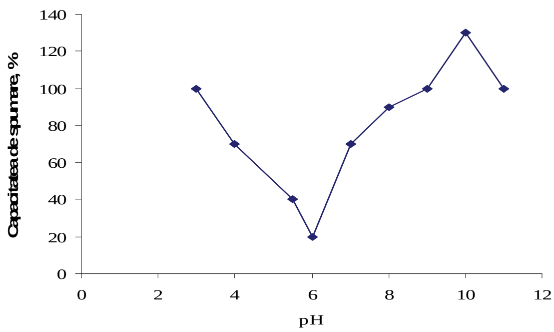


Fig. 3.Protein solubilization at acid pH

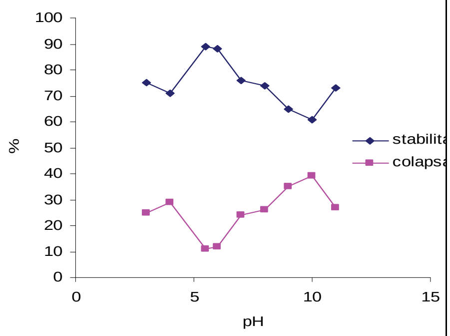


Fig. 4.Protein solubilization at acid pH

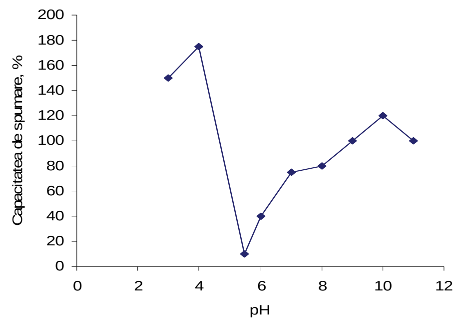


Fig.*5*.Extraction method with distilled water

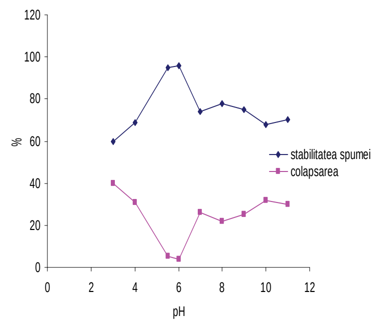


Fig. *6*.Extraction method with distilled water

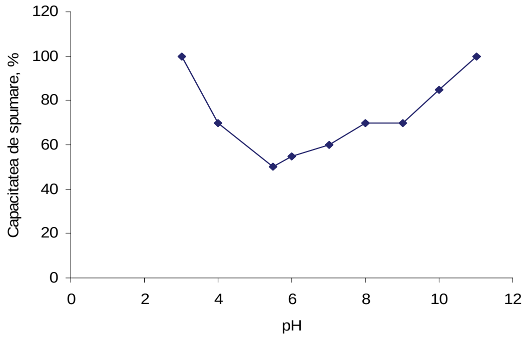


Fig.*7*. Phosphate extraction buffer

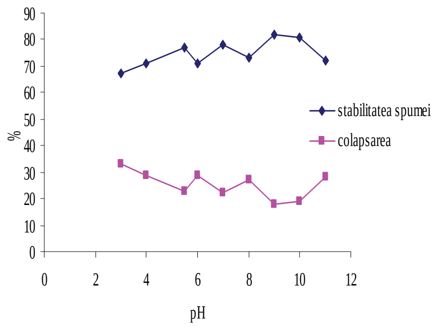


Fig.*8*. Phosphate extraction buffer

Foaming capacity and foam stability were determined by the method Sathe and Salunkhe (1981). After mixing the total volume was read.

Another method for determining the foaming capacity and foam stability was developed in 1996 by Wild and Clark .. To read the final volume of foam (foam capacity was calculated) and then by keeping the volume for 30 minutes at 25 ° C (foam stability was calculated).

In our case, whatever type of meat used or extraction method used we observed a minimum foaming capacity isoelectric pH (5.4 to 6).

Pig by the method of extraction and solubilization at alkaline pH isoelectric precipitation, the foaming capacity is maximal at acid pH (pH 4) drops to the isoelectric pH is minimal which is maintained constant up to pH 7, then has a upward trend in the alkaline pH. foaming ability to a minimum around the isoelectric pH value then we have an increase (up to pH 10.0).

The method of extraction by washing with distilled water, a decrease in foaming capacity at pH 4, where maximum by isoelectric pH which is minimal, then a continuous increase in the alkaline pH's.

The method of extraction by washing with PBS, has a maximum foaming capacity at pH 3 and pH 11 and a minimum at pH 5.5, pH decreases in the acid site by the isoelectric pH, increases in the alkaline pH's.

Foam stability is increased around 5.5 and 6.0 pH values, because the foaming capacity is minimal.

The same type of variations have been observed by other researchers. Also, they observed: the concentration of protein increases myofibrillar slurry increases the foaming capacity (Wild and Clark, 1996). The analysis performed indicates that any type of meat used for this study extracted by any of the listed capacity is minimal foaming at isoelectric pH, increasing the values of acidic and alkaline pH's. This is because the protein isoelectric pH myofibrillar have minimum solubility, so they do not incorporate air. The foaming of the hydrophobic proteins bound to the air and the hydrophilic to the water.

2.2.2 **EMULSIFYNG CAPACITY**

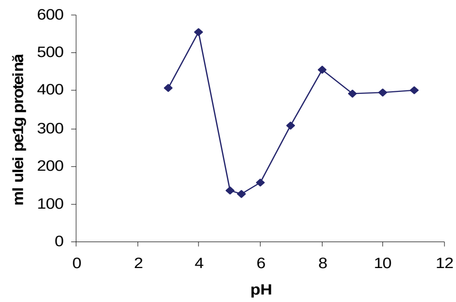


Fig. 10.Protein solubilization at alkaline pH

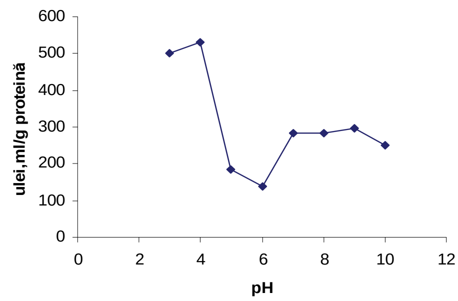


Fig. 11.Protein solubilization at acide pH

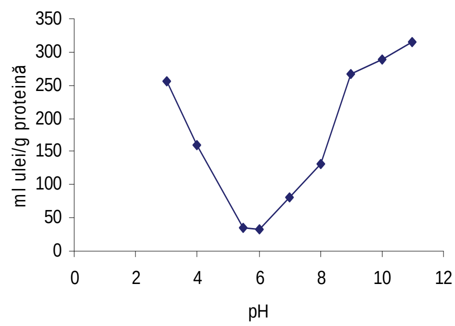


Fig.12. Extraction method with distilled water

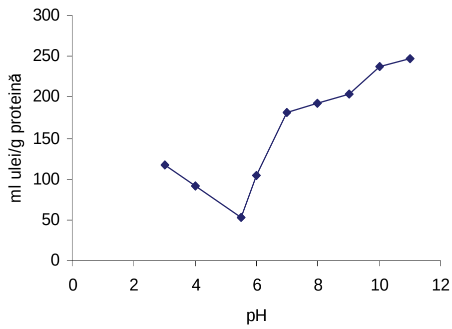


Fig..13. Phosphate extraction buffer

Emulsifying capacity, protein myofibrillar pork is pH dependent. The solutions used have pH values between 4 and 11. At acidic pH have a maximum, then decreases to a minimum at pH-5, 5, 6.0, and then emulsifying capacity increases with pH up to 9.0.

The same also identified Chove, Gradinson, & Lewis (2001) further studies. Other similar studies have been made and Taneyama Aoki, & Inam (1980).

2.2.3 **SOLUBILITY**

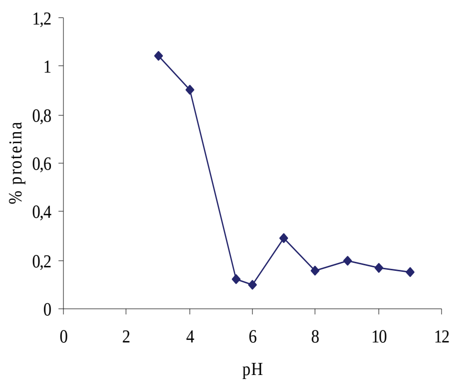


Fig.*15*. Protein solubilization at alkaline pH

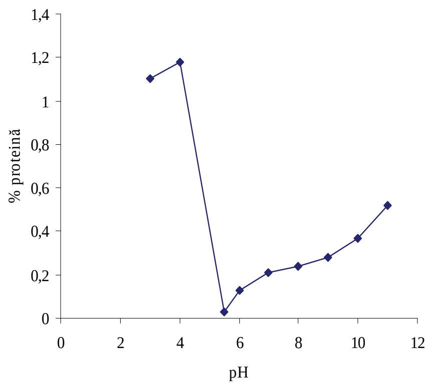


Fig.*16*. Protein solubilization at acide pH

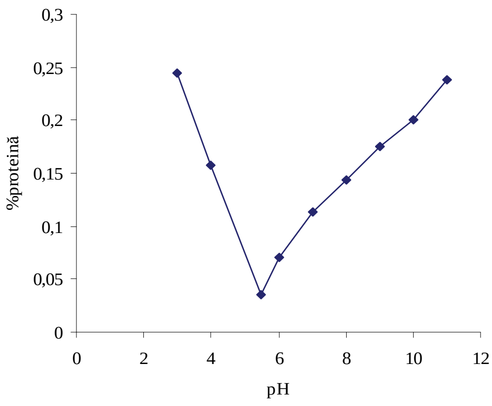


Fig*17*.. Extraction method with distilled water

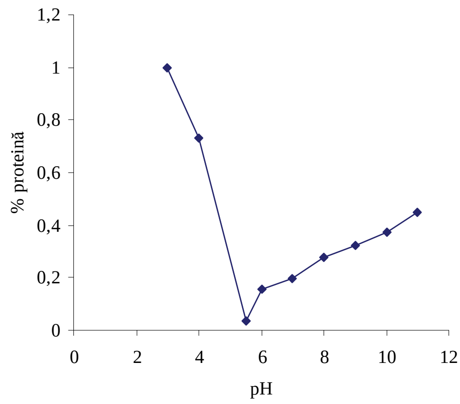


Fig.*18*. Phosphate extraction buffer

Protein solubility was determined as early as 1940 (Robinson & Hodgen), biuret method.

Determination of total nitrogen were made using the semimicro-Kjeldahl method and found:

- Method - the alkaline protein solubilization and isoelectric precipitation pH, protein is maximal at pH acid lowers the pH and isoelectric minimum, then increases at alkaline pH;
- Method - protein solubilization and acid precipitation at pH isoelectric pH, solubility is highest at acidic pH increased to alkaline pH and isoelectric minimum;

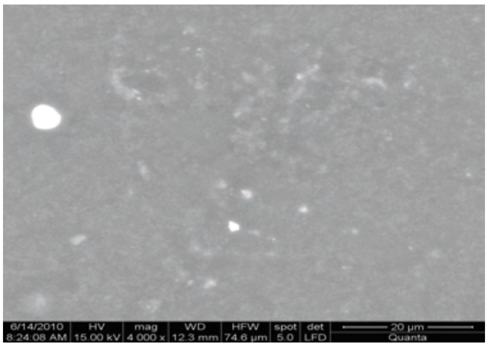
- Method-extraction by washing with distilled water, protein solubility is highest at acidic pH and alkaline pH and isoelectric minimum;
- Method - extraction by washing with PBS and EDTA, solubility is highest at acidic pH, isoelectric pH minimum, then increases in alkaline environments.

Regardless of the method of extraction, protein solubility is minimal at their isoelectric pH and the maximum at acidic pH.

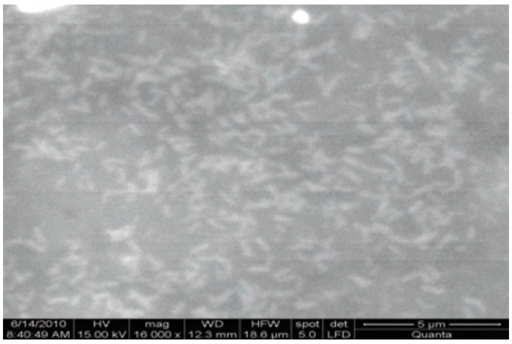
2.4 1 **DETERMINATION OF FILM THICKNESS**

Thickness, µm-128

3.5 **MICROSTRUCTURE OF EDIBLE FILMS**



4000x



4000x

Several works involving the Evaluation of edible films used SEM Have When trying to correlate the properties of films with the same morphological structure (Chen, Kuo, & Lai, 2009; Garcı'a et al., 2009; Rhim, Hong, Park, & Ng, 2006). Surface microphotographs showed a less homogeneous external structure, even if it is dense and cohesive. This heterogeneity is probably due to channels formed within the film structure, the water, drying, forming pores superficial, surface.

In addition to these channels, the matrix protein have been observed several white dots that could be some insoluble particles in low concentration saline solution. There were also observed, some discontinuity in the protein network, some cracks could be caused by treatment that includes a vacuum applied to the sample, in preparation for microscopy, vacuum can not remove the glycerin is completely miscible myofibrillar proteins.

The presence of cracks and pores in the film structure may compromise the structural integrity of the film and could cause changes in their functional properties.

Another phenomenon that can be explained by the migration of moisture during drying is the appearance of crystals on the surface of the film, visible in some regions they are not present throughout the area. This migration of salt takes place in parallel with the migration of moisture, is a mosaic.

Similar results were also observed in the work of other researchers: Yang and Froning, Sobral, Menegalli and Souza.

3. CONCLUSSIONS

I tried to emphasize the graphic changes emulsifying capacity of proteins extracted by different methods miofibrilare the same type of meat. This has been observed a decrease in emulsifying capacity:

•-alkaline extraction method;
• pH-acid extraction method;
•-distilled water extraction method;
•-phosphate buffer extraction method.

REFERENCES

1. *Petru Alexe*, "Unconventional protein sources," Academic Publishing, Vol, Lower Danube University of Galati.
2. *Constantin Banu, Aurelia Ionescu*, "Handbook of Practical Work in Technology and equipment for meat and fish", Galati 1984.
3. *Constantin Banu* ,Technology of meat and by-Didactic and Pedagogic Publishing House, Bucharest 1980.
4. *Cagri, A., Ustunol, Z., Ryser, ET* Antimicrobial edible films and coatings, Journal of Food Protection Pannipa Pongkongkaew and Watcharaporn Onseng, Preparation and Properties of Porcine Plasma Proteins-Polysaccharide Composite Films Thammasat Int. J. Sc. Tech., Vol 14, No. 2, April-June 2009
5. *Mariniello, L., Di Pierro, P., Esposito, C., Sorrentino, A., Masi, P., & Porta, R.* (2003). Preparation and mechanical properties of edible pectin-soy flour films obtained in the Absence or Presence of transglutaminase. Journal of Biotechnology, 102, 191-198.
6. *Coffmann & C.W. Coffmann and V.V. Garcia*, Functional properties and amino acid content of the protein isolated from mung bean flour, Journal of Food Technology 12 (1977), pp 473-484.
7. *Sze-Tao & Sathe K.W. Sze-Tao and S.K. Sathe*, Functional properties and in vitro digestibility of almond (Prunus dulcis L.) protein isolated, Food Chemistry 69 (2000) (2), pp 153-160. Abstract | View Record in Scopus | Cited By in Scopus (17)
8. *Vani & Zayas B. Vani and J.F. Zayas*, foaming properties of selected plant and animal proteins, Journal of Food Science 60 (1995) (5), pp 1025-1028.
9 Wild and Clark, P.J. Wild and D.C. Clark Foam formation and stability. In: G.M. Hall, Editor, Methods for testing protein functionality, Blackie Academic and Professional, London, England (1996), pp 110-148.
10 *Taneyama Aoki, & Inam* (Emulsifying properties of soy protein: Proteins and characteristics of. The first published online: 25 aug. 2006
11. *Sober ,Menegalli and Souza.* Characterization of Some functional properties of edible films based on muscle proteins of Nile Tilapia
12. *Paschoalick TM, Garcia FT, Sobral and AMQ*. Received 19 July 2002 Revised 18 November 2002 Accepted 11 December 2002. , Available online 28 March 2003.
13. *Gontard, N., and S.Guilbert*.in Food Packaging and Preservation. By Ed M. Mathlouthi, pp 159 181.Blackie Academic & Professional, Glasgoww 1994.
14. *Krochta, J. M., E.A. Nisperos-Carriedo and Baldwin M.,* and Coatings to Improve Food Edible Films Quality.Techonomic Publishing Company, Lancaster, Pennsylvania in 1994.

15. *Cuq.B., N. Gontard and S. Guilbert*, in: Active Food Packagings.Ed. by MLRooney: pp 111-142.Blackie Academic & Professional, Glasgoww 1995.

16. *S. Guilbert, B. Cuq. and N. Gontard*, Food Add. Cont.60 (1997) 741-751.

17. *Cuq.B., N. Gontard and S. Guilbert*, Cereal Chem.75 (1998)

18. *S. Guilbert, N. Gontard* and in Foods and Packaging Materials-Chemical Interactions.Ed. by P. Ackermann, M. and T. Ohlsson Jägerstad. pp.159-168.The Royal Society of Chemistry. Cambridge 1995**.**

19. *Wu, Hettiarachchy, & Qi U. Wu, S. Hettiarachchy and M. Qi,* Hydrophobicity, solubility, and emulsifying properties of soy protein peptides papain Prepared by Modification and ultrafiltration, Journal of American Oil Chemical Society 75 (1998) pp 450-845.

20. *David W. Stanley, Ashley P. Stone, Herbert O. Hultin* Chicken Beef and Solubility of Myofibrillar Proteins in Low Ionic Strength Media J. Agric. Food Chem., 1994, 42 (4), pp 863-867 Publication Date: April 1994

21. *Bernard Cuq, Nathalie Gontard, Jean-Louis Cuq, and Stéphane Guilbert* Ecole Nationale Superieure Agronomique of Montpellier, 2 Place Viale, 34060 Montpellier Cedex 1, France, ENSI-SIARC, 1101 Avenue Agropolis, BP 5098, 34033 Montpellier, France, and Laboratoire Food Genie biologique et des Sciences, University of Montpellier II, Place Eugène Bataillon, 34095 Montpellier, France), J. Agric. Food Chem., 1997, 45 (3), pp 622-626 Publication Date (Web): March 17, 1997 Copyright © 1997 American Chemical Society

22. *Kinsella (1976) J.E. Kinsella,* Functional properties of proteins in foods: A survey, CRC Critical Reviews in Food Science and Nutrition 7 (1976) (3), pp 219-280

23. -*Vani & Zayas (1995) B. Vani and J.F. Zayas,* Foaming properties of selected plant and animal proteins, Journal of Food Science 60 (1995) (5), pp 1025-1028

24. *Yang and Ffroning* –Evalution of protein in functionality Alkali Processed Surimi.

25. *Pearce, K. N., & Kinsella, J. E.* (1978). Emulsifying properties of proteins: Evaluation of a turbidimetric technique. Journal of Agricultural and Food Chemistry, 26, 716-723.

STATISTIC RESEARCH CONCERNING THE IDENTIFICATION OF SOME CHARACTERISTICS OF SHEEP DAIRY PRODUCTS PREPARING, OBTAINED IN THE SHEEPFOLD, SPECIFIC TO THE MOUNTAIN AREA IN THE SOUTH OF CARPATHIANS

IULIAN VLAD, CRISTINA PÎRVULEȚ [1],GHEORGHE SĂVOIU[2], MIRELA STANCIU[3]
[1]USAMV Bucureşti, [2]Universitatea din Piteşti, [3]Universitatea „Lucina Blaga" Sibiu
e-mail: [1]vladiul@yahoo.com, negre_cris @yahoo.com,
[2]mirela_stanciu2008@yahoo.com, [3] gsavoiu@yahoo.com

Key words: thematically aproached interview, sheepfold dairy products, traditional products, respondent.

SUMMARY

Presently, in global and long recession conditios, threats to Romanian econmy development multiply, especially to rural or traditional economy, such as grazing abandon which has negative involvements upon local food products, the severe diminishment of mountain pastoral population, especially of the medium number of a traditional farmstead which will not be able to offer alternatives by promoting some agro-tourist activities in these areas, the excessive ageing of rural population, the lack of a reasonable replacement rate within the young poulation, in comparison with the old one, which could ensure the survival of the main occupations and rural activities, the imminent dissapearance of some local traditional aliments, including the loss of food originality within some agro-tourist projects or services, the change of the originary use due to desertification processes, a systematic non-use and urbanization etc..If we make reference to a modern agriculture with all its operations within a distribution chain which starts with the financers and manufacturer companies and ends with the food products traders and processors, one may observe that the traditional agriculture is endangered, being replaced with an agro-alimentary industry. If we think of the modern tourism, one can offer survival chances to the agro-tourism , but only in the context of its correlation with the agricultural activities, which should turn into a more efficient one, in economic terms, by season compensations and by maintaining the occupational and specific consumption traditions .The present work represents a synthesis of a statistic research achieved within the project financed with European funds, entitled ''Mountain resources and sustainable development" (RO 0010 PMS 29 – small grants project approved within the Demand of projects offers– Second Round in the Financiary Mechanism of the European Economic Area (SEE), The Fund for NGOs in 2010).

The dairy products theme primary approach requests a previous explanation of its location in the economic life forefront of the three selected and studied localities in the sub-mountain area of Carpathians. Vaideeni, Corbeni, Rucărul and Domneşti localities engender pastoral activities traditions with other activities centred on local resources, starting with seasonal tourism and forest activities with remarkable results in semi-manufactured products and even in craft products, reaching a terminal limit in Domneşti with the profile change into a distinct industrial production activity which has as final product the so-called terracota, which valorizes local clay's special properties.

Another significant reason, for prioritary preparation hierarchy and for dairy products individual exploitation and valorization, is rendered by the fact that the ever lower price of an essential sheepfold product, such as wool price, was practically excluded out of the first importance sheepfold products, such as it is, as well as, later processed, starting with textile articles and clothes, to carpets. The topic of traditional sheepfold dairy products becomes ever serious and individualizes the grazing types, and furthermore, in the conditions of European Union adhering and integration, attracts researchers'attention, researchers who gathered a wide documentary material, along the time, but at the same time it attracts the attention of local authorities,fact which supposes an economic potential which has a high importance degree according to the cultural patrimonial values whose implementation is really imperative.

If in the past, more evolved grazing such as herd moving produced a surplus concerning the first degree products obtained with this old occupation (as well dairy as wool products), surplus which was traded, presently, the phenomenon is restricted and submitted to a special treatment, especially as a consequence of the products quality, products which are on the market, and of the rules which appeared after the integration in the EU. To the normal restraints concerning the quality, there are also added the involvements related to their protection. Rural Romania, and especially the mountain one, still produce traditional products appreciated as well by Romanians as by foreigners. As a consequnce, these traditional products must be protected lest to be manufactured in other country by adulteration and even by intelectual theft. In this context, within the adhering negotiations to the Communitary Police, Romania asked protection for more tradtional products such as: milk, yoghurt, green ewe cheese, cheese, hard cheese, cottage cheese, sausages, ham varieties, black-pudding, bacon, spirits distilled from fruit etc. The legal framework for the protection of the Romanian traditional products concerning the geographical denominations, the original names of agricultural and food products as well as the protection of the originality certificates were firstly delimited and later they caught shape by the orders issued by the Agriculture, Forest, amd Rural Development Ministry (233/2004 Order whih approved the norms for the originality certificates and the 212/2004 Order which defined the geographical indications and the origin denominations protected in Romania). The geographical indication helps to identify an originary product whose quality characteristics may be lent to a certain locality. The originality (specificity) is rendered by a series of characteristics which differentiate clearly a food or agricultural product from other similar products in the same category. It is obvious that these characteristics concerning origin designation, the origin and specificacity indicator must be protected and communicated at an an international level, like in case of trades.This operation requests a mentality and traditions change, as well as an adequate infrastructure, from checking to recording, getting closer the concept of classical cultural patrimony to the Japonese contemporary one.

As a general remark, the products variety seems surprising and the multitude of preparing procedures, their exploitation and valorization but more interesting is the fact that, especially along the Carpathians, in the areas directly influenced by the margineni herds moving grazing, there will be discovered the products which are considered as close to the traditional idea of gastronomic perfection, of a more restraint diversity, but in a larger quantity and touching a higher level, concerning the profit, and their special quality. That's the way some differences appear, but which risk to vanish rapidly, especially concerning the preparing, exploitation and individual valorization of milk. Conservatorism and diversity engender today in the mentioned areas, cancelling the woman prohibition to the pastoral life[6], an old and harsh measure for men's protection in order to prohibit women's access to a field which belonged only to men, such as the one of pastoral life, but also man's unwitnessed desire to protect women and children by these severe life dificulties but sometimes this life proved to be harsh even with its followers.

1. MATERIAL AND METHOD

The research geographical area was represented by the localities which still shelter ungureni people , denomination of the shepherds in Vaideeni and Corbeni area , the way almost all the shepherds in Domneşti or Rucăr monographies used to appear , all of them being localities placed under the South slope of Western Carpathian, to the east of the Olt river, animals breeders who kept along centuries their customs concerning the sheep breeding and their traditional methods concerning the sheepfold products preparing, in terms of a typological conservatory dominance under the impact of a sheep breeding economic efficiency (a typically male thinking), engendered with the area creativity and originality (a feminin approach, specific to shepherds wives).

As an outline, the research acknowledged that the „ungureni"'s grazing from the areas situated at the south slope of Western Carpathians, and to the east of the Olt river, still presents the three forms of ewe dairy products preparing , in comparison with the sheepfold based exclusively on the shepard's conservatorism, with the sheepfold dominated by his wife originality, and the mixed variant, with a significant impact as well. In comparison with the related families structure, due to the strength and the health status of traditional sepherds family members, the products diversity of ewe milk stays the survival proof for the poienăreşti families, from the Sebeş Border, but also for the harmonization of these preparing ways in the subsistence sheepfold with shepherds and their wives at the same time.

The method used within this research was the one of the semistructured individual interval which only established the debate topics, respecting the specific methodological requests, which makes it different from the alternative of the structured interview. More empathy and ability than it was foreseen was proven , from the part of the people who guided the interview, in order to reach the results obtained in the 23 interviewed families. The small interview guide, with whom the field team was endowed, was made of three teams each of them being made of two researchers.

[6]The prohibition for women to participate to the pastoral life, and even to any contact with this activity, appears in some ancient traditions, as in the case of living fire, respected in the centre and north of the country (Tiberiu Morariu, *Contribuţiuni la aprinderea focului viu în Ardeal, Maramureş şi Bucovina,* în *Anuarul arhivei de folclor,* IV, 1937, pag. 229—236; Ion Muşlea, *Materiale pentru cunoaşterea şi răspîndirea „focului viu" la români, Anuarul arhivei de folclor,* IV, 1937, pag. 237—242; Traian Herseni, *Probleme, Anuarul arhivei de folclor,* IV, 1937, pag. 168 — 169).

Research mehodological guide based on the semi-structured interview

Box no. 1

Major themes to mention in writing, as a consequence of the dialogue in the shepherds family l. Pastoral customs knowledge. Note: There will be identified the main local religious fests with pastoral impact (related to the moving of herds towards the mountains, lambs parturition, the local Nedeia or shepherds and their wives field fest, other fests). Regularly, all these traditions being linked to important Saints in the area, and shepherds grazing tradition will be identified if the producers are really traditionalist, in terms of major occupational customs. 2.Fairs. Note: The fairs are in the area, having a double impact (a religious fest is doubled by shepherds traditional fest, related to specific products sell, starting with cheese and finalizing with wool products etc.)... 3.Nedeia fest .... 4.Other fests.. 5.Other religious and pastoral events 2.Sheepfold products and their organoleptical traits, preparing way, keeping, valorization (medium price), specific consumption on a production unit...................... 3. The use of subproducts resulted from milk processing (whey milk, milk rests) .... 4.Sheepfold pigs breeding, pigs were fed with milk rests... 5.Soil natural fertilization (animals overnight staying in railed areas)... 6.Regularly checked tourist structures number, dependant on pastoral or traditional customs .... 7.Workshops and craftsmanship for pastoral activities with products valorization ....

A small part from this research results are being detailed in a sensibly synthetysing manner, respecting shepherds families methods originality and their products preparing description, description made by the interviewed people.

2. RESULTS AND DISCUSSIONS

Traditional and specific sheepfold products, obtained from milk in the studied area

From the careful observation of the pastoral farmsteads , of sheepfolds and specific herds moving , one may acknowledge the existance within the inferior grazing categories of the following dairy products – such as the ones which belong to the local type adequate to the local or sedentary moving of herds, but also to mixed breding on the grasslands near the villages or to mixed breeding of animals , which spent the summer on different grasslands and the winter in shelters within the borders .

Green ewe cheese and cheese preparing method represents a three steps process, namely milk curdling, whey milk extraction and green ewe cheese transforming in cheese (the proper green ewe cheese), as well as soft cottage cheese and other products obtaining from the rests which remaines after making the green ewe cheese; these rests are boiled or fed to animals. The first step, the one of milk coagulation and its transforming in green ewe cheese is practically the same for all grazing kinds and in all the areas of pastoral moving of herds , the only differences are concerning the tools and the terminology .The green ewe cheese production is and it will remain a procedure made without fire, using the abomasum. After the whey milk is extracted, the green ewe cheese is put to yeast . The remaining whey milk is put into a large bowl, which will be put to boil later .When the whey milk boils , it is continuously mixed not to stick to the bottom of the bowl , until the soft cottage cheese appears. The soft cottage cheese and the green ewe cheese are prepared and traded in the same way, they are mixed and cut and, then they are made more or less salty. All these series of actions are met in all the sheepfolds, and the differences are only given by words or name of the bowl where the milk coagulates, by the strainer, or by the tool which mixes the milk or by the method which extracts the whey milk from the cheese etc. The activities in the traditional sheepfold generate not only originary food products but also unforgetable phrases. So that, what it remains, after kneading the green ewe cheese is submitted to some mixing processes or continuous balance, until the butter is obtained, hence the famous phrase (obtain everything from a person).

Naturally, in different mountain areas, there are identified a specific seasonality and periodicity in preparing and trading sheepfold dairy products. As an outline, one may assert that once with the the end of April and mostly once with the beginning of May, one may begin to prepare the green ewe chesese or normal cheese, and in August and September, there is prepared and stocked the the bladder cheese, and concerning the products obtained from sour milk or winter milk , starting with the winter coming, since the end of Sepember and the beginning of October, one may pass to the production and stocking of these products.

In order to distinguish better the differences , it is requested a detailed presentation of some products specific to the mountain area previously described. Among the specific products, one may remark: *the smoked gren ewe cheese, the salty gren ewe cheese, the bladder cheese, the sour milk or the soft cottage cheese.*

The Rucar area was and remained famous due to its smoked and salty green ewe cheese.In Brasov archives, there are mentioned three merchants from Rucăr area, still since 1503, who merchandised wool, skins and green ewe cheese.Their place was where the green ewe cheese was produced, in the northern part of today’s Rucar locality, on the estates belonging to Idonoşoiu, Şandru and Simion families. Around 1672, Istratie from Rucăr put himself as a pledge, in front of a Turkish merchant, for about 3000 lbs of green ewe cheese, attesting and foreseeing the rich traditions of Rucar today’s green ewe cheese.

The smoked green ewe cheese is obtained from the fresh green ewe cheese, namely not leavened, which was cut into pieces and then it was kept in pickle for a few days, then it was preserved smoked.

The salty green ewe cheese is also prepared from the fresh one, which is put into a large cast-iron kettle with fresh whey, mixing with a big spoon , or there are introduced slices of green ewe cheese in boiled water and they are mixed until it is obtained a dough which might be moulded, the way one wishes .After some days, the green ewe cheese is taken out of the moulds and put to smoke for some weeks. Here it is a statement of *Pârnuță Dumitru*, a shepherd from the Rucar mountain corridor about how the bladdder cheese is prepared : „*The only one who takes care of shepherds food and the way it is prepared , is the shepherd, since he was born. After the milk is milked , it is drained and thencoagulated. But , we don't add anything else than milk abomasum. Then, it is well squized and put to leaven in a fir tree bark .When it was leavened well enough, it is put in fir tree bladders or little baskets .If it is put only in these baskets , it is salted more... "*

In Vaideeni traditions , *the curdled sour milk is made so hard as you can cut it by kinfe.It is often called winter milk* „ The curdled milk is continuously prepared , if there are kept some helpings of leaven , from a product to another , which are added in the boiled and cooled milk , then it is well mixed and covered with a fur, and only after three hours, it is put to cool*..."* (the way we find out from *Fiuca or Sofia and from Gheorghiță Filipoiu*). Famous in Vaideeni was and still is the very fat milk which is milked before weaning the ewes, this one being the milk which gives the hard sour milk or the green ewe cheese.

In Corbeni areas, the bladder cheese and the soft cootage cheese are very appreciated, a shepherd's wife, *Anca Avram,* from those areas remarks.The bladder cheese is put into the ewe skin in order to receive a good flavour , then into fir tree bark or between fir tree branches .This cheese is prepared in the sheepfold for about 4 months in a year , and remains a specific product of Ungureni people (only between 21 May and 8September). The ewes are milked, the milk is drained and warmed to reach (about 30°C), it is well mixed and then a cheese roll is formed Then, it is let to drain, and to leaven (it is put to leaven, like the bread). The soft cottage cheese is prepared in the sheepfold starting with May till September .The whey is boiled into a large kettle and before boiling, on the surface we find the soft cottage cheese. The cheese is taken with a strainer and put to drain. *After it was drained, about 24 hours, it is rubbed with a little salt and put into small sacks, forsome days or even 30 days.* It is cut into pieces and it is kept in the freezer . From about 100 ewe, we can obtain 1 - 2 kg soft cottage cheese per day for 4 months (according to *Mihai Son*). *Corbeni cottage cheese is prepared in the sheepfold a week before Saint Gheorghe* and ending with May (abou one month).The preparing way may be different from a sheepfold to another, but mostly, the raw materials are the same, the grassland being the one which gives quality to the product. In Corbeni, the ewes are milked, the milk is drained and warmed (at about 30°C). Lamb abomasum is added (100 litters of ewe milk is mixed with 20 spoons of lamb abomasum) and it is let for 20-30 minutes until it coagulates. The product is taken and put into a wooden bowl to drain). There, it is cut into small cubes and put to drain again for about the same time). It is put into prickle for about 24 hours, then it is put into plastic boxes (first a salt layer, after a cheese layer and so on so forth, and it is completed with the prickle the cheese was in). From 100 milk litters, one may obtain over 12 kg of cottage cheese (*according to Ionel Ciobanu*).

An important part of sheepfold traditional products are obtained from the studied area milk, and unfortunately, they dissapeared, or they remained only in our grandparents'memory. The soft cootage cheese preserved in cheese, made of layers or or slices of green ewe cheese, had the taste of the hard cheese we eat, but it didn't succed insurviving until nowadays. The green ewe cheese forms still live only in the memory of the old ones, the same happens with the fairs, which dissapearred long ago, so their impact and traditionality.

The way our grandparents remember the customs of their predecesors, the green ewe cheese was done from sweet green ewe cheese, cut into slices and put into hot water, where they were kept for some minutes, and afterwards, the salt was added and it was put to get dried.After having dried well, it was preserved in barrels with cheese. (Gheorghe Stan from in Vaideeni, telling about the products n the fairs which used to be).

The conclusions we may reach are connected to the quality of these products , obtained from sour milk, which are better received in human beings food , for a part from the lactose is turned into lactic acid , and within the general framework of the analysis , one may acknowledge remarkable differences among the areas we presented before. Generally, not dairy products determine a certain kind of grazing, but the opposite .In this respect, one may identify certain obvious correlations among evolution levels of the grazing types and dairy products perfectioning. The dairy products variety, one can meet within a local or regional grazing procedure, or more evolved grazing types like the ones in the hays are characterized by small number of dairy products, but however produced in large quantities, namely, butter, bladder cheese and more recently the cottage cheese.

3. CONCLUSIONS

Rural Romania still makes many dairy products which are appreciated both by Romanians and foreigners. As a consequence, these traditional products must be protected so that they can't be produced in other countries. In this context, within the negotiaions to the Communitary Politics adhering , we asked protection for more tradional product such as: milk, green ewe cheese, yoghurt, hard cheese, cottage cheese, sausages, liverwurst, ham varieties, mosaic salami, fruit spirits etc. The legal framework of traditional Romanian products, concening geographical indexes as well as the protectoion of specificity certificates were firstly demarcated and then they materialized into the orders emitted by the Agriculture, Forest and Rural Development Ministry. 233/2004 Order which approved the norms for specificity certificates and 212/2004 Order which defined the geographical indexes and the origin denominations protected in Romania (some examples appear in annex no. 1).

Development normality must be directed towards important local products in order to preserve nature (High Nature Value Products). They are the products which help to maintain the natural landscapes in rural areas, by continuing the agricultural practices in a traditional way , practices which are still spplied by farmers for animals breeding and fields management. At the same time, the local products are an important principle in local economy development. Food and agricultural practices by which, the land, grasslands, hays and orchards are managed , but also the way animals are reared, play an essential role both in creating and maintaining local culture, landscape, but especially for children and people health. Thus, obtaining and trading local food products represents a catalyser for the maintaining and development of community, and at the same time a source of sustainable benefits for local economies. An important local product for nature preservement is that product which helps to the rural area biodiversity preservement, to habitats and rural landscapes preservement as well to the natural resources protection.

The mountain village as a system or as a whole of the Carpathian or sub-carpathian rural community from Sibiu Border, means a lot for the pereniality of this nation, in comparison with the simple aggregation of all results processed from the interviews in the localities mentioned before, which constituted **the economic, geographical and demographical basis of the effected statistical researc**h **(Vaideeni, Corbeni, Domnești and Rucăr**).

The systems theory seems to be well-known by Romanian peasants, reconciled with his thoughts, and his reconciliation comes from his deep religious occupational traditional nature, according to his answer to the question upon the Romanian village , an answer which is deeply philosophical , similar to the idea that any system means much more than the sum of its parts: "*The world, the way it is, it is well built; you can't change it. The world is a whole and we are inside it .Well, here the Sun is after the hill and it is about to set. If it didn't want to rise, what would we do? To whom to speak, to whom to command? You may build a factory or a car , but how can you change the way Sun works or how can you mend it if it doesn't work ? There is somewhere a power we can't defeat , a power which keeps things together and which is above all lof us.."* (Ernest Bernea)

The sheepfold represents more, much more than the aggregated result of a pastoral traditional activity, being in fact a passport of the shepherd to the eternity, the modern ecological referential of the new agriculture and its redefined derived product by new animal products of modern animal husbandry, based on ecological requests and traditionality, in the culinary area of the universality, which history can't do anything else than to confirm it again and again.

REFERENCES

1. *Aubert, C.,* (1970), L'agriculture biologique, Ed Paris.
2. *Aubert C. et Leclerc, B.*, (2003), Bio, raisonnée, OGM, Quelle agriculture dans notre assiette? Terre Vivante, Paris.
3. *Brown L., R.,* (2006), Plan B2.0: Rescuing a Planet Under Stress and a Civilization in Trouble. *2006*, apărută şi la Bucureşti, în Editura tehnică, sub titlul Planul B 2.0 Salvarea unei planete sub presiune şi a unei civilizaţii în impas.
4. *Brown L. R.,* (1995), Who will feed China?: Wake-Up Call for a Small Planet, Worldwatch Environmental Alert Series.
5. *Dinu, I. D.,* (1996), Animalele şi omenirea, Biblioteca zootehnică, Bucureşti.
6. *Rosener, W.,* (2003),Ţăranii în istoria Europei, Ed. Polirom, Iaşi.
7. *Săvoiu G.,* (2006), Populaţia lumii între explozie şi implozie demografică, Ed. International University Press, Bucureşti.
8. *Săvoiu, G,* (2007), Statistica.Un mod ştiinţific de gândire, Ed.Universitară, Bucureşti.
9. *Spengler, O.*, (1929), The Decline of the West, vol. II, New York Knopf.
10. *Stahl, H., Stahl P*., (1968), Civilizaţia vechilor sate româneşti, Editura Ştiinţifică, Bucureşti.
11. *Trebici V.* (1985), Mică enciclopedie de statistică, Editura Ştiinţifică şi Enciclopedică, Bucureşti.
12. *Wolf, E. R.* (1966), *Peasants*. Englewood Cliffs, NJ: Prentice-Hall.
13. *** www.insse.ro
14. *** http://ec.europa.eu/agriculture/organic/splash_en

Annex 1

The list of geographical indexes and origin denominations protected and recognized in Romania, for food products

A. Dairy products	- of Sibiu;	- of Brădet;
Milk: :	- of Alba;	- of Vidraru;
- of Dorna;	- of Bistrita	- of Râuşor;
- Cedra of Apuseni;	- of Homorod	- of Argeş*;
- of Cluj;	- of Brădet;	- of Covasna;
- of Covasna;	- of Rarău;	- of Dorna.
- of Satu Mare;	- of Covasna;	*Cottage cheese:*
- of Harghita;	- of Sibiu;	- of Braşov;
- of Rarău.	- of Arad;	- of Huedin;
Ioghurtt:	- of Satu Mare;	- of Argeş*;
- Cedra of Apuseni;	- of Harghita.	- of Carei;
- of Satu Mare;	*Caşcaval:*	- of Oaş;
- Napoca.	- of Rucăr*;	- of Vâlcea*;
Sour milk:	- of Bobâlna;	- of Sibiu;
- of Harghita.	- of Tarniţa;	- of Harghita.
Green ewe cheese:	- of Dej;	**B. Meat products**
- of Oaş;	- of Moeciu;	*Salami:*
- Baschiu;	- of Vidraru;	- of Sibiu.
- of Alba;	- of Mateiaş;	*Sausages:*
- of Sibiu.	- of Râuşor;	- of Pleşcoi.
Cheese:	- of Satu Mare;	**C. Bakery products**
- of Moeciu;	- of Carei;	*Bread:*
- of Făgăraş;	- of Napoca;	- From Ardeal with potatoes;
- of Ţaga;	- of Hârlău;	- From Ardeal with the roasted surface'
- of Năsal;	- of Dobrogea;	*Brezzels:*
- of Vlădeasa;	- of Feteşti;	- of Buzău;
- of Mănăştur;	- of Penteleu;	- of Braşov.
- of Satu Mare;	- of Harghita;	Pie *:*
- of Moldova;	- of Ciuc;	- From Dobrogea.
- of Dorna;	- of Sibiu;	**D. Processed fruit**
- of Napoca;	- of Rarău;	- jam from Râureni plums
- *	-*	- jam from Topoloveni plums

Source: *Turism rural. Tratat*. Ed CH. Beck, Bucureşti, 2010 ., example presented by authors in the treaty annexes .

Note*: There are requested detailings for the products in Argeş and Vâlcea counties, concerning the four localities presented in the research.

The 39th International Session of Scientific Communications of the Faculty of Animal Science, Bucharest, Romania
Scientific papers (seria D; vol. LIII) – Animal Science

THE INFLUENCE OF THE USE OF AN ENZYMATIC PRODUCT WITH XYLANASE TO THE FLOURS PANIFICATION TRAITS

MONICA MARIN, ELENA POGURSCHI, D.DRĂGOTOIU

Key words: xylanase, flour, panification traits, rye flour, wheat flour.

SUMMARY

With increasing consumer demand for high quality products with low fat content, enzymatic technologies make it possible to control the consistency of dough and hard dough workability with low fat content.

The action of Pentopan Monothis, enzymatical product with xylanase, begins by the time of the kneading and continues by the time of the fermentation process, making the getting of one soft and elastic paste. Xylanase has been suggested that use could cause water pentozans redistribution in gluten phase, favoring extensibility and behavior resulting in better baking.

By using the rye flour in panification a various sortiment of products can be made, having a different nutritive value, shape, taste and colour. The rye flour is different by the way the core's colour is at a white bread or a black bread, and it may taste a little bit as rye. [4] The rye bread may be made only from base ingredients, such as wheat and rye flour, water, yeast and salt, but it may also contain other ingredients, like: molasses, potato flour, sugar, fats, whey, milk powder, which have the role to make the smell, the taste and the product's colour better or to lenghten the product's preservation time.

The rye flour contains pentozans, which prevent gluten which appears during beating of the leavens. The partial enzimatical hydrolise of pentozans makes the leavens better and it increases the bread's volume. Recently, it has been discovered that nonstarch poliglucides, such as arabinoxylanases and β-glucanases play an important role in the panification process and that that quality can increase by using hemicelulases and β-glucanases. [5] The white wheat flour contains 2,5 – 3 %, the integral wheat flour contains almost 5 % and the rye flour contains 8 % hemicelulose, which has an important role in fastening the water to the leavens. Pentosans can fasten almost 6,5 times more water in their mass and they can contribute with almost three times more to fasten the water to the leaven. [2]

Adding pentozanases in the leaven proved to have a big effect over making the bread last longer and in the rye bread's case, it will shorten the leaven's evolution time and the energy consumption during the fermentation. [1]

1. MATERIAL AND METHOD

The enzymatic product "Pentopan Mono" has a fungical characteristic, as beige powder, and with an enzymatic action of 12,5 U/g.

During the researches 6 recipes of bread made, respectively a control batch and 5 experimental batches in which different quantities of enzimathic product was introduced. The followed purposes were represented by the quality indicators of bread, respectively the nominal volume, the volume, the altitude, the diameter, the porosity, the elasticity, the humidity and acidity (table 1).

Table 1

The experimental scheme

Number batch	The quantity of enzymatic product used	Objectives
Control batch	Except enzymatic product	► the quality indicators of bread (nominal mass, volume, height, diameter, report H/D) ► the physical-chemical indicators of bread (porosity, acidity, humidity, elasticity)
Exper. batch 1	With addition of 0,4 g Pentopan Mono/10 kg flour	
Exper. batch 2	With addition of 0,8 g Pentopan Mono/10 kg flour	
Exper. batch 3	With addition of 1,0 g Pentopan Mono/10 kg flour	
Exper. batch 4	With addition of 1,2 g Pentopan Mono/10 kg flour	
Exper. batch 5	With addition of 1,4 g Pentopan Mono/10 kg flour	

In table 2 are presented the recipes and the technology parameters which were used during the experimental period.

Table 2

The recipes and technologicals parameters used in experiments

Raw materials and technological regime	Indirect method																	
	Total						Leaven						Paste					
	M	P1	P2	P3	P4	P5	M	P1	P2	P3	P4	P5	M	P1	P2	P3	P4	P5
Wheat flour, kg	7	7	7	7	7	7	5	5	5	5	5	5	2	2	2	2	2	2
Rye flour, kg	3	3	3	3	3	3	-	-	-	-	-	-	3	3	3	3	3	3
Watter, l	5	5	5	5	5	5	2,5	2,5	2,5	2,5	2,5	2,5	2,5	2,5	2,5	2,5	2,5	2,5
Yeast, g	250	250	250	250	250	250	250	250	250	250	250	250	-	-	-	-	-	-
Salt, g	150	150	150	150	150	150	-	-	-	-	-	-	150	150	150	150	150	120
Pentopan, g	-	0,4	0,8	1,0	1,2	1,4	-	-	-	-	-	-	-	0,4	0,8	1,0	1,2	1,4
TFr, min.	-	-	-	-	-	-	5	5	5	5	5	5	-	-	-	-	-	-
TFe, min.	-	-	-	-	-	-	120	120	120	120	120	120	-	-	-	-	-	-
TFr, min.	-	-	-	-	-	-	-	-	-	-	-	-	8	8	8	8	8	8
Td, min.	-	-	-	-	-	-	-	-	-	-	-	-	40	30	30	30	30	30
Tc, min.	-	-	-	-	-	-	-	-	-	-	-	-	30	30	30	30	30	30
T oven, °C	-	-	-	-	-	-	-	-	-	-	-	-	220…230					

TFr = time kneading leaven, paste; TFe = time fermentation leaven; Td = time rise paste; Tc = time baking; T oven = temperature in oven.

Every experimental lot was composed of 15 loaves, which were obtained with the direct procedure, which follows the next steps: the kneading, the dough fermentation, the dough re-fermentation, dough separation, the modeling of dough parts, the re-yeast of dough parts, the final fermentation of dough parts and the baking, in sealed poliethilen bags.

2. RESULTS AND DISCUSSIONS

The quality indicators of the final bread, which were settled to 3, 24, 48, and 72 hours from their baking, are presented in table 3.

Table 3

The quality indicators of breads regarding their dimension

Quality indicator	Time after baking (hours)	M	P1	P2	P3	P4	P5
Nominal mass, g	3 24 48 72	529 526 518 516	530 528 519 517	528 526 520 516	531 527 521 518	530 528 521 518	533 530 524 520
Volume, cm^3/100 g product	3 24 48 72	290 286 282 278	296 289 283 280	300 297 290 288	307 303 297 290	313 305 298 292	321 317 310 303

The nominal mass of bread isn't influenced by the addison of xylanase. It was diminished in time, a slower diminution being observed at the test number 5, where the enzimathic products was 1,4 g/10 kg flour.

The volume of bread has raised a increased tendency to the experimental batches, and the loaves of test number 5 were maintaining the highest volume comparatively to the other experimental batches, respectively 303 cm^3/100 g product in 72 hours from the baking, that is 8% more than the control test.

The volume of the loaves was superior to all experimental batches, comparing the loaves obtained without addition of proteolitic enzimathic product.

The physic-chemical indicators of bread analyzed in the experimental period are presented in table 4.

The porosity of bread was the highest in test number 2 (0,8 g Pentopan/10 kg flour) at 3 hours from baking, with 5,7% comparing with the control test, maintaining itself in time (70% at 72 hours from baking).

Regarding the elasticity, it was improved starting with the rising of enzyme dose, being higher at test number 5 (raising at 3 hours from baking with 16,4% in comparation with the control test, 8,9% more than test number 1, 2,4% in comparation with tests number 2, 3 and 1,22% more than test number 4). In time, the elasticity was diminuated, but maintaining at the higher level at the loaves with an enzymatic product of 1,4 g Pentopan/10 kg flour.

Table 4

The physical-chemical indicators of breads obtained in the experimental period

Quality indicator	Time after baking (hours)	M	P1	P2	P3	P4	P5
Porosity, %	3	70	72	74	71	72	70
	24	70	72	72	70	71	69
	48	70	72	71	70	71	70
	72	69	71	70	70	71	67
Elasticity, %	3	73	78	83	83	84	85
	24	68	73	78	81	79	82
	48	68	71	73	77	77	80
	72	66	69	70	74	74	77
Humidity, %	3	40,31	42,76	43,06	43,32	43,81	43,93
	24	39,70	42,35	42,48	42,79	43,06	43,01
	48	39,22	42,22	42,05	42,21	42,59	42,69
	72	38,91	41,09	41,37	41,86	41,93	41,91
Acidity, degree	3	4,8	4,9	4,8	5,0	5,0	5,1
	24	4,5	4,4	4,4	4,8	4,6	4,6
	48	4,3	4,4	4,2	4,4	4,4	4,4
	72	4,1	4,0	4,2	4,2	4,1	4,2

The humidity was maintained in relatively constant limits at all the analyzed loaves, and it was slowly increased by the dose of enzyme used.

The acidity has presented at 3 hours from baking a rising proportional with the used of enzymatic dose, so that after to decrease at all tests, that is at 72 hours the values were close at all tests (4-4,2 degrees).

Selinheimo E. (2006) established that the improvements over the bread's volume were presented as obtained with both the α-amylase enzyme preparations and xilanolitice with preparations, moreover, showed that simultaneous use of α-amylase and xylanase has a complementary effect, enhancing the quality of bread, both in terms of increasing volume and reducing aging.

The influence of enzymes on water distribution, both in the dough and in bread may be one reason for the favorable results of the volume, texture and stability.

3. CONCLUSIONS

- In case when using an optimal doses of enzymatic product with xylanase (1,4 g/10 kg flour), on has achieved the best results regarding the nominal mass, the volume and the elasticity of the final bread product.
- The action of this product begins by the time of the kneading and continues by the time of the fermentation process, making the getting of one soft and elastic paste.
- Xylanase has been suggested that use could cause water pentozans redistribution in gluten phase, favoring extensibility and behavior resulting in better baking.

REFERENCES

1. *Banu C. şi col*. – Tratat de industrie alimentara. Probleme generale. Ed. ASAB, Bucuresti, 2008.
2. *Banu C. şi col*. – Aplicatii ale aditivilor si ingredientelor in industria alimentara. Ed. ASAB, Bucuresti, 2010.
3. *Selinheimo E., Kruus K., Buchert J., Hopia A., Autio K.* – Effects of lacase, xulanase and their combination on the rheological properties of wheat doughs. Journal of Cereal Science, vol.43, 152/159, 2006.
4. http://www.anamob.ro/panif/secara.shtml.
5. http://www.scribd.com/doc/26603627/Actiunea-Enzimelor-in-Panificatie.

The 39th International Session of Scientific Communications of the Faculty of Animal Science, Bucharest, Romania
Scientific papers (seria D; vol. LIII) – Animal Science

GROWTH DYNAMICS OF RAINBOW TROUT *(ONCORHYNCHUS MYKISS)* FROM FIAD-TELCISOR SALMONID COMPLEX, BISTRITA-NĂSĂUD COUNTY

[1]DANIEL COCAN, [1]VIOARA MIRESAN, [1]RADU CONSTANTINESCU, [1]CAMELIA RĂDUCU, [1]IULIA FESTILĂ, [1]IULIA PRODAN, [2]IOAN SĂRMAS
[1]University of Agricultural Sciences and Veterinary Medicine Cluj-Napoca, street Manastur 3-5, Cluj-Napoca, Romania, Faculty of Animal Husbandry and Biotechnology
cocandaniel@yahoo.com; vmiresan@yahoo.com
[2]National Forest Autority, Valley Wine ForestryDistrict, Bistri a-Năsăud County

Key words: rainbow trout, growth dynamics, economic strategies

SUMMARY

Growth dynamics of rainbow trout *(Oncorhynchus mykiss)*, superior to other salmonids species, led to the exploitation of this species in the most countries of the world. The individuals of this species, depend on many factors, like environment, nutrition and genetics. In this study, authors have followed over 540 days, the evolution of body mass and average daily gain at the specimens of rainbow trout from Fiad-Telcisor salmonids complex, Bistrita-Năsăud county, from the larval stage and up to the stage of trout for consumption with an average weight of 250 gr. These studies are necessary to prepare a strategy on fisheries production planning, depending on market demand of these products and eliminating additional costs due to over production.

Fish and fish products always represented a staple food in human nutrition. The aquatic resources of continental and oceanic natural waters, have permanently assured the humanity's food needs, but today, on the conditions of the demographic boom, may be destroyed the ecosystems balance, on the strenght of irrational exploitation of their (Svennevig & co., 2000). For this reason, specialists' attention bound for aquaculture, field of the last years a real progress (Goldburg & Naylor, 2005). On this economic stage, a fierce commercial competition and significantly reduction of the market price, involving development and alignment a new concept of strategy, to decrease the production price. For this, aquaculture producers focus their efforts to obtain high yields at a high quality level and in conditions of maximum efficiency.

A common situation on the fish market in Romania, is to sell products. Lack of strategy on the relationship between production capacity of fish farms and marketing opportunities of these products, lead to the accumulation of hardly marketable stocks which involving additional financial burden (Popescu, 2009). To avoid such situations, are requested market studies and research on the possibilities to obtain rhytmic and constant productions. They involv serious knowledge about factors which influence the physiology of fish growth (Cocan & co., 2009).

In Romania, but also in many other countries around the world, salmonid species predominantly found in farms are rainbow trouts *(Oncorhynchus mykiss)*. It is successfully exploited, due to its plasticity and resistance to changes in environmental conditions and diseases, and due to efficient conversion of feed (Cocan, 2008). There have been numerous studies on the factors that influence the growth of rainbow trout, including: growth density, environmental conditions, water quality, the rate of removal of water or operating system adopted (North & co., 2006; Roque d'Orbcastel & co., 2009; Sørensen & co., 2005; Matthews & co., 1997; Clark, 2003).

Leatherland (1993), has conducted studies on interaction between plasma growth hormone, thyroid hormones and cortisol concentrations in rainbow trout, depending on the density of growth (150 kg/m^3, respectively 60 kg/m^3). The results demonstrated that to a high density, the growth rate drops significantly, due to high concentration of cortisol, but also due to restricted diet because of the high density. Because are poikilotherms, trouts shows changes of behavior and some physiological parameters according to season (Gallardo, 1997). Temperature is one of the abiotic factors with a major influence on the development of metabolic processes. Farming system adopted are also greatly influence on the growth dynamics of rainbow trout, each showing the advantages and disadvantages. Recirculating systems (RAS) providing optimal growth conditions, medial parameters being monitored continuously (Sirakov & Ivancheva, 2008), but inefficient water filtration systems can affect meat quality (Rønsholdt & McLean, 1999), or may give rise to health problems (Svobodova & co., 2005). Classical breeding systems are often at risk of contamination by polluted waters (Moogonei & co., 2010), and environmental conditions can not be controlled.

In this study, authors have monitored the growth dynamics, body mass evolution and average daily growth of rainbow trout *(Oncorhynchus mykiss)*, from Fiad-Telci or salmonid complex.

1. MATERIAL AND METHOD

The salmonids complex Fiad-Telcisor, location in which to place our experience, was established in two successive stages. The Fiad trout farm was established in 1983, and the main activity object was represented by salmonid reproduction and obtaining of biological material destined for mountain zone water re-population. In aim to make activity efficient, in this unit exist also basins populated with biological material destined for consumption. With 1.7 Ha surface, the Fiad trout farm is situated to 452 m altitude, and the necessary water is assured from two sources: Sălăuța Valley with 200 Liters/s debit and Fiad Valley with 100 Liters/s debit. The water temperature in this salmonid farm presents very large variations in last years, presenting a minimum of 0.5^{o}C in January and a maximum about 26.5^{o}C in August. In the last years was observed an increasing of day number during summer period when the water reached values over 20^{o}C.

Due to variations in temperature and dissolved oxygen, adversely affecting the smooth operations of breeding and breeding lots maintenance, in 1993 was opened the breeding and hatching station from Telcisor. Located at an altitude of 527 meters and benefiting from an area of 850 m^2, breeding and hatching station from Telcisor is a distance of 15 km from Fiad trout farm. Due to four sources of water, Tăusoarei Spring, Seaca Walley, Bârlei Creek and a drilling which providing water with a constant temperature by 19.5^o C, breeding and hatching station from Telcisor, benefit of very good conditions for artificial reproduction of salmonids and eggs incubation, thanks to implementation of a good management on the use of water sources, and rotation and mixture of these, according to the biological needs of the trout. Fiad-Telcisor salmonids complex is subordinated to National Forest Autority and belongs to Wine Walley Forestry, Bistrita-Năsăud County.

This study lasted 540 days, between January 2009-July 2010. In each stage of this study, were weighed every 30 rainbow trout randomly selected of growth basins, and in tables are presented the mean values of results obtained. For gravimetric measurements, we used an analytical balance type Shimadzu AW 320, with a weighing range up to 320 grams and an accuracy of 0.1 mg. Trout were weighed, were released later. The data obtained, were statistically interpreted.

2. RESULTS AND DISCUSSIONS

Growth, development and reproduction of salmonid species, suppose employment physical and chemical parameters of culture water within certain limits, minimum and maximum, among which are highlighted the comfort conditions (Bud &

co., 2007), when the intensity of physiological processes presents the highest recorded level. On this line, water quality from Fiad-Telcisor salmonid complex was monitored during the 12 calendar months (table 1). Were monitored following physical and chemical parameters: temperature, transparency, dissolved oxygen, carbon dioxide, hydrogen sulfide, pH, hardness, ammonia, nitrates, nitrites, sulphates, iron, chloride, magnesium and salinity.

Table 1

Physico-chemical parameters of water from Fiad-Telcisor salmonid complex

Specification	U/M	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Temperature	^oC	1.15	1.55	3.6	6.15	8.4	11.00	17.85	20.75	17.50	8.90	4.10	1.75
Transparency	m	0.73	0.69	0.65	0.64	0.66	0.61	0.65	0.57	0.58	0.64	0.67	0.69
O_2	mg/l	10.15	10.20	9.70	9.30	8.95	8.45	7.75	6.75	7.05	7.85	9.05	9.60
CO_2	mg/l	7.00	7.10	8.25	8.30	8.45	8.50	10.35	11.30	11.20	9.25	8.30	7.55
H_2S	mg/l	0.25	0.15	0.20	0.35	0.25	0.30	0.55	0.45	0.30	0.25	0.20	0.15
pH	-	7.1	7.2	7.2	7.3	7.2	7.1	7.2	7.4	7.3	7.2	7.3	7.2
Hardness	dH^o	8.57	8.41	8.27	8.17	8.09	7.62	7.86	7.77	8.39	8.08	7.55	8.34
Ammonia	mg/l	0.038	0.009	0.008	0.015	0.044	0.020	0.009	0.015	0.044	0.020	0.038	0.009
Nitrates	mg NO_3/l	3.16	3.32	4.32	3.32	3.93	4.40	4.11	4.27	3.56	3.89	4.19	3.82
Nitrites	mg NO_2/l	0.035	0.040	0.030	0.035	0.040	0.045	0.045	0.035	0.045	0.045	0.030	0.035
Sulfide	mg SO_4/l	7.50	8.00	8.00	9.50	8.00	8.00	7.50	9.50	8.00	8.00	8.50	8.00
Iron	mg Fe/l	0.10	0.09	0.08	0.09	0.10	0.09	0.09	0.10	0.10	0.09	0.09	0.08
Chloride	mg Cl/l	24.75	25.00	26.50	24.50	24.50	26.00	26.50	23.50	25.00	25.50	26.00	24.50
Magnesium	mg Mg/l	24.50	26.50	26.50	23.50	24.50	25.00	24.50	23.50	25.50	25.50	25.50	26.50
Salinity	‰	0.14	0.15	0.15	0.15	0.14	0.15	0.14	0.16	0.14	0.13	0.15	0.14

BODY WEIGHT EVOLUTION (BWE) AND AVERAGE DAILY GAIN (ADG) TO THE LARVAE AND FRY CATEGORIES

Providing an average temperature of 10^oC to the water in hatcheries, the larvae have hatched after an incubation period of 30±2 days. I began to perform the measurements from the 10th days after hatching (table 2), since the larvae had an average value of body weight character of 0.075±0.01 gr. Morphological, they had not yet oral cavity, and in this case, feeding was exclusively endogenous, on yolk sac reserves. The present volume of this was approximately 85-90% of the initial volume of eggs. According as the age, values of all the characters studied are gradually increasing. In terms of body weight, at the age of 20 days, larvae showed a mass of 0.105±0.01 gr., body weight evolution (BWE) being of 0.03 gr., and the average daily gain (ADG) recorded, was 0.003 gr.

Between 20-30 days, after the total resorption of yolk sac and the development of oral cavity, has made the transition from larvae stage to the fry, body weight evolution BWE was 0.045 gr and average daily gain ADG recorded presented the value of 0.0045 gr.

Initial body weight (larvae 20 days) was 0.105±0.01 gr, and at 30 days age, it presented a value of 0.15±0.01 gr.

In the next phase of ontogenetic development (fry 30 days-fry 45 days), body weight evolution BWE recorded was 0.25 gr, with an average daily gain ADG of 0.017 gr, and in the next period of 15 days (fry 45 days-fry 60 days) to be registered a body weight evolution BWE of 0.20 gr and an average daily gain ADG of 0.013 gr. In the next range (fry 60 days-juvenile 75 days), body weight evolution BWE was 0.99 gr, and average daily gain ADG registered a value of 0.066 gr.

Table 2

Body weight evolution and average daily gain to the larvae and fry categories

Nr.	Employment category	n	Age (days)	Body weight				BWE (gr)	ADG (gr)
				Initial		Final			
				X±sx	V%	X±sx	V%		
1	Larvae	30	10 – 20	0.075±0.01	10.27	0.105±0.01	9.30	0.03	0.003
2		30	20 – 30	0.105±0.01	9.30	0.15±0.01	13.92	0.045	0.0045
3	Fry	30	30 – 45	0.15±0.01	13.92	0.40±0.01	17.90	0.25	0.017
4		30	45 – 60	0.40±0.01	17.90	0.60±0.01	14.96	0.20	0.013
5		30	60 - 75	0.60±0.01	14.96	1.59±0.02	12.33	0.99	0.066

BODY WEIGHT EVOLUTION (BWE) AND AVERAGE DAILY GAIN (ADG) TO THE JUVENILE, YOUNG TROUT AND TROUT FOR CONSUMPTION CATEGORIES

With the first appearance of scales, fry have passed in the next stage of growth, juvenile phase (table 3). During the 45 days (juvenile 75 days-juvenile 120 days), body weight evolution BWE was 14.69 gr, and average daily gain ADG recorded was 0.326 gr. In the next 30 days (juvenile 120 days-juvenile 150 days), body weight evolution BWE submitted a value of 8.33 gr, while the average daily gain ADG recorded a value of 0.278 gr, slightly down from the previous interval, cause being due to the thermal regime for the warm months of August and September, which influenced the level of dissolved oxygen and fish flock appetite. But the situation was remedied in the next interval, when during the month of October (juvenile 150 days-juvenile 180 days), body weight evolution BWE was 11.59 gr, and the value of average daily gain ADG, reached threshold of 0.386 gr. Over the next 60 days (juvenile 180 days-juvenile 240 days), corresponding months of November and December, with low temperatures, we recorded again low values of body weight evolution BWE and average daily gain ADG, 11.86 gr, respectively 0.197 gr, but with increasing the thermal and photoperiod (January-April), especially in the second decade of this period, during the 120 days following (juvenile 240 days-young trout 360 days), body weight evolution BWE was 54.22 gr, and average daily gain ADG was 0.452 gr. After being passed the threshold of 100 gr for body weight, has made the transition from the juvenile stage to the young trout stage, and for the next period (young trout 360 days-trout for consumption 480 days), continued its upward trend of body weight evolution BWE and average daily gain ADG, being recorded values for these indices of 106.90 gr, respectively 0.891 gr.

For the last growth stage of trout for consumption (trout 480 days-trout 540 days), body weight evolution BWE was 41.32 gr, and average daily gain ADG was 0.688 gr.

Table 3

Body weight evolution and average daily gain to the juvenile, young trout and trout for consumption categories

Nr.	Employment category	n	Age (days)	Body weight				BWE (gr)	ADG (gr)
				Initial		Final			
				X±sx	V%	X±sx	V%		
1	Juvenile	30	75 – 120	1.59±0.02	12.33	16.28±0.22	13.78	14.69	0.326
2		30	120 – 150	16.28±0.22	13.78	24.61±0.25	9.97	8.33	0.278
3		30	150 – 180	24.61±0.25	9.97	36.20±0.40	11.01	11.59	0.386
4		30	180 – 240	36.20±0.40	11.01	48.06±1.14	23.82	11.86	0.197
5	Young trout	30	240 – 360	48.06±1.14	23.82	102.28±2.56	25.01	54.22	0.452
6		30	360 - 480	102.28±2.56	25.01	209.18±1.63	7.78	106.90	0.891
7	Trout	30	480 - 540	209.18±1.63	7.78	250.50±3.46	13.82	41.32	0.688

3. CONCLUSIONS

Looking at the overall track indices, we conclude that during the 65 days (larvae 10 days-juvenile 75 days), body weight evolution BWE was 1.515 gr, and average daily gain ADG was 0.023 gr. Evolution of the two indices has been steady and gradual, except the range 45-60 days, where, due to transition to another type of feed, has been a slight decrease in growth performance.

Analyzing the two indices track overall (body weight evolution BWE and average daily gain ADG) we conclude that the body weight evolution BWE, during the 465 days (juvenile 75 days-trout 540 days) was 248.91 gr, and average daily gain ADG have presented a value of 0.535 gr. The growth was not gradual and steady, being largely influenced of seasonal temperature fluctuations and modification of feed structure used, characteristic of each stage of growth.

As a result of physico-chemical analysis, revealed that water from Fiad-Telcisor salmonid complex, fall within the water line for growth and operating salmonids, except for brief periods when high temperature affects dissolved oxygen levels. In these situation, it interferes with artificial methods by oxygenation of water, and to avoid excessive heating of water in case of heat wave, were planted rows of trees between basins.

REFERENCES

1. *Bud I., Ionescu O., Vlădău V.V., Pop S.N*., 2007, Peştii din apele reci. Păstrăvii. Ed. Risoprint, Cluj-Napoca
2. *Clark M.L.,* 2003, Comparison of water quality, rainbow trout production, and economics in oxygenated and aerated raceways. Master of Science Thesis, Virginia Polytechnic and State University, USA
3. *Cocan D. Miresan Vioara, Constantinescu R., Bud I., Co ier Viorica, Răducu Camelia, Pece Aurelia,* 2009, Research concerning some factors which influencing the growth physiology ia a rainbow trout (*Oncorhynchus mykiss*) population, reared within controlled environment. USAMV Iasi, Lucrări stiintifice vol.52, Seria Zootehnie
4. *Cocan D.I.,* 2008, Cresterea păstrăvului curcubeu (*Oncorhynchus mykiss*) în sistem recirculant si conditii controlate de mediu. Ed. Bioflux, Cluj-Napoca
5. *Gallardo M.A., Canals P., Albi J.L., Pesquero J., Sanchez J.,* 1997, Seasonal variation in uptake of short-chain neutral amino acid by red blood cells and hepatocytes in trout (*Salmo trutta*). The Journal of Experimantal Biology, 200: 2781-2787
6. *Goldburg Rebecca, Naylor R.,* 2005, Future seascape, fishing, and fish farming. Front Ecol Environ, 3(1): 21-28
7. *Leatherland J.F.,* 1993, Stocking density and cohort sampling effects on endocrine interactions in rainbow trout. Aquaculture International, 1(2): 137-156
8. *Matthews K.R., Berg N.H.*, 1997, Rainbow trout responses to water temperature and dissolved oxygen stress in two southern California stream pools. Journal of Fish Biology, 50: 50-67
9. *Moogonei R., Karabassi A.R., Monavari S.M., Rabani M., Taheri M.A.,* 2010, Effect of the selected physico-chemical parameters on growth of rainbow trout *(Oncorhynchus mykiss)* in raceway system in Iran. Iranian Journal of Fisheries Sciences, 9(2): 245-254
10. *North B.P., Ellis T., Turnbull J.F., Davis J., Bromage N.R.*, 2006, Stocking density practices of commercial UK rainbow trout farms. Aquaculture Journal, 259: 260-267
11. *Popescu A. Sînziana,* 2009, Cercetări privind structura costurilor si a veniturilor în ferme ciprinicole, salmonicole si sturionicole. Teză Doctorat, USAMVB Timisoara
12. *Rønsholdt B., McLean E.,* 1999, Quality characteristics of fresh rainbow trout as perceived by the danish processing industry. Aquaculture International, 7(2): 117-127
13. *Roque d'Orbcastel E., Person-Le Ruyet Jeanine, Le Bayon N., Blancheton J.P.,* 2009, Comparative growth and welfare in rainbow trout reared in recirculating and flow through rearing systems. Aquacultural Engineering, 40(2): 79-86
14. *Sirakov I., Ivancheva E.,* 2008, Influence of stocking density on the growth performance of rainbow trout and brown trout grown in recirculation system. Bulgarian Journal of Agricultural Science, 14(2): 150-154, National Centre for Agrarian Sciences
15. *Sørensen M., Storebakker T., Shearer K.D.*, 2005, Digestibility, growth and nutrient retention in rainbow trout (*Oncorhynchus mykiss*) fed diets extruded at two different temperatures. Aquaculture Nutrition, 11: 251-256
16. *Svennevig N., Reinertsen H., New M.,* 2000, Sustainable Aquaculture: Food for the Future? Aquaculture International, 8(1): 99-102
17. *Svobodova Z., Máchová J., Poleszczuk G., Hůda J., Hamáčová J., Kroupová H.,* 2005, Nitrite poisoning of fish in aquaculture facilities with water-recirculating systems. Acta Vet. Brno, 74: 129-137

The 39th International Session of Scientific Communications of the Faculty of Animal Science, Bucharest, Romania
Scientific papers (seria D; vol. LIII) – Animal Science

RESEARCHES CONCERNING THE MAIN BODY SIZES CORRELATION AT INEU CARP BREED

NICOLAE CARMEN GEORGETA, POPA DANA, POPA R., MAFTEI M., SULER ANDRA, IŞFAN NICOLETA

Key words: carp, correlations, Ineu breed, main body sizes

SUMMARY

Genetic progress per generation depends on heritability, number of considered traits and also the correlations among them, especially the genetic ones. Concerning fish breeding programmes, one of the major problems is the selection for the body shape and weight, which affect the meat production. We have studied how body weight is correlated with the main traits, which determine body shape in Ineu carp breed (body length, maximum body height and maximum height/length ratio). The experiment was carried out for three years. From the genetic point of view, at 137 days age, body weight was positively correlated with all characters which give the body form. Over the next two years of life, we found the same tendencies as at the first age, except that H/l rapport is genotypic negative correlating or is small correlated with other studied characters. The obtained results have consequences for the selection response expected when selecting on body weight.

1. MATERIAL AND METHOD

For the study of quantitative traits, the knowledge of degree of interdependence between two traits is of a large interest. When two traits are dependent one beside the other, it is needed to be quantified this interdependence and to be assigned its meaning. It can be distignified with the correlation coefficients.

The biological stuff used for this experiment has been provided by the Centre of Researches and Development of Aquaculture Nucet, from Dambovita district. It represents a sample of Ineu carp breed individuals.

The research has been made on five lots of one summer age spawn, belonging to five families. One family is constituted by two females and one male. Every each lot was made of fifty individuals. The individuals were measured, consequently, three years. At the end of each summer of growing, it has been actuated the weight, length and maximum body height. The relation between maximum height and body length (H/l) has been actuated, too.

In order to determinate the correlation coefficient between two traits, it has been used the classical formula of correlation, which is the ratio between co variation of the two traits and the geometric average of the two traits' variants. The phenotypic, genotypic or environmental correlations have been estimated by using the variance and covariance components. Any correlation is considered to be the relation between covariance and the geometric average of variances.

2. RESULTS AND DISCUSSIONS

Concerning the Ineu carp population, from the table 1 date, all correlations between characters are positives at one summer age. From genotypic point of view, the body weight is positive and high correlated with all studied characters which give the body form.

Table 1

Phenotypic, genotypic and environmental correlations between the studied traits at one summer age Ineu breed

Pair of the traits	$r_F \pm Sr_F$	$r_G \pm Sr_G$	r_M
Body weight x - maximum body height	0.981±0.068	0.992±0.018	0.982
- body length	0.976±0.076	0.993±0.018	0.973
- H/l relation	0.368±0.329	0.804±0.406	0.270
Maximum body height x - body length	0.989±0.052	0.997±0.007	0.988
- H/l relation	0.401±0.324	0.824±0.339	0.285
Body length x - H/l relation	0.262±0.341	0,769±0.459	0.138

The same is happened with genotypic correlations of other two characters, maximum high and body length, respectively.

The small values are observed at phenotypic and environmental correlations between H/l rapport and others characters.

At one year and a summer age, the H/l rapport is negative correlated with all studied characters (–0.450; –0.944; –0.979), the rest of correlations are positives and sufficiently intense (Table 2).

Table 2

Phenotypic, genotypic and environmental correlations between the studied traits at one year and a summer age Ineu breed

Pair of the traits	$r_F \pm Sr_F$	$r_G \pm Sr_G$	r_M
Body weight x - maximum body height	0.939±0.121	0.974±0.072	0.940
- body length	0.898±0.156	0.757±0,412	0.978
- H/l relation	0.106±0.352	–0.450±0.807	0.283
Maximum body height x - body length	0.864±0.178	0.991±0.020	0.888
- H/l relation	0.284±0.339	–0.944±0.131	0.579
Body length x - H/l relation	–0.235±0.344	–0.979±0.036	0.140

At two years and a summer age of Ineu breed, all estimated correlations are positives, with two exceptions: the genotypic correlation between H/l rapport and live body weight (–0.695) and with body length (–0.298), respectively (Table 3).

Table 3

Phenotypic, genotypic and environmental correlations between the studied traits at two years and a summer age Ineu breed

Pair of the traits	$\mathbf{r_F \pm Sr_F}$	$\mathbf{r_G \pm Sr_G}$	$\mathbf{r_M}$
Body weight x - maximum body height	0.921±0.139	0.660±0.352	0.997
- body length	0.961±0.139	0.994±0.344	0.956
- H/l relation	0.097±0.352	–0.695±0.459	0.354
Maximum body height x - body length	0.920±0.139	0.820±0.389	0.944
- H/l relation	0.364±0.329	0.248±0.942	0.392
Body length x - H/l relation	0.008±0.354	–0.298±0.894	0.089

As well, we can observe that the value of phenotypic correlation between H/l rapport and body length is very close to zero (0.008) that means deficiency of interrelations between those characters.

3. CONCLUSIONS

The outcome of the interdependence study in some morphological traits at Ropsa breed was:

1. The body weight, maximum height and the body length was correlated strongly positive, during the three years of growing, resulting the exterior traits can be use for indirectly breeding of production performances (the body weight).
2. For the same population, we can expect -in its ontogenesis- to appear some differences regarding the genetic parameters of considered traits, because of the different pairs of genes, which act in different ways at some ages.
3. A possible explanation about the differences obtained by us could be the outcome of “sample” effect, associated to the sample which on the experiment has been made.

REFERENCES

1. *Kirpitchnikov, V. S.*, 1999. Genetics and breeding of common carp, revised by R. Billard, J. Reperant, J. P. Rio and R. Ward, Institut National de la Recherche Agronimique, Paris.
2. *Moav, R., Hulata, G., Wohlfarth, G.*, 1975. Genetic differences between the Chinese and European races of the common carp. I. Analysis of genotype-environment interactions for growth rate. Heredity 34: 323-340.
3. *Nicolae, Carmen, Georgeta,* 2004, Studiul determinismului genetic al procesului de creştere la peşti, Teză de doctorat, USAMV, Bucureşti.
4. *Popescu-Vifor, Şt.*, 1985. Genetica procesului de dezvoltare la animale, Ed. Ceres, Bucureşti.
5. *Suzuki, R., Yamaguchi, M.*, 1984. Meristic and morphometric caracters of interracial hybrids of the common carp Cyprinus carpio L. Bulletin of the National Research Institute of Aquaculture 6: 1-9.

The 39th International Session of Scientific Communications of the Faculty of Animal Science, Bucharest, Romania
Scientific papers (seria D; vol. LIII) – Animal Science

REARING THE TURBOT *Psetta maeotica* – A PERSPECTIVE ACTIVITY ON THE ROMANIAN LITTORAL

TANIA ZAHARIA, VALODIA MAXIMOV, SIMION NICOLAEV, VICTOR NITA
National Institute for Marine Research and Development "Grigore Antipa" Constanța, Romania

Key words: rearing, turbot, Romanian littoral

SUMMARY

Black Sea turbot populations should be preserved for ecological, biological and economic reasons. These fish are important predators of benthic organisms, thus removing them may greatly disrupt ecosystems. Their extraordinary life cycle - long period of metamorphosis - offers a great opportunity to expand our understanding of their reproductive ecology. For the protection and preservation of this valuable species, management measures are required, especially adapted to the conditions on the Romanian littoral. The paper is based on the consultation of an abundant bibliographic material, as well as on the results of the research and experiences carried out within NIMRD, aiming the use of turbot aquaculture techniques as a management measure of the natural population of this valuable species.

1. MATERIAL AND METHOD

The paper hereby is based on the consultation of an abundant bibliographic material, as well as on the results of the research and experiences carried out within NIMRD for a long period of time: 1980-2010.

The biological material, represented by turbot juveniles and adults, was captured from the natural environment and reared in the experimental base of the institute, comprising 9 exterior concrete basins and 4 interior fiber glass tanks.

2. RESULTS AND DISCUSSIONS

Over the last 50 years, the Black Sea ichthyofauna has undergone major changes concerning either its qualitative and quantitative structure or the behavior of various species. These changes are consequences of human activities, directly through the fishing pressure and indirectly through the deterioration of the environmental conditions, especially in the Western part of the Black Sea. The marine demersal species fishing in Romania enjoys a long tradition, its practice was recorded as an occupation of the fishing settlements in Dobrogea in the Eighteenth and Nineteenth centuries and of the Romanian marine fisheries in the Twentieth century. The bottom fish species inhabiting the Romanian Black Sea shelf represent the most important part of the regional fishery potential as far as the commercial interest, the demand on the autochthonous and foreign market are concerned [1, 3].

Black Sea turbot is a demersal species, inhabiting soft bottoms. The juveniles stay close to the shore, on sandy bottoms and, as they grow up, they retire to greater depths. The adults are located at depths of 60-100 m in winter. In spring, they come close to the shore, at a depth of 20-40 m (the inferior limit of the *Corbulomya* facies), but not everywhere, only in specific places, where they form large reproduction agglomerations [1, 3].

Picture no.1 - The Black Sea turbot

The marine demersal fishing along the Romanian Black Sea shore is realized in two ways:

◘ fishing with coast trawler vessels, B-410, Baltica and T.C.M.N. types, equipped with pelagic trawl and gill nets, which activate offing, at depths greater than 20 meters;

◘ fishing along the shore, practiced in the 28 fishing points, between Sulina-Vama Veche, in shallow waters (3.0–11.0 m), using fixed tools (trap nets, gill nets, longlines and beach seines) and at depths of 40–60 m, using gill nets and longlines [2, 3,4].

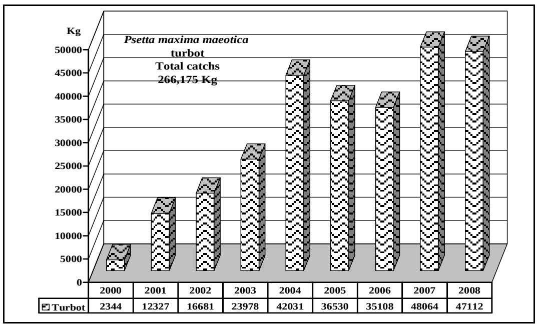


Figure no. 1 - Turbot catches between 2000-2008

Unfortunately, up to the present, no specialized turbot production farm has been developed. Consequently, the entire quantity of turbot on the market is provided only by specialized fishing, regardless of all the positive results registered by NIMRD in the experiences carried out. They reveal the huge potential that the Romanian littoral offers for the development of this branch of aquaculture.

The technological process is shown in Figure no. 2:

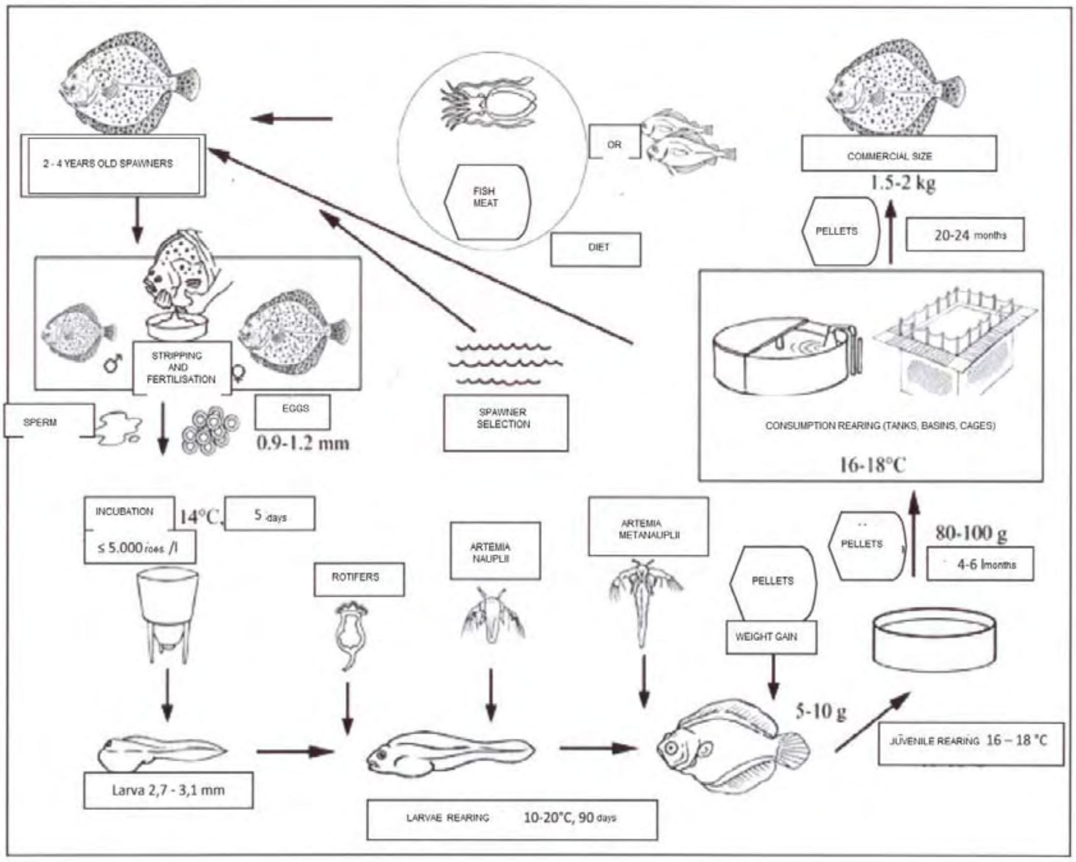


Figure no.2 - The technological process scheme

OBTAINING THE SEMINAL PRODUCTS: Using 2-4 years old spawners (females are older), the seminal products are obtained through abdominal massage, with no hormonal simulation. Generally, the semination period in captive individuals expands for 6 months, compared to the natural environment, where it lasts for about 4 months[9]. Sperm emission, following the abdominal massage in case of controlled reproduction, was not observed in individuals weighing less than 0.6 kg separately. Histological studies on turbot ovaries led specialists to suggest an asynchronic model, with a single reproduction a year: the ovules become mature synchronically, which determines their elimination in shares. The duration of the reproductive period is of about 2 months, while the individual reproduction last for 10-14 days. Daily abdominal pressure increases significantly the survival and incubation and hatch percentage. The total quantity of eggs obtained from a female varies between 300.000 and 2.000.000, from 50.000 to 700.000 per each share.

THE ARTIFICIAL FERTILIZATION: was realized applying the dry and semi-wet methods, taking into account the great survival capacity of turbot spermatozoons in sea water, as well as the great sperm cells concentration. Thus, 0.3 ml of sperm are sufficient for 100 ml of eggs, manually mixed with 50 ml of seawater, then being left to rest for about 10 minutes, for fertilization. Following this operation, the spawn is washed and placed in the pelagic spawn incubator. Fertilization rates may vary between wide ranges (0-90%), being determined mainly by the quality of the sperm.

EMBRYONARY DEVELOPMENT: turbot spawn is pelagic, spherical, with thin and transparent membranes. The cytoplasm is homogenous and the perivitelin space is very narrow. As the embryo develops, is becomes larger. The diameter of the spawn varies from 1.10 to 1.33 mm, the fat drop from 0.17 to 0.23. The fat drop is always placed in the superior area of the spawn. The embryonary development lasts for 4-5 days, the duration of 1.300-1.500°h, covering various stages (Figure no.3)[5,9].

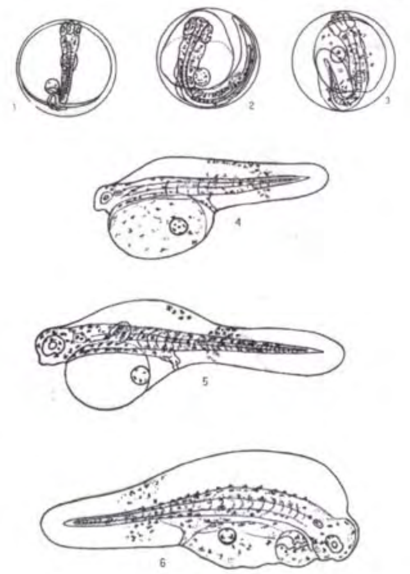


Figure no.3 - The embryonary development stages in turbot

When HATCHING, turbot larvae measure 2.80-4.0 mm. The yolk bag is large and oval. The fat drop is located in the rear, inferior side of the yolk bag, which makes the larvae swim horizontally, with the abdomen upwards. The body is bright pink coloured, background for forked melanophores. In the middle of the caudal area, the black and pink pigments are placed on the edge of the fin. After hatching, the larvae are little active, they stand in the surface layer, with their abdomens upwards[6,7,8].

LARVAL REARING: the turbot larvae hatch the 4^{th} or 6^{th} day after fertilization, depending on water temperature. The greatest losses are registered during the hatching. The freshly hatched larvae are transferred in the rearing vessels, where they are kept for a while in the water body, with the yolk bag upwards. During the first 2 days, the larvae do not display any reaction to light, but, in the 3^{rd} day, they gather in the lighted side of the rearing vessel. The 6 days larvae have the yolk sack completely absorbed, the fat drop is still present, ingested food can be observed in the bowels (only microscopic algae at first), the larvae passing to mixed food. For the feeding, macrophyte algae cultures must be prepared in advance, the most common species being: *Chaetoceros calcitrans, Skeletonema costatum, Isoshrisis galbana, Tetraselmis sueccica, Dunaliella tertiolecta*. Also, cultures of the *Brachionus plicatilis* rotifer and *Artemia salina* phylopode are required, which are distributed according to a standard feeding scheme, depending on the rearing water temperature (Figure no.4).

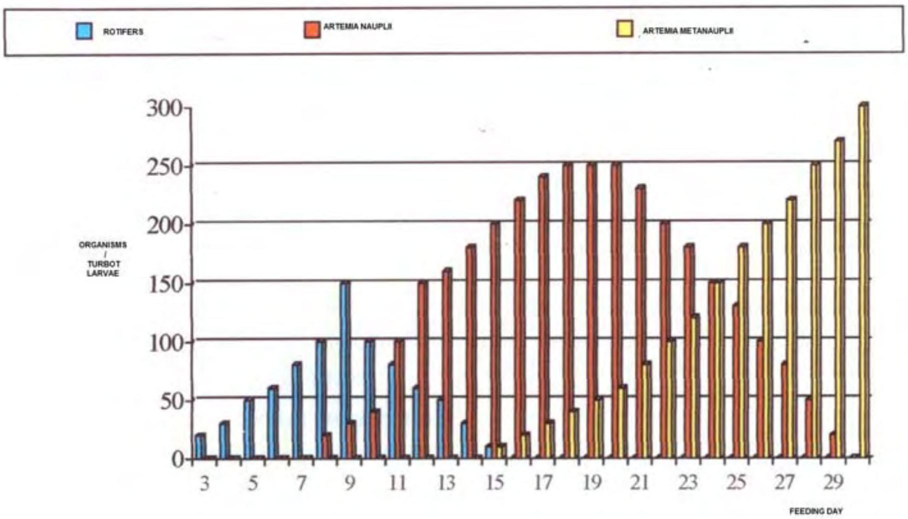


Figure no. 4 - The standard feeding scheme and daily food ratio of turbot larvae at an average water temperature of 19°C

JUVENILES REARING: At the end of the living food feeding, the turbot juveniles, still pelagic, are ready to pass to complex food. Successfully obtaining juveniles adapted to inert food is related to the moment of passage to this food. The rearing is done either in the larval tanks, or in special tanks, about 2 m^3. The rearing density is of about 2.500 ex./m^2. standard diets must be attractive and tasty, stabile in the water and unpolluting. The pellets on the market, obtained through extrusion, meet these requirements and have a well balanced biochemical composition. The food ratios and the pellet dimensions must be permanently correlated to the dimensions of the juveniles. Rearing pellet fed juveniles becomes a routine operation, with an about 90% survival rate.

COMMERCIAL REARING: can be done using various systems, depending on the investor's option, the continuous maintenance of the biological material being carried out[9]. The feeding is done with inert food: special turbot pellets (e.g. EFICO Sigma 870 or Ecolife 70), according to the dimensions of the fish. Under optimal circumstances, 20 - 40 kg/m^3 of fish can be obtained, at a very attractive price (between 6.98 şi 8.94 €/kg). The main drawback for commercial rearing is the slow growth at low or high temepratures, limiting to only a few months a year the rearing in optimal conditions. Thus, in order to reach the commercial size of min. 2 kg/fish, a 3 years growth cycle is required.

3. CONCLUSIONS

Taking into account the importance the turbot has in the marine ecosystem and the Romanian fishery, the experience gained by other countries in turbot rearing, as well as by the encouraging results of the experiences carried out by NIMRD, we consider that this valuable species can be successfully reared on the Romanian littoral, turbot aquaculture becoming a safe way for protecting the species, on the one hand, and obtaining profit, on the other hand.

REFERENCES

1. *V. Maximov, G. Radu, I. Staicu,* 2006 - Contributios to the knowledge of the biological characteristics of some demersal fish from the Romanian marine area. Cercetari marine (Recherches marines), v. 36, p. 153-172
2. *V. Maximov, S. Nicolaev, G. Radu, I. Staicu,* 2008 - Estimation of growing parameters for main demersal fish species in the Romanian marine area. Cercetări marine, (Recherches marines), 37: 289-304
3. *V. Maximov, I. Staicu*, 2008 - Evolution of demersal fish species catches from the Romanian marine area between 2000 and 2007; Cercetări marine (Recherches marines), v. 37:305-323
4. *V. Maximov, G. Radu, I. Staicu, E. Anton*, 2009 - Assessment study of turbot stocks (*Psetta maxima maeotica*) on Romanian Black Sea coast area; NAFA Bucharest / JRC/STECF-UE / DG MARE, 46
5. *Zaharia Tania, L.ALexandrov*, 1997 - Contributii la cunoasterea dezvoltarii embrionare si larvare la calcan *Psetta maeotica* (Pallas), Analele Stiintifice ale ICPDD, Tulcea: v. v: 335-342
6. *Zaharia Tania, L.Alexandrov., M.Popa., I.Bilal*,1998 - Observatii privind comportamentul larvelor de calcan in primele etape de dezvoltare - Cercetari marine, v.29-30: 287-293; ISSN 0250-3069
7. *Zaharia Tania, L.Alexandrov., I.Bilal, A.Adam*,1998 - Reproducerea calcanului in captivitate, AQUAROM '98, Galati: 362-363
8. *Zaharia Tania, L.Alexandrov., M.Zaharia, I.Bilal*, 1999 - The results of the experiments of the culture of the flounder at the Romanian Black Sea coast, Options Mediterranean, recent advances in Mediterranean aquaculture finfish species diversification, Zaragoza, (Spain), vol.47: 205-214; ISSN 1022-1379
9. *Zaharia Tania*, 2002 - Cercetari privind elaborarea tehnologiei de reproducere si predezvoltare a cambulei si calcanului in vederea refacerii populatiilor natural, Teza de doctorat, Universitatea “Dunarea de jos” Galati: 172 p.

The 39th International Session of Scientific Communications of the Faculty of Animal Science, Bucharest, Romania
Scientific papers (seria D; vol. LIII) – Animal Science

ROTIFER REARING FOR USE IN LITTORAL FISH LARVAE FEEDING

LAURA ALEXANDROV, TANIA ZAHARIA
National Institute for Marine Research and Development "Grigore Antipa" Constanța, Romania

Key words: aquaculture, larval nutrition, living food, rotifers, *Brachionus plicatilis* cultivation

SUMMARY

The paper presents the rotifer *Brachionus plicatilis* rearing technology, under the circumstances of the Romanian littoral. Based on a classical selection, adaptation and rearing technology (Japanese and French), the use of this organism is essential during the early development stages of ecologically and economically valuable fish species specific for the Romanian littoral. The biological material was selected from the natural environment, from the coastal marine zone, the Sinoe Lagoon and Lake Techirghiol.

The researches carried out between 1985-2000 allowed obtaining massive cultures in the laboratory, basins (NIMRD "Grigore Antipa" Constanta) and experimental facilities (Istria, Ovidia), used for feeding economically and ecologically valuable crustaceans and fish of the littoral zone.

Rotifer rearing has a dominant position in countries with developed aquaculture, such as Australia, Philippines, France, Germany, Greece, Italy, Israel, Japan, Kuwait, Norway, Spain, Russia, Thailand, USA. Out of the reared species, the marine rotifer *Brachionus plicatilis* is the most widespread.

Brachionus plicatilis Muller, 1784 (Trochelminthes, Rotatoria, Monogonata, Brachionidae) is a marine organism widely spread in the littoral area. Its body is covered by a digestible, chitin shield. The lifespan depends on water temperature and is averagely of 7 days. It reaches adulthood after 0.5-1.5 days and lays eggs at approximately 4 hours intervals. The egg-juvenile evolution lasts for 12-24 hours, depending on the temperature. An amictic female can lay 20 or more eggs between the 7^{th} and 10^{th} day of life. It is a filtering organism, mostly phytoplanktonphage, consuming algae, bacteria, detritus, various organic solutions from its living environment.

The mass rearing of the rotifer was elaborated by Theilacker and Mc.Master in 1971. Presently, this organism is industrially produced worldwide and is used for feeding the early larval stages of 60 fish and 18 crustacean species. The largest producer is Japan (2.5 t in 1985). It contributes to obtaining a global 881.9 thousand t marine fish and 515.7 thousands t brackish fish production (FAO 1994), of which, in the Mediterranean basin, around 60.0 thousands t/year (FAO 1996).

Considered a conventional element in the first feeding stage of reared marine and brackish fish species, this organism is appreciated for its exceptional qualities.

- small size (123 - 292 μm);
- resistant to changes of environmental conditions;
- capacity of adapting to broad salinity rates, in massive densities;
- survival rate of up to 2,000 ex./ml;
- high reproduction rate: 0.7 -1.4 descendents/female/day;
- massive propagation through parthenogenetic reproduction;
- high nutritional value;

- capacity of improving its nutritional quality through fat acids, amino acids, vitamins and antibiotics assimilation, transferred to the consumers (Lubzens and colab., 1989);
- slow swimming speed, limnic nature;
- habit of remaining in the water mass, fast colonization.

1. MATERIAL AND METHOD

On the Romanian littoral, the rotifer was collected from the Black Sea, brackish waters (Lake Sinoe) and continental saltwater lakes (Lake Techirghiol). It is encountered less often in fresh water (littoral, pre-marine lakes: Siutghiol, Taşaul).

The researches carried out between 1985-2000 allowed obtaining massive cultures in the laboratory, basins (NIMRD "Grigore Antipa" Constanța) and experimental facilities (Istria, Ovidiu).

The culture environment used for the controlled rearing of rotifers is sea water: sterilized (through boiling, ionization, ozoning): for strains; ozoned: for interior cultures; decanted, pre-filtered: for exterior cultures.

The *culture environment salinity*, on the Romanian littoral, is 17-20 ‰, ranging within the tolerated limits of 1-60 ppm (Hoff and Snell,1989).

The average temperature of the culture environment is 16 - 20º C, for interior cultures, and maximum 26ºC, for those exposed to natural variations. The acceptable limit range between 20-30° C (Hirayama and Kusano, 1972). The usual *PH* of rotifer cultures is 7.0-8.0, but, in order to maintain a low level of ammonia, the 7.5 value is ideal. *Ammonia* in high concentrations does not endanger the life of rotifers, but becomes a restrictive factor of reproduction. Influenced by temperature, it may exceed 80 µg/l (max. 1mg/l Barnabé, 1989). The *oxygen concentration* is kept at high level through moderate airing, even though rotifers survive even at 2-7 ppm (Fukuso, 1989a). *Light* is a secondary factor, but indispensable for lack of oxygen elimination. In the laboratory, the light intensity used is 2,000-3,000 lux, for each rearing installation, with a 16 h light/8 h dark photoperiodicity. *Nitrates*, *phosphates*, *the organic substance* are hydrochemical parameters essential for rotifer cultures, which must be analyzed weekly.

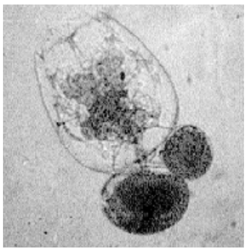
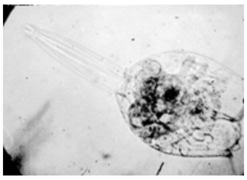


Fig.no.1,2. *Brachionus Plicatilis,* selected and reared on the Romanian littoral



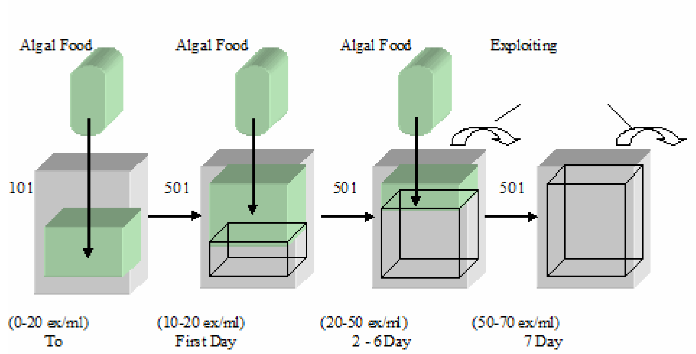
2. RESULTS AND DISCUSSIONS

The technological process of rearing the *Brachionus plicatilis* rotifer is relatively simple, but it is the results of many and long tests and experiences.

Rotifer rearing techniques

- o The preparation of the cultivation on stages: 7-14 days
- o Types of cultures
- \- Strains, permanently kept in a thermostatic collection
- \- Low, medium and high level inoculum, with capacity transfer at 4-5 days up to 8-10 days interval and actual exploitation after 15-17 days.
- \- Intensive massive culture, developed in capacities between 1 and 6 mc.

Fig. no. 3 Technological scheme of semi-continuous rearing (Asian updated experience)



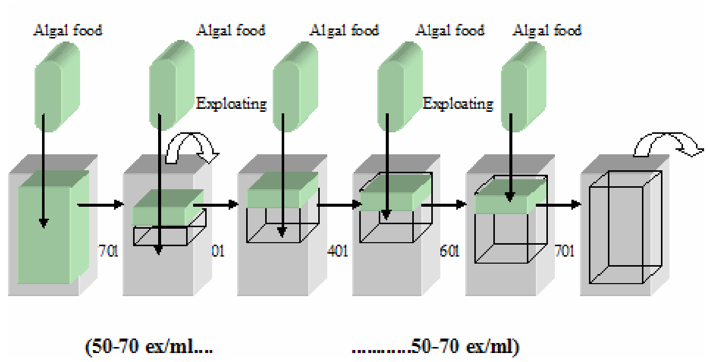


Fig. no. 4. Series rotifer rearing (Asian updated experience)

Type of food

The food of rotifers is extremely varied, ranging in size between 2 and 20 μ, while the chemical composition matches the metabolic needs of the consumers. It must be accessible, floating in the water mass and easy to catch.

The *Algae* are the main food component for rotifers and come from monospecific cultures. The main species used are: *Nannochloris oculata* (5 x 10^6 cel/ml), *N. atomus*, *Tetraselmis sueccica* (5 x 10^4 cel/ml), *Dunaliella* (2-4 x 10^4 cel/ml), *Isochrisys* (clona Tahiti), *Pavlova lutheri*, *Chaetoceros calcitrans pumillum*, *Exuviella.*

The most frequently used as feeding variants were:

- the *Tetraselmis suecica* monoculture
- the *Isochrysis* sp. (Tahiti clone), *Pavlova lutheri* algal mixture,
- *Chaetoceros calcitrans f. pumillum*

– Alimentary yeast and PMM oily organic solution.
  The common alimentary yeast (*Saccaromyces karlsbergensis*) and *beer barm* (*Saccaromyces cerevisiae*), fresh or dry, are diluted in water and administered simple or in combination with other nutriments. The accompanying bacteria are an additional food source for rotifers. The daily ratio, mathematically calculated, is 1,2-4 mg/rot/day (Foscarini,1988 and Fishimi, 1989). 88% yeast is administered, to which 12% more expensive algal culture is added.
  The compound food, containing dry algae, shark or other fish species liver oil, fish flour, starter fodder and vitamin pre-mixes, is administered in different variants along with the algal cultures, in order to enrich the nutritional quality of rotifers.
– The yeast and shark oil emulsion diet in a 10:90 percentage substantially improves the biochemical content of rotifers.
– *Other enriching methods* involved the use of vitamins, especially B_{12}, A, C, D and E. Special commercial products were also administered to cultures, essential for the nutrition of marine fish larvae: HUFA GOLD Sanders, with a rich content of lipids (48%), especially based on C22:5(n-6) 11 % and C22:6(n-3) 22 % acids, and BLACK GOLD Sanders, with a 90% dry algae content (42% proteins, 26% lipids and 12% carbonates).
  All these allowed obtaining superior nutritional quality organisms.

Table 1

The main biochemical components of rotifer mono and policultures

Small marine invertebrates	Proteins G/100 s.u.	Sugars G/100 s.u.	Fats G/100 s.u.	Ash (%)	Energy value Kcal/g
Brachionus plicatilis monoculture	37,09	14,12	9,01	1,34	-
Brachionus plicatilis exterior culture	57,05	9,50	23,20	1,71	456,89
Rotifers + Copepodes	37,09	9,01	14,12	1,34	320,02
Rotifers+ Ostracodes	52,00	16,28	8,40	1,20	437,86

Brachionus plicatilis	Hydrosoluble proteins - % µg of total proteins	Free amino acids: % of S.U.	Stearic compounds - % µg of total fats	Humidity index equiv., no. acid/mg sample	Fospho-lipids - µg of total fats	Dry subst. (%)
monoculture	16,70	0,05	5,14	0,14	1,17	13,4

The qualitative improvement of cultures was continuously done, through various techniques:
- Improving algal cultures,
- Improving nutritional variants,
- Preserving the culture environment quality through specific maintenance methods,
- Preserving the health of organisms,
- Endurance mass production, egg collection and preservation,
- Genetically improving cultures.

Parameter	Measurement unit	Quantity	Comments
Inoculation density	ex/ml	100, in extensive culture	Kafuku, Ikenoue, 1983
Inoculation density	ex/ml	100-1,000 intensive culture	Kafuku, Ikenoue, 1983
Maximum production	mil.rotifers/day	300	NIMRD results[x)]
Maximum production		3,600	For the rearing platform
Minimum production	mil.rotifers/day	2,5	[x)]
Average production	mil.rotifers/day	10,0	[x)]
Maximum productivityn	mil.rotifers/day	75	semi-continuous system
Average productivity	mil.rotifers/day	25.7	[x)]
Stock density	mil.rotifers/day	2-5 ex/ml	[x)]
Harvesting density	mil.rotifersdayi	200 ex/N	[x)]
Food cost of total production	75% of which:	50% for algae mil.ex/day 22% for yeast mil.ex/day	

Use of rotifers in fish feeding
The rotifer cultivation was realized for the exclusive or alternative feeding of early stages of Romanian littoral fish species, for the first time in most of the cases:

- marine species (flounder, turbot, acclimated trout, round goby, Black Sea silver side),
- fresh water species, reared in various brackish environments: oligohaline (<3 g ‰) - grass carp, pike; mesohaline (0,8-9,5 g ‰) - silver carp, bighead carp, (1,2-11,9 g ‰) - bream, pikeperch; polyhaline (3,59-12,71g ‰) - gibel carp.

The feeding requirements of fish larvae with natural food are a consequence of their characteristics and lacks during the early stages of life (dimension of oral cavity opening, physical, sensory properties, feeding needs, catch, swallow and digestion capacity, enzyme equipment) and of the quality of rotifers (buoyancy, motility, quality preservation, easy to be reared, nutritional value).

In establishing the *diet regime*, the synchronizing of invertebrate cultures with fish larvae development stages and the technological efficiency are taken into account (Fig.no. 5).

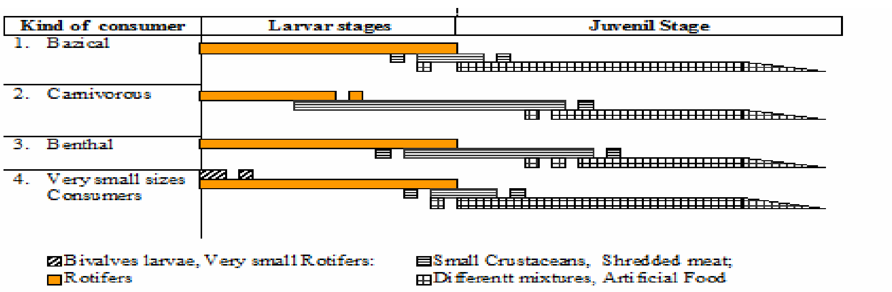


Fig.no. 5. Feeding efficiency

The evaluation of feeding efficiency is done by various morphological, physiological, biochemical, histological analysis methods

3. CONCLUSIONS

1. In aquaculture, rotifers are indispensable during the early feeding stages of fish larvae, for any industrial rearing system.
2. The main qualities and advantages of rearing the rotifer *Brachionus plicatilis* are:
- small size (123 - 292 μm),
- capacity of adapting to broad salinity rates,
- survival capacity at a 2,000 ex/ml density,
- high rate of reproduction: 0.7 - 1.4 descendents/female/day,
- superior nutritional value.

3. Directions in which improvements in rotifer rearing on the Romanian littoral were noticed:
- Massive densities cultivation through the semi-continuous and series methods,
- Genetic improvement,
- Using classic feeding sources, as well as unconventional, economic ones (concentrated algae, shark liver oil enriched yeast or other sources),
- Disease prevention,
- Improving the nutritional value,
- Collecting and preserving eggs,
- Improving certain maintenance and harvesting techniques,
- Increasing the exploitation security, through the improvement of installations and rearing equipment,
- Optimizing the rearing stages.

REFERENCES

1. *Alexandrov Laura* - Obtinerea “Hranei Vii” in Acvacultura,2008, ISNB 978-606-8035-02-4,
2. *Lim L.C.*,1991,An Overview of Live Feeds Production System in Singapore, in: USA-ASIA Worksh, Honolu, Hawaii, 203-220
3. *Liao I. C., Su M. S., Su H. M.,* 1991, An overview of live feeds production system design in Taiwan, In: Rotifer and Microalgae Culture Systems, Honolulu, Hawaii, No. 991, 135-151
4. *Sorgeloos P.& Colab*, 1986, Manual for the Culture and Use of Brine Shrimp *Artemia* in Aquaculture, Ghent, Belgia, 368
5. x x x - Annual scientific reports - NIMRD, 1986-2000

The 39th International Session of Scientific Communications of the Faculty of Animal Science, Bucharest, Romania
Scientific papers (seria D; vol. LIII) – Animal Science

RESEARCH ON ELABORATING TECHNOLOGY FOR REARING OF *OREOCHROMIS NILOTICUS* SPECIES (TILAPIA) IN FACILITIES LOCATED IN THE ENCLOSURE WITH THE FREE MOVEMENT WATER

VLADOIU SILVIA, GHEORGHE CORINA, COSTACHE MIOARA, OPREA DANIEL

Key words: research, *Oreochromis niloticus*, sealed enclosures, free movement of water

SUMMARY

Studies were aimed to test the growth of *Oreochromis niloticus* species, at different densities in tanks Ewos type, placed in a dark chamber with free water circulation. Growth experiments were achieved in two technological variants: in the first variant, were used 200 exemplars with an average weigh of 9.02g/ex and the density 1.8 kg/m^3; in the second variant, a number of 300 exemplars were used, with an initial average weight of 8.54 g/ex with a density of 2.56 kg/m^3. Production achieved has been recorded the best value in the experimental variant (V.2) where it was used a lesser stoking density. The experiment was conducted over a period of 70 days between June 14 and September 9, 2010.

1. MATERIAL AND METHOD

To achieve biological experiment were used 2 Ewos type tanks, with a capacity of 1.5 m³ and a useful volume of 1000 l / tank.

Tanks are placed in a closed rearing station with free circulation of water, for research and production of fish species at the Fish Culture Research and Development Centre Nucet.

The experiment was spread out from June 14 to September 9, 2010 with two experimental variants. Tanks were used to stoke a number of 500 exemplars *Oreochromis niloticus*, weighing between 8 and 12 g / ex.

Experimental variants were as follow:

- ***Variant 1*** – For this option was used a number of 200 exemplars of tilapia (*Oreochromis niloticus)* with an average weight of 9.02 g/ex, corresponding to a density of 1.8 kg/tank:
- ***Variant 2*** – For this option were used 300 exemplars of tilapia (*Oreochromis niloticus)* having an average weight of 8.54 g/ex, representing a density of 2.56 kg/tank.

We fed the fish with the same type of protein fodder - Aller Tilapia XS, having a content of 33 % PC. The biochemical composition of the fodder we used is the following: 33% PC, 6% FC, 45% NFE, 3.3% fibers, 6.7% ash, 1.1% P total. The vitamin content: vit. A- 10.000 IE/kg, vit. D-500 IE/kg, vit. E- 100 mg/kg.

Feed was manually delivered three times per day, every day at fixed hours (9^{00}, 12^{00} and 16^{00}).

During the experiment, daily ration of feed changed, in the first stage (25 days) represented 15% of body weight, 8% in the second stage (25 days) and 5% in the third stage of the experiment (20 days).

At the end of the experiment, based on measurements made on fish, the following parameters were calculated:

- *survival %*
- *Increased growth (W)* = final weight (Wt) - initial weight (W0) (g);
- *Feed conversion rate (FCR)* = Total Feed (F) / increase in total growth rate (W) (w / w);
- *Specific growth rate (SGR)* = 100 (ln Wt - ln W0) / t (% BW / day);
- P*rotein efficiency rate (PER)* = Enjoy all the growth (W) / amount of protein given (g);

2. RESULTS AND DISCUSSIONS

Throughout the experiment, main parameters of water quality were monitored (table 1).

Table 1

The main chemical parameters of technological water

Crt.	**Parameter**	**u.m.**	**Values recorded**
1	pH	upH	6,5 – 7,2
2	Alkalinity	ml HCl/l	2,2 – 3,9
3	Total Hardness	(^{o}D)	3,92 – 5,82
4	Dissolved Oxygen	mg O_2/l	3,8 - 6,2
5	CCO-Mn	mg /l O_2	9,3 – 37,3
8	AmoniaNH^{+}_{4}	mg /l	3,43 –4,67
9	Nitrite (NO-2)	mg /l	0,019 – 234,64
10	Nitrate (NO-3)	mg /l	0,02 – 128,31
11	P of PO_4	mg /l	0,2

Water temperature recorded values within the range 21 to 28 ^{0}C; the pH between 6.5 and 7.2; dissolved oxygen between 3.8 and 6.2 mg/l.

While the temperature was almost identical, the oxygen varied depending on the quality of water and density. Monitored parameters were within acceptable limits for tilapia.

Throughout the experimental fishing was done twice a month in which we aimed to control the growth rate, fitness and health status of fish.

Data on growth performance of fish are presented in table 2.

For all experimental variants the following indexes were calculated:

-FCR (feed conversion rate), (Figure 1);

-SGR (specific growth rate), (Figure 2);

-PER (protein efficiency rate), (Figure 3).

Table 2

Fish growth performance

	Stage 1		Stage 2		Stage 3	
Fish growth performance	**V 1**	**V 2**	**V 1**	**V 2**	**V 1**	**V 2**
Total feed given per tank (kg)	6.75	9.50	5.75	8.75	5.8	7.2
Initial mean weight (g/fish)	1.80	2.56	3.68	5.35	5.8	7.13
Fish harvested (kg)	9.02	8.54	20.46	19.80	33.92	28.50
Total fish gained (Kg)	3.68	5.35	5.80	7.13	**8.67**	**11.88**
Final mean weight (g/fish)	20.46	19.80	33.92	28.50	**51.62**	**48.5**
Growth gained (g/fish)	11.44	11.26	13.46	8.70	17.70	20.00
Total fish gained (kg)	1.88	2.79	2.12	1.78	2.87	4.75
ln Wo	0.03	0.05	0.02	0.03	0.01	0.02
ln Wt	3.28	3.36	2.02	1.46	2.10	2.66
SGR (% BW/d)	0.46	0.45	0.54	0.35	0.89	1.00
FCR (kg/kg)	3.59	3.41	2.71	4.92	1.99	1.52
Protein /tank	4.39	6.18	3.74	5.69	3.71	4.68
PER (g)	0.43	0.45	0.57	0.31	0.77	1.01

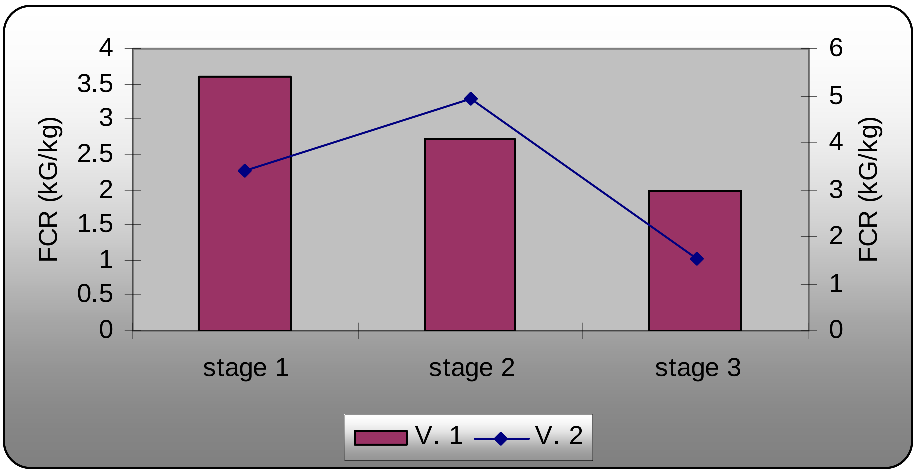


Fig. 1 - The variation of FCR (g/g) along the experimental period

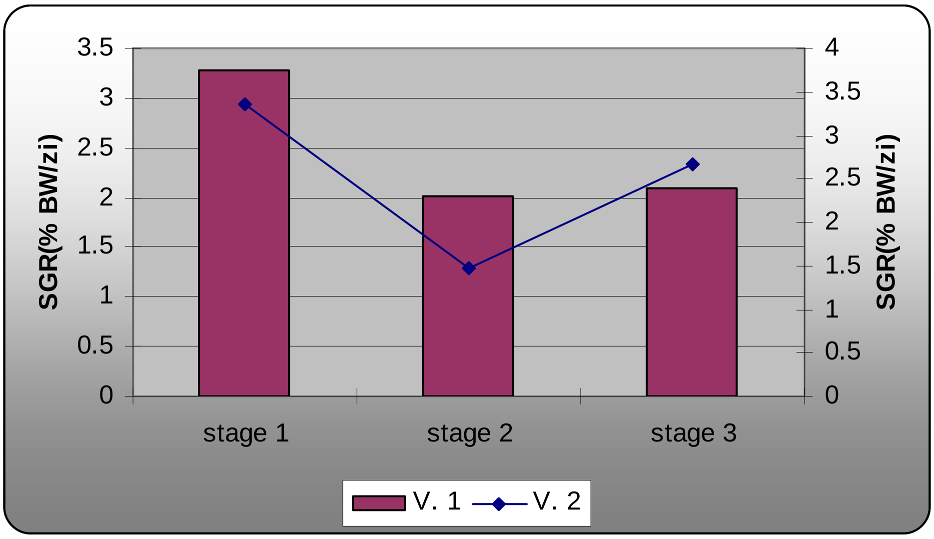


Fig. 2 - Specific growth rate SGR (%BW/day)

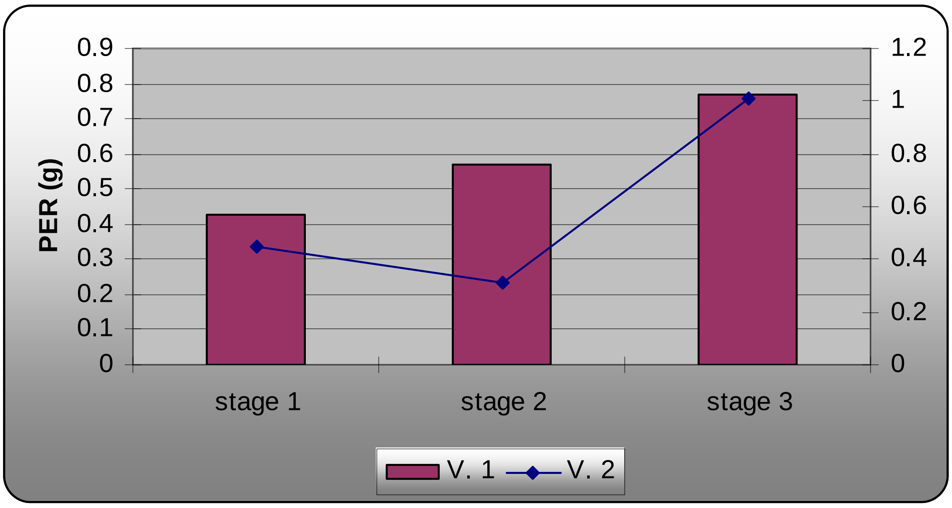


Fig. 3 - Protein efficiency ratio (PER) (g)

Values obtained from this experiment showed good growth in those tanks where stoking density used was lesser.

Regarding this, survival was: 96.9 % in V1 and 93.3 % in V2.

The economical aspect of the experimental results is shown in table 3.

Tabel 3

Economical efficiency of feed

	V. 1	V. 2
The total amount of feed (kg)	18.30	25.45
Fish production (kg)	8.67	11.88
Conversion factor (kg/kg)	2.11	2.14

3. CONCLUSIONS

After the experiment, the best results in terms of final average weight were obtained in the first variant of growth, where stoking density was lesser (200 tilapia exemplars). Survival achieved high values in both experimental variants of growth (96.6 % - V1, 93.3 % - V2).

Other technological parameters obtained were recorded following values:

- Growth gain has recorded the highest values in the last stage of growth, in both variants (17.7g/ex – V. 1 a and 20g/ex in the V. 2);
- Total growth gain recorded the highest values in the last stage of growth, but in variant 2 the value was higher (4.75 kg);
- The best specific growth rate (2.66% BW / day) was obtained in variant 2.

Population density has a major importance in raising fish in enclosed spaces, but to increase production, the key is the quality of feed and water temperature.

REFERENCES

1. *Barnabe G.* – Bases biologiques et ecologique de' aquaculture; Ed. Lavoisier Tec & Doc; Paris, 1991;
2. *Chapman G., Fernando C.H.* – The diets and related aspects of feeding of Nile tilapia (*Oreochromis niloticus L.*) and common carp (*Cyprinus carpio L.)* in lowland rice fields in northeast Thailand ; Aquaculture 123 (3-4), 1994;
3. *Hepher B.* – Nutrition of fishes; Cambridge University Press , 1988;
4. *James D.S. ; Kwei L.C.; Kitjar J.* – Supplemental feeding of tilapia in fertilized ponds; Journal of the World Aquaculture Society, vol 25/4, 1994;
5. *Lin C.K.; Diana J.S.* – Co-culture of catfish (*Clarias macrocephalus X Clarias gariepinus)* and tilapia (*Oreochromis niloticus)* in ponds; Aquatic Living Resources, vol.8 nr. 4 / 1995;
6. *Melard CH* – Les bases biologiques de l'elevages intensif du tilapia du Nil; Cahiers d'ethologie appliquee, teza de doctorat, Univ. De Liege, Belgique, 1986;
7. Smil*ey F. L.* – Tilapia: the fish of decade; Proceeding of Infofish – Aquatec 1994, Colombo, 1995;
8. *Verdegem M.C.J.; McGinty A.S.* – Evaluation of edge seining for harvesting *Oreochromis niloticus* fry from spawning ponds; Aquaculture 80, 1989.

EFFECT OF FEEDING FREQUENCY ON GROWTH PERFORMANCE AND FEED CONVERSION RATE IN CARP CULTURE (*Cyprinus carpio* L, 1787)

RADU DANIELA, COSTACHE MIOARA, COSTACHE MIHAIL, OPREA DANIEL

Key words: cultured carp, *Cyprinus carpio*, frequency of feeding, growth, feed intake, conversion ratio, condition factor.

SUMMARY

This study followed the evaluation of feeding frequency effect on rearing performance, feed consumption and feed conversion rate on cultured carp (*Cyprinus carpio* L., 1787). To accomplish the proposed purpose, they were used Ewos type tanks, wherein were reared 360 fish, with average weight of 85.9 ± 31.56 g. After being counted were divided into equal groups of 40 specimens in nine Ewos type tanks. For the three baths have been applied to three treatments (daily feeding frequency: once /day - F1, twice /day - F2 and three times /day - F3). The average weight of fish at the end of the study experimental groups reached 608.7 ± 3.42 g in F1, F2 618.3.7 ± 3.18 g and 623.1 ± 2.54 g in group F3. Growth data indicated that, the final live weight and SGR values of group F3 were significantly higher than those of the other groups ($P<0.01$). The best (lowest) mean FCR was obtained from once daily feeding (F1) ($P<0.05$). Condition factors (CF) showed similar values. It appears that fish fed once a day (F1), are lower than those fed two or three times a day, but the FCR was better than the other two groups.

1. MATERIAL AND METHOD

The survey was conducted at the Fish Culture Research and Development Center Nucet and was carried out over a period of 91 days after the date of June 14th 2010 until September 14th 2010. In the experiment have been used nine EWOS type tanks of 1.5 m^3 and an efficient volume of 1000 l/tank. During the survey, volume of water from tanks has been maintained at 0.6 m^3. The flow of water supply has varied from 6 to 10 l/minute, depending on fish size, density and water temperature. Three hundred and sixty fingerlings of carp, aged one year, with a weight of 85.9 ± 31.56 (85-121) g, have been counted and distributed equally in nine tanks. They were applied three treatments (the frequency of daily feeding: once/day – F1, twice/day – F2, three times/day) in each series three tanks, so that the experiment was conducted in three replications of 40 fishes for each tank. For acclimatization to the new conditions, fish have been stoked in tanks with three days before the start of experiment. After stoking and acclimatization, each fish have been weighed (± 0.01 g) individually in order to determine the initial weight and check in the density on each tank. The initial average density for all groups was about 7.8 kg/m^3. During the experiment, fish have been feed with commercial fodder SOPROFISH 32/10 PROFI – extruded complex mixture for carp, PC: 32 %, LC: 11 %, EM: 15.2 MJ/kg.

Distribution of food was done manually once a day at group F1 (at 01:00 PM), twice a day (09:00 AM and 05:00 PM) for group F2 and three times a day (09:00 AM, 01:00 PM and 17:00 PM) for F3, six days per week and a day of fast. Unused feed and wastage excrements accumulated have been constantly removed from tanks. Daily have been recorded food consumption (ration), mortality and basal parameters of water quality (temperature and dissolved oxygen). Dead fish have been weight and immediately replaced with others of similar size. At intervals of about o month, fish from each tank have been weight (±1 g). At the end of experiment, all fishes ware weight and measured on total length (±1 mm) individually. Fish have been anesthetized with 50 ppm MS-Sandoz for individual manipulation (determination of weight and/or length). Results from measurements were used to determine the condition factor and statistical interpretation.

From data get during the survey time have been determined the main technological parameters:

- Feed conversion rate (FCR) = Total Feed (F)/increase in total growth rate (W) (w/w);
- Specific growth rate (SGR) = 100 (ln Wt – lnW0)/ t (%BW / day) (kg/m^3);
- Feed efficiency (FE = feed delivered / weight);
- Condition factor (CF = $[(W / L^3) \times 100]$);
- Coefficient of variation (CV = SD × 100/mean W).

All data were subjected to one-way analysis of variance (ANOVA) and differences between means compared by the Tukey test at a 95% confidence interval ($P<0.05$).

2. RESULTS AND DISCUSSIONS

Mean water temperature ranged from 20.5 ^{0}C to 29.0 ^{0}C (Figure 1); the content of dissolved oxygen registered values of 4.8 – 8.2 mg O_2/l.

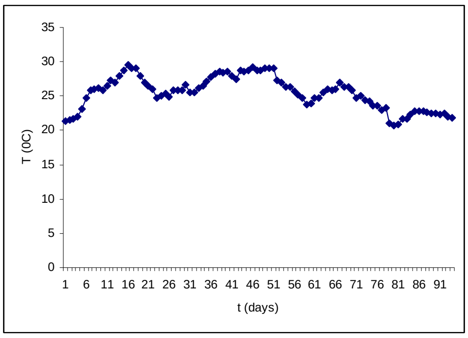


Figure 1. Variation of water temperature during survey time

At the end of experiment, the average weight of fish from groups F1, F2 and F3 goes to 608.7 ± 3.42 g (F1), 618.37 ± 3.18 g (F2) and 623.1 ± 2.54 g on F3 respectively (Figure 2; Table 1).

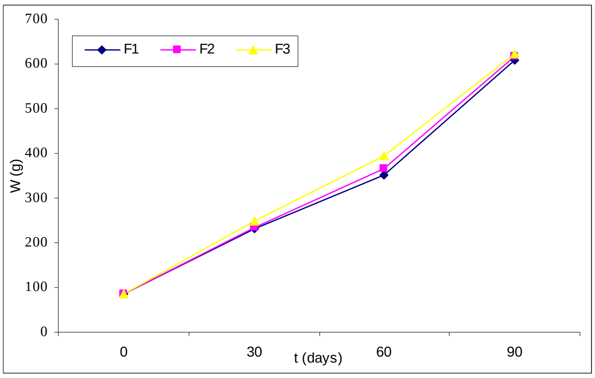


Figure 2. Comparative situation between groups of study on increasing the weight of fish during the survey time

It means mean live weights of the groups increased of 42.5% in 91 days. On the groups of study F1, F2 and F3 respectively, the specific growth rates (SGR) varied from 1.56–1.78 with average values of 1.57; 1.68, 1.78 %, (table 1). Growth data have indicated clearly that values of final weight and SGR for group F3 were significantly higher then the other groups (P<0.01).

Condition factor has been determined only on the beginning and the end of experiment. Differences between groups were not significant (table 1). Initial stoking density of fish at the beginning of study to assess the performance of growth by following the frequency of daily feeding was of 7.06 – 7.83 kg/m^3 and reached the final densities of 40.5; 41.22 and 41.54 kg/m^3, in order to increase feeding frequency (Table 1).

Daily feed consumption and conversion rates are were presented in Table 1. Mean values declined with the decrease of feeding frequency whereby resulting in significant differences amongst all three groups (P<0.05).

Feed conversion rate, recorded the best values (the lowest mean) FCR in the groups in which the frequency of feeding was once a day (F1) followed by F3 and F2 (Table 1). At the end of study, variation coefficient for weight was 18.7 ± 2.86 %; 19.5 ± 1.56 % and 17.8 ± 1.83 % for the groups F1, F2 and F3 respectively, and did not grow up significantly in time.

Table 1

Weight (W), Specific growth rate (SGR), Condition factor (CF), Feed consumption (FC,W% of weight), Food conversion rate (FCR) and density factor (D) values carp fingerlings during the trial, ($_i$: initial and $_f$: final values)

Parameters	F1	F2	F3	ANOVA
W_i	85.9±0.40	84.8±0.21	85.4±0.36	NS
W_f	608.7±3.43	618.3±3.16	623.1±2.57	**
SGR (%/day)	1.70±0.021	1.73±0.021	1.78±0.012	**
CF_f	2.19±0.070	2.17±0.076	2.20±0.067	NS
FC (%W/day)	0.51±0.032	0.65±0.020	1,27±0.036	**
FCR	1.32±0.104	1.47±0.095	1.56±0.103	*
FE	0.72±0.025	0.67±0.032	0.58±0.036	**
Df (kg/m^3)	40.51±0.389	41.22±0.354	41.54±0.280	**

NS: No significant, *: P<0.05, **: P<0.01

Distribution of feed for groups of fish that have been the subject of this study was done by hand until saturation and has made differentiated according to the protocol set. The biggest increase in weight ($P < 0.05$) was obtained at the group feed on highest frequency (three times a day). The practical experience has shown that the rate of growth depends on both the quantity of food administrated and the frequency of its delivery.

According to the study conducted by De Silva (1995), when fish are feed until saturation, they don't have the tendency to eat again, only when the gut is almost complete empty. Therefore, a feeding with frequency of ones a day is often more then enough. Another variable checked in this study was the factor of condition, which is linked both to economical growth and feeding. Statistically, there were no significant differences of values registered for condition factor between groups.

Also, the report of food conversion indicated clearly a temporal variation during probation; the values for group F1 also decreased considerably towards the end of the trial. Feeding frequency, growth and food conversion rate are major variables for commercial aquaculture. Understanding of relationships between them is essential for optimizing feeding strategies on fish. Unfortunately, the maximal growth and the smallest food conversion rate does not coincide with the same feeding frequency. The best food conversion rate has been achieved on feeding in smaller rations. Thus, it was clear that it is possible to choose frequency of the most advantageous feeding, in which growth is maxim, food conversion rate is optimum or that there is a balance between the two. The daily frequency of feeding is a very useful when is aimed at achieving a balance between maximum growth and an optimal food conversion. A high rate of feeding lead to the best performance (Stickney, 1994).

Minimize inter-individual variation, administration of quality fodder properly qualitatively and quantitatively, choice the appropriate moment for its delivery, contribute effectively to maximizing production, cut excessive food and improve water quality.

Variation coefficients for weight indicated growth tendency, but in these study they don't have affected by feeding frequency. The condition factor, that is linked to economic growth and feeding, was another variable checked on the study.

3. CONCLUSION

- The amount of the daily feed ratio, frequency and timing of the feedings and presentation of the predetermined ratio are the key factors of feed management strategies, influencing the growth and feed conversion
- Feeding more than once and twice a day (three times) increased growth performance.
- Feed conversion rate was better in once-daily feeding than twice or three times.
- Feeding frequency did affect neither the condition factor, nor the coefficients of variation for weight.

REFERENCES

1. *De Silva S.S.* and *T.A. Anderson*, 1995. Fish Nutrition in Aquaculture. Chapman & Hall Aquaculture Series, London, 319 pp.

2. *Goddard S., 1996*. Feed Management in Intensive Aquaculture, Chapman & Hall, New York, 194 pp.
3. *Hasan M.R., 2001*. Nutrition and feeding for sustainable aquaculture development in the third millennium. In: R.P. Subasinghe, *P. Bueno, M.J. Phillips, C. Hough, S.E. McGladdery* and *J.R. Arthur* (Eds). Aquaculture in the Third Millennium. Technical Proceedings of the Conference on Aquaculture in the Third Millennium, Bangkok, Thailand, 20-25 February 2000. NACA, Bangkok and FAO, Rome: 193-219.
4. *Jobling M.*, 1995. Fish Bioenergetics, Chapman & Hall, London, 309 pp.
5. *Oprea L., Rodica G.*- Nutriția şi alimentația peştilor, Edit. Tehnica, 2000
6. *Stickney, R.R*. 1994. Principles of Aquaculture. John Wiley and Sons, New York, 502 pp.
7. *Wang, N., Hayvard, R.S.* and *Noltie, D.B.* 1998. Effect of feeding frequency on food consumption, growth, size variation and feeding pattern of age-0 Hybrid Sunfish. Aquaculture, 165: 261-267.

The 39th International Session of Scientific Communications of the Faculty of Animal Science, Bucharest, Romania
Scientific papers (seria D; vol. LIII) – Animal Science

RESEARCHES CONCERNING THE INFLUENCE OF HYDRO-CHEMICAL FACTORS ON THE REARING OF *Oreochromis niloticus* SPECIES IN EWOS TYPE TANKS

GHEORGHE CORINA - ELENA, RADU DANIELA, COSTACHE MIOARA

Centre of Researches and Development of Aquaculture Nucet-Dambovita,e-mail: scp_nucet@yahoo.com

Key words: tilapia (O*reochromis niloticus*), Ewos tanks, chemical factors, protean fodder

SUMMARY

The water quality management in these rearing systems constitutes the key factor for the success of aquaculture practices. This is why it is compulsory to know the water quality parameters and their interdependence, as well as their effect on the fish health.

Tilapia is a successful fish, both among producers and consumers, first of all because of its robustness, tolerance, flexibility and general plasticity manifested in the most varied environment conditions but, in equal measure thanks to its organoleptic features, nutritive value (96 kcal/100g) and mostly to the protein content (19,2%). The ability of this species to survive in unfavorable environment conditions (low oxygen concentrations, high ammonium concentrations, high salinity, and generally limitative parameters for other species) allows tilapia to be reared in higher densities compared to other fish species (Fitzsimmons, 2001).

Initially, tilapia was used in aquaculture as a cheap mean to produce fish meat and also because the species was able to reproduce in almost any aquatic systems, it is omnivorous and resistant enough to be raised in controlled conditions (Pillay 1990).

Tilapia became one of the most used species in the world for farm rearing, being surpassed from the total production standpoint, only by carp species (Watanabe et al. 2002).

In our experiments we analyzed the limitative chemical factors influenced for the species O*reochromis niloticus*, reared in Ewos type tanks.

1. MATERIAL AND METHOD

The experiment of rearing the species *Oreochromis niloticus* took place in two tanks (fig.1), placed in an enclosure used for rearing fish species which make the object of research and production in of Fish Culture Research and Development Centre Nucet. The technical features of these rearing tanks are as follows:

- side – 1,45 m;
- height – 0,7 m;
- water depth – 0,5 m;
- useful volume – 1 mc;
- supply installation type: with surface horizontal action;

The rearing tanks supply is done on the upper side through a supply pipe.

The water exhaustion installation – is used for the transportation of the used water through a pipe towards the exhaust port.

The device that maintains the level is made up of two concentric telescopic tankes. By raising or lowering the central tanke, which is sealed with a rubber gasket to the external tanke, one can ensure the water in the rearing tank to raise, lower and evacuate.

Fig.1 Image with the Ewos tanks

Stoking of the experimental Ewos tanks took place on 14th June, 2010 at the water temperature of 26 ^{0}C. The duration of the experiment was of 70 days.

Tilapia rearing experiment was made in two variants.

In the 1st variant, we used 200 ex., with an average weight of 9,02g/ex., and in the 2nd variant we populated with 300 ex., with an average weight of 8,54 g/ex.

We fed the fish with the same type of protein fodder - Aller Tilapia XS, having a content of 33 % PC.

The biochemical composition of the fodder we used is the following: 33% PC, 6% FC, 45% NFE, 3.3% fibers, 6.7% ash, 1.1% P total. The vitamin content: vit. A-10.000 IE/kg, vit. D-500 IE/kg, vit. E- 100 mg/kg.

The fodder administration was divided into three staged:

- 1st stage – it includes the first 17 rearing days, when we administrated 20%,
- 2nd stage – it includes the following 14 days, when the ratio was of 8%,
- 3rd stage – it includes 24 days, the ratio being of 4%.

Generally, tilapia rearing takes place in intensive or super-intensive systems, in different environmental conditions, with different densities and using the adequate strategies. The water quality in the intensive or super- intensive rearing systems is most likely to be subject to continuous changes.

The survey of the environmental conditions was made both with the field equipment and with the chemical analysis within the specialty laboratory of CCDP Nucet.

The quality parameters observed during the experiment are represented by: temperature, oxygen, nitrites, nitrates, ammonium, phosphates, pH, calcium, alkalinity, hardness, CCO and chlorides.

Their determination was made by using the following equipment: the oxygen concentration and the saturation percentage were determined by means of WTW Oxi 315

I apparatus, pH was determined with the WTW pH-meter and the water temperature was determined with a mercury thermometer.

For the other parameters observed we used standard determination methods (APHA,1985).

Table 1

Critical and ideal values of the main quality parameters for water in the intensive tilapia cultures [6]

Medial parameters	Critical /ideal values
Oxygen	<2/>6 mg/l
Temperature	10 – 35/10 – 32 ^{O}C
TAN (total ammoniac azoth)	>15/<3 mg/l
AN (non ionized ammoniac)	>1/<0.2 mg/l
Solids in suspension	>200/<20 mg/l
CBO	>200/<5 mg/l
NO_2	>5/<1 mg/l
NO_3	>500/<20 mg/l

2. RESULTS AND DISCUSSIONS

The hydro-chemical conditions in the experimental tanks evolved at a constant rhythm, reaching a maximum in August.

Temperature, the determinant factor in carrying out the technology varied between the values of 20 ^{0}C at population and 29 ^{0}C at the end of the experiment, recording a maximum of 28.8 ^{0}C.

The values of the pH recorded were comprised between 8.04-8.2, values that are registered in the optimum range for the development of *Oreochromis niloticus* species.

The pH evolution along the experimental period is showed in fig.2.

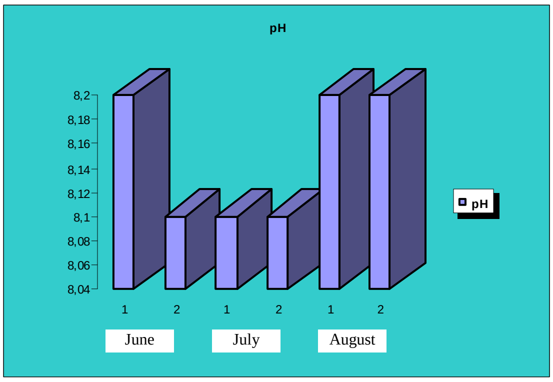


Fig.2. The evolution of the pH average values during the development

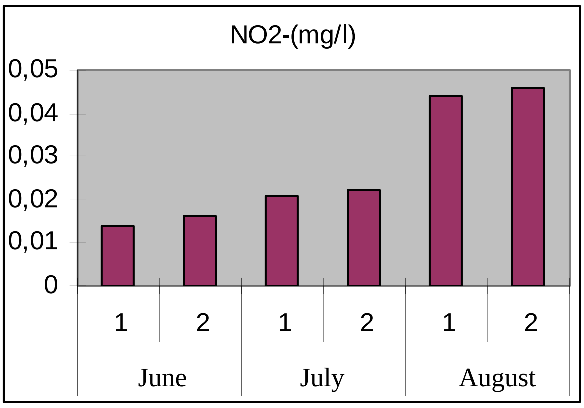


Fig.3. The evolution of the ion nitrite average values during the experiment

Nitrites are toxic for many fish as it makes hemoglobin less able to transport oxygen; chloride ions can reduce toxicity. Culture tilapia is more tolerant to nitrite than many species of fresh water fish [4].

The nitrites concentration (fig. 3) varied in direct relation to temperature and the concentration of the dissolved oxygen.

In our rearing experiment the values of ion nitrite are placed in the rearing optimum.

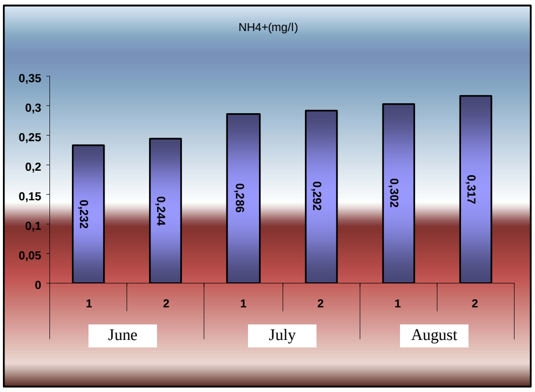


Fig.4 The evolution of the average values for ion ammonium during the experiment

Massive mortality of tilapia can happen within a few days, when the fish is transferred at once in water with ammonia concentrations over 2 mg NH_4^+ / l. However, when they are gradually acclimatized to sub-lethal levels, approximately half of the fish will survive 3 or 4 days at ammonia concentrations as big as 3 mg NH_4^+ / L. Longer exposure (several weeks) to higher concentrations of 1 mg / l of the ionized ammonium and a reduced concentration of DO in water causes losses, especially among young fish. The mortality of the first long exposure can start at lower concentrations of 0.2 mg / l.

The non-ionized ammonia at lower concentrations of 0.08 mg / l, can determine the decrease of the food consumption.

The values achieved after this experiment indicated a better growth percentage in the two tanks. As for the survival percentage it was between 98.3 % for the 1st variant and 96.0 % for the second variant.

Tilapia can survive at concentrations of dissolved oxygen (DO), of 0.3 mg/l, much under the tolerance limits for most of the culture fish. After our experiments, one could notice that this species recorded better growth parameters when we registered values of 6.4-7.2 mg O_2/l.

The experiments showed that when the concentration of dissolved oxygen increases (6 mg O_2/l) and the chlorides concentration decreases (22 mg/l Cl^-), the nitrite concentration records higher values that can affect their development.

Generally, for tilapia's culture in fresh water, the nitrite concentration should be kept under 27 mg NO_2^-/ l. As a protection measure against the nitrites toxicity in the recirculation systems, the chlorides concentrations must be kept at 100 at 150 mg Cl^- /l.

All the others chemical parameters analyzed recorded optimum values to rear the *Oreochromis niloticus* species.

3. CONCLUSIONS

- Controlling and maintaining a balance between the chemical limitative factors for the rearing of *Oreochromis niloticus* species is the most important element and must follow for an optimum rearing of the species.
- In our experiments we recorded a good level of growth for the fish both in the first and in the second variant. In the 1st variant we introduced fish with an Average weight = 180g/fish, and in the second variant we started from an Average W. =8.54g/ex and got to an Average W. =174g/ex. The growth difference was due to the different stoking density and the hydro-chemical conditions.
- As a result of our experiments one noticed that the toxic ammonium percentage in the water depends on temperature and pH.
- Changing the water in the tanks used for the rearing experiment had an essential role in maintaining a constant level of dissolved oxygen, which favored rearing.
- The percentage of water supply is essential to maintain an optimum level of oxygen (3 mg O_2/l).
- Though Tilapia can survive at low concentrations of oxygen for several hours, the rearing tanks for Tilapia should be manage in such way as to maintain the oxygen concentrations over this value of 1 mg / l. The high metabolism and, possibly, its resistance to diseases are inevitable when the oxygen decreases below this level for long periods.
- If tilapia is somehow particular dependent on the thermal regime of the water, it shows a special plasticity about other factors.

REFERENCES

1. *Abdel – Fattah M. El- Sazed*, 2004, Tilapia culture, Oceanography Department, Faculty of Science Alexandria University, Egypt.
2. *Cristea V., Ceapă C., Răuță M., Ştefănescu V.* – Oportunitatea şi condițiile introducerii sistemelor superintensive în acvacultura României, AQUAROM ´98, International symposium, Galați, Romania, 1998
3. *Gary A. Wedemeyere*- Physiology of fish in intensive culture system. ITP,
4. *H. Kroupova, J.Machova, Z.Svobodova, Nitrite influence on fish: a review, Vet. Med.- Cyech.50. 2005 (11): 461-471.*
5. *Isabelle Metaxa*, 2003, Asigurarea şi Controlul Calității în Acvacultură, Pax Aura Mundi Publishing House, Galați.
6. *Paula Popa* and *Neculai Patriche, 2001* - Chimia mediului acvatic, Ceres Publishing House Bucharest

The 39th International Session of Scientific Communications of the Faculty of Animal Science, Bucharest, Romania
Scientific papers (seria D; vol. LIII) – Animal Science

EASY WAYS TO INCREASE FISH PRODUCTION BY TESTING DIFFERENT AMOUNTS OF ORGANIC FERTILIZER IN CYPRINID FARMS

BUD I., C. MITRE, L. CSEP

Key words: trophicity, impact, polyculture, asiatic cyprinids, blank material

SUMMARY

In the paper the authors tested the impact it had on the development of organic fertilizer and natural food indirectly on growth performance of different species of fish.

The experiment follows the mean by which the organic fertilizer quantity influences the production performances in polyculture system, using 2, 3, and 4 tons of manure per ha water shine.

Results obtained put in evidence significant differences between witness lot and the other three pools, done by a superior production with 91,6 – 242,87 – 468,5 kg, and in directly correspondence with given manure quantity . Between variants, in pool into which were used 4 tons / ha water shine, it were obtained the highest production 1498 kg/ha, and less to witness lot over 1029, 5 kg / ha.

Carp of culture has been a long time the only species of fish which was the subject of exploitation of our fisheries, species otherwise very appreciated by consumers because of their special biological and productive qualities. Lately, specifically since 1962, almost all farms are growing cyprinid, with carp and three species of Asian cyprinids imported from China: cosas (Ctenopharingodon idella), bloody or silver carp (Hypopthamichthys molitrix) and bighead carp or marbled carp (Aristichthys nobilis).

Production performances are dependent on the one hand, on natural foods, specifically the quantity and quality of aquatic flora and fauna, and on the other hand the contribution that it brings the additional food.

Quantity and quality of natural food depends on how water basins that are prepared, either by classical agro-technical works (plowing, harrowing, and then seeded flooded), or by supplements of biodegradable organic matter (especially manure).

Taking into account these elements, in the present work we aimed to quantify the impact it has on the performance management of manure production by testing different amounts administered per unit of water surface area.

1. MATERIAL AND METHOD

Experiment was conducted during 2009 in the fishery C.S.Piscicola S.R.L. Cehu Silvaniei, with four fishponds with a functional area between 6 and 14 ha water shine. One pool represented the control group and in the other three pools were used 2, 3, and respectively 4 tons of manure per hectare water surface.

Population formulas and density per unit area were similar in all four basins studied, such as biological differences recorded at the end were determined solely by the impact that has had manure on aquatic flora and fauna.

It were followed during the entire year the planktonic creatures and framing categories of water quality, phytoplankton composition, accumulation of total body weight and daily average, rate of survival and of loss, production per ha water shine and the differences recorded between basins.

2. RESULTS AND DISCUSSIONS

A brief foray into the general state of fish ponds studied, allows us to see that they meet the general conditions for exploitation of fish, noting that the de-clogging operations are required in the future, considering that more than 20 years were any interventions made in the hearth of the basin, and deposited substrate is relatively thick suspension.

Some of the features of basins in which the research are developed, are presented in Table 1. The data presented in this table shows that generally parameters followed and characteristics of each basin in part, extends from the levels required to exploit echnology of cyprinids, although some limits to the lower ranks in terms of comfort for fish.

Table 1

The situation of fish ponds used for fish consumption

Specification	Suface (ha)	Average depth (m)	flow (l/s)	alimentation (source)	surface covered by vegetation (%)	degree of clogging (%)	general condition of dams
Pool2	6 ha	1,6 (0,8-2,2)	5	Valea Sălajului	12	20	Good
Pool 3	14 ha	1,6 (0,8-2,4)	3	Gravitațional	17	24	40 % rehabilitation ongoing
Pool 4	6 ha	1,7 (0,8-2,5)	3	Gravitațional	20	15	30 % rehabilitation ongoing
Pool 5	12 ha	1,7 (0,8-2,5)	3	Gravitațional	15	18	good

Next we watched against air and water temperature readings during the year, data which are presented in Table 2. From data in this table we can see that the values of air temperature in the area of farm shows wide variations between a minimum of -15^{0}C recorded in January and a peak in August of +29^{0}C.

Unlike exterior temperature, water temperature is positive in all cases, ranging from 1.8^{0}C in January and a maximum of 25.2^{0}C in July. According to these data, values in all cases the aquatic environment are favorable over both winter and summer, without need for intervention from the farm workers.

Table 2

The evolution of air and water temperature at fish farm Cehu Silvaniei in 2009

Calendar month	Air temperature (° C)	Water temperature (° C)
January	- 15	+ 1,8
February	- 12	+ 1,9
March	+ 3	+ 2,7
April	+ 17	+ 15,6
May	+ 22	+ 19,8
June	+ 20	+ 20,6
July	+ 29	+ 25,2
August	+ 22	+ 23,8
September	+ 18	+ 20,1
Octomber	+ 8	+ 14,8
November	+ 7,2	+ 10,9
December	+ 4,3	+ 6,1

In order to assess the amount of aquatic creatures and their evolution during the biological cycle, we watched some of these elements in each basin, in direct correspondence with the amount of organic fertilizer and set the best option in this respect.

From data of Table 3, we conclude that the differences are significant in the beginning of biological cycle, apart between basins, depending on the amount of organic fertilizer and water temperature. If in March, these differences are reduced between basins, with increasing of temperature, increases the amount of planktonic creatures, reaching maximum values during the summer months, July and August. The experimental ponds where we used organic fertilizer, the amount of planktonic creatures differ depending on the amount fed while in the control basin planktonic creatures quantitative values are significantly lower throughout the biological cycle. The impact that they have organic fertilizers is very well highlighted by the evolution of water quality category during the 8 months of operation followed. Thus, we conclude that in basins where organic fertilizer was used, with the exception of March, all other months the water is very rich in planktonic creatures, while in the control basin, in the 8 months, only four, water is very rich 2 months rich, and the other two months the right toward poor.

We still play productive performance on the four basins studied, in direct correspondence with the amount of fertilizer given. Every pool we used the same density, respectively 5200 heads on ha water shine, the same structure of species and the same average weight of samples, the only difference was the quantity of managed manure.

The basin 4 (Table 4) we used the highest amount of organic manure (4 tonnes / ha) and got the following results.

At the moment of populating the typical structure is distinguished for popular operating system in polyculture, in which one has the highest share is of carp (57.6), followed by Asian cyprinids (28.8%), crucian carp and other less valuable species, 3, 8%.

Table 3

The amount of planktonic creatures according to calendar months and pool (cm^3/m^3)

Specifi-cation	Surface (ha)	Amount of organic manure (t/ha)	The amount of planktonic creature (cm^3/m^3)								Water quality cathegory							
			March	Apr	May	June	July	Aug	Sept	Oct	March	Apr	May	June	July	Aug	Sept.	Oct
Pool4	6	4	15	32	48	66	69	68	68	41	B	FB	FB	FB	FB	FB	FB	FB
Pool5	12	3	12	22	42	59	63	63	62	38	P	B	FB	FB	FB	FB	FB	FB
Pool3	14	2	10	17	33	52	60	61	59	35	P	B	FB	FB	FB	FB	FB	FB
Pool2 (witness)	6	-	5	12	22	45	51	48	45	19	S	P	B	FB	FB	FB	FB	B

FB – very rich; B – rich; P – right; S - poor

Table 4

Manufacturing performance in the basin IV - 6 ha (4 tons manure / ha)

Species	POPULARE				RECOLTARE				% loss
	Weight to population (g)	Density (buc/ha)	Kg/ha	Total kg	Weight to fishing (g/piece)	piece/ha	Kg/ha	Total kg	
Carp	30	3000	90	540	400	2400	960	5760	20
Sanger	15	1000	15	90	450	760	342	2052	24
Cosas	15	500	7,5	45	300	450	135	810	10
crucian	10	500	5,0	30	100	460	46	276	8
Other species	10	200	2,0	12	100	150	15	90	25
TOTAL	-	5200	119,5	717	-	4220	1498	8988	19,23

Production of fish obtained per hectare was 1498 kg, which we consider very favorably and at the highest values in recent years of operation. In making this production has contributed carp and 960 kg, 342 kg bleed, 135 kg of grass carp, crucian carp and other species with 46 kg to 15 kg.

In the second pool, which was normal given 3 tonnes / ha of manure, while other elements are identical (Table 5), the amount of fish was 1272.37 kg / ha of water surface, lower than the previous basin and with a slightly higher percentage of losses (19.93%).

The third tank that received organic fertilizer, but the lowest quantity (2 tons / ha), production was lower compared with the other two being at 1121.1 kg / ha and increased losses to 22.50% (table 6.). The individual weights were also lower compared with those recorded in previous pools.

In the case of witness basin, in which it was bred only the carp species and in which it was not manure given, recorded performances were the most reduced, obtaining a production of 1029,50 kg, lower values ranging between 91.60 kg and 468.5 kg depending on the amount of fertilizer administered (Table 7).

Table 5

Production performances in V th pool – 12 ha (3 tons manure/ha)

Species	Population				Harvest				% loss
	Weight to population (g)	Density (pices/ha)	Kg/ha	Total kg	Weight to fishing (g/pieces)	Pieces/ha	Kg/ha	Total kg	
Carp	30	3000	90	1080	350	2350	822,5	9870	21,67
Sanger	15	1000	15	180	400	740	296,0	3552	26,0
Cosas	15	500	7,5	90	250	440	110,0	1320	12,0
Carasus	10	500	5,0	60	75	425	31,87	382,44	15,0
Other species	10	200	2,0	24	80	150	12,00	144,0	25,0
TOTAL	-	5200	119,5	1437	-	4105	1272,37	15268,4	19,93

Table 6

Production performances in IIIrd pool (2 tons manure/ha)

Species	population				harvest				% loss
	Weight to population (g)	Density (pieces/ha)	Kg/ha	Total kg	Weight to fishing (g/pieces)	pieces/ha	Kg/ha	Total kg	
Carp	30	3000	90,0	1260	320	2300	736	10304	23,33
Sanger	15	1000	15,0	210	350	725	253,7	3552	27,50
Cosas	15	500	7,5	105	220	435	95,7	1339,8	13,00
Carasus	10	500	5,0	70	60	420	25,2	352,8	16,00
Other species	10	200	2,0	28	70	150	10,5	147,0	25,00
TOTAL	-	5200	119,5	1673	-	4030	1121,1	15695,6	22,50

Table 7

Evolution of fish production and recorded differences, depending on the amount of organic fertilizer used

Specification	Surface (ha)	garbage run (tons/ha)	biological cycle (days)	Total quantity populated (kg)	Harvested quantity (kg)	Production to ha (kg/ha)	Difference to witness (kg)
Pool IV	6	4	160	717	8988	1498,00	+ 468,5
Pool V	12	3	160	1437	15268,4	1272,37	+ 242,87
Pool III	14	2	160	1673	15695,6	1121,10	+ 91,60
Witness pool	6	-	160	717	6177	1029,50	-
TOTAL	38	-	160	-	46129	-	-

3. CONCLUSIONS

Following these results the main conclusions can be drawn.

To avoid the trophicity decrease of pools, it is advisable from time to time to compensate losses of substances that are occurring by fish extract, at doses of organic substances.

Administration of organic fertilizer will be made only after a proper analysis to determine the amount of natural food in each hand basin.

The basins studied, the most favorable amount of organic fertilizer was 4 tons per ha water shine.

Production of fish obtained from ponds in which organic fertilizers were used in all cases was superior to the control basin and different depending on the amount fed.

Administration of organic fertilizers will take account of pools natural trophicity, and also of fish species to be exploited.

Growth in polyculture system is significantly more effective compared to monoculture, capitalizing more fully the natural food in pool, being also more economical because it involves the administration of large amounts of additional feed.

REFERENCES

1. *Barnabe G.* (1993) - Biological and environmental bases of Aquaculture. Ed Lavoisier Tec. And Doc. Paris
2. *Boyd C.E.* (2003) - The status of codes of practice in Aquaculture. World Aquaculture, 34 (2), 63-66.
3. *Bud I. et al* (1991) - Influence of manure from the web-footed water increased the gloss on the main physico-chemical parameters of the basin fisheries. Simp. Nat. Cluj-Napoca, vol. XVII, pp. 213-218.
4. *Bud I.* (1993) - Opportunities to increase production over the transition from operating in monoculture, to the polyculture. Simple. Nat. Cluj-Napoca, vol. XIX, pp. 552-560
5. *Bud I. St. Diaconescu* (2004) - Growth of carp and other fish species. Ceres Publishing House, Bucharest.
6. 6.*Bud.I., V. Vlad, Stefan Reka* (2008) - Predator fish - raising, breeding, recovery. Ed Ceres, Bucharest
7. *Bud I., V. Vlad, M. Nadasanu* (2010) - Treaty for raising fish. Ed Texts, Dej
8. *Pricope T.* (1999) - Hydrobiology. Ed I. Borcea, Bacau.

The 39th International Session of Scientific Communications of the Faculty of Animal Science, Bucharest, Romania
Scientific papers (seria D; vol. LIII) – Animal Science

STRUCTURED SURVEY ON *EUSTRONGYLIDES SP.* (Ph. NEMATODA) WITHIN A POLLUTED AQUATIC ECOSYSTEM

LAURA URDEŞ, DIACONESCU CRISTIANA,
HANGAN MARIUS, GEANINA VLASE

Key words: heavy metals pollution, *Eustrongylides sp*. larvae, freshwater fish

SUMMARY

According to the latest findings, there are some helmints which show a high heavy metal accumulation capacity in their hosts, acting as biofilters. This study aimed at finding whether fish living endoparasites might become reliable indicators for heavy metal pollution of a natural aquatic system. The research was carried out on seven species of freshwater -infected and noninfected- fish which were collected from Razelm lake (the Danubian Delta area).

Concentrations of Cu, Zn, Hg, Cd, Pb and the enzymatic activity of superoxide dismutase and glutation peroxidase were determined in the liver and muscle. Atomic absorption spectrophotometry has been used for heavy metals content and photocolorimetry for SOD and GPx. Histological changes in the liver and muscle following the natural exposure of fish to the heavy metals were examined in light microscopy. The biochemical results revealed that the amount of heavy metals in helmints were many times higher than in the tissues of some studied fish. By comparison, the infected fish accumulated less metals than the uninfected ones.

Although exfoliative cytology and histology might be seen as biomarkers in the assessment of liver exposure to some pollutants in fish, the endoparasites are more consistent and reliable indicators for metal pollution than some of their aquatic hosts or the components of their natural environment.

Environmental pollution caused by the development of industry and technology threatens freshwater ecosystems. Whenever it rains or snow melts, significant amounts of pollutants are carried directly to water.

Heavy metals have several natural sources, such as mineral rocks, vegetation, salt and sand; but the pollutants are more frequently sourced by car and truck exhaust, engines, rust and untreated sewage, which are pumped directly into the water. As well as pesticides, heavy metals adhere to sediments, being transported with it by water, into aquatic systems. By their presence there, usually at a low level but chronic in nature, heavy metals come to threaten aquatic life.

Fish are relatively sensitive to changes in their environment and previous studies indicate that these substances are poisoning fish even in low concentrations, because they have the ability to bioaccumulate. Fish health may therefore provide good indication of the health status of an aquatic system. Histological, physical and biochemical analysis appear to be three of the most sensitive parameters capable of determining the changes that may occur as early toxic effects of aquatic pollution.

Lately, there’s been paid a large interest to the connection between heavy metals and certain endoparasites as acanthocephals, cestods, nematodes and even trematodes, (Turcekova *et* al. 2002, Sures, B. 2003). On this issue, there are four major statements which our study has been based on. Firstly, pollutants –among whom heavy metals, as well- may increase parasitism by increasing host's susceptibility or the abundance of the intermediate hosts and vectors (Turcekova *et* al. 2002); certain heavy metals, such as Cadmium, Copper, Lead and Zinc have been found to be six to 280 times higher in cestodes and acanthocephalans than in the tissues of their definitive hosts (Tekin-Özan, S. & Kir, I. 2007, Terry, A. D. *et* al, 2006, Turcekova *et* al. 2002, Malek, M. *et* al., 2007). Larval stages mightn't be able to take up high quantities of heavy metals in their hosts; at least, not so much as the helmints do (Turcekova *et* al. 2002, Sures, B. 2003). Furthermore, some authors (Baruš, V. *et* al. 2006, Bergey, L. *et* al. 2002) indicated that nematodes might be unsuitable as accumulation indicators if metals are present at low concentrations in environment.

In order to provide data regarding the interrelationship between an aquatic system, heavy metal pollutants, freshwater fish and *Eustrongylides* sp. larvae, we studied a number of eustrongilidosis cases and noninfected freshwater fish in the Danubian Delta area, from pathological, histological and biochemical points of view.

1. MATERIAL AND METHOD

The study was carried out during September 2008 - February 2009. Seven species of freshwater fish, silver carp (*Hypophthalmichthys molitrix*), roach (*Rutilus rutilus*), rud (*Scardinius erythrophtalmus*), carp bream (*Abramis brama*), rapacious carp (*Aspius aspius*), perch (*Perca fluviatilis*) and pike perch (*Stizosteidon lucioperca*) respectively, were collected from the Lagoonar Complex Razelm-Sinoe, Jurilovca province, from Tulcea district. Of them, only pike perch, perch and rapacious carp were found parasitised with *Eustrogylides sp*. larvae.

Water, plant and sediment samples were collected from the site. Fish were dissected and examined macroscopically, a number of samples being taken then from the muscle and liver. The larvae were also collected for biochemical analyses.

Histological changes in the liver and somatic muscles were examined in light microscopy. For this purpose, we used the classic staining methods, Haematoxylin & Eosin and Giemsa.

In order to asses the biochemical parameters following the natural exposure of fish to lead, mercury, cadmium, copper and zinc, the liver and muscle samples from both infected and non-infected fish, together with *Eustrongylides* sp. larvae, water, plant and sediment samples, were analysed. The values of heavy metals and the activity of two enzymes, superoxide dismutasis (SOD) and glutation peroxidase (GPx), were obtained from the tissues using Atomic Absorbtion Spectrophotometry and Photocolorimetry respectively.

2. RESULTS AND DISCUSSIONS

Morphologically the entire picture of eutrongilidosis described in the literature was found in the infected fish. It consisted in congestion, haemorrhages, chronic inflammation, granulomas, ascites and, especially in rapacious carp and perch, severe visceral and mesenteric adhesions. In most cases, the larvae were found free, into the body cavity and the inner organs, whilst, in rapacious carp, only encysted larvae were found. In the *liver*, histological changes included hepatocyte vacuolization; leucocyte infiltration, mostly near the bile ducts and in Disse space; congestion and haemorrhages. In terms of histological changes in the *muscle*, there were connective tissue hiperplasy and leucocyte infiltration. Muscle and liver lesions found in the fish correlated with the decreased activity of superoxide dismutasis (SOD), in perch (2,30 U/mg in muscle; 3,05 U/mg in the liver) and rudd (3,15 U/mg in muscle; 2,90 U/mg in the liver).

The decreased activity of superoxide dismutasis was sharp in perch's muscle and in the rudd's liver. Rudd belonged to the uninfected group of the studied fish, though. Following this assertion, we are presuming that the pathogenic effect induced in the muscle by the larvae might have been greater than the heavy metal effect on the uninfected group of fish. Furthermore, the parasites might have slightly protected the liver's host from the pathogenic effect induced by the heavy metal exposure.

Rudd, uninfected fish, had in the muscle the highest quantities of lead (96,03 μg/kg), copper (660 μg/kg) and zinc (7880 μg/kg) (table 1). Rapacious carp, which was found heavily parasitised, had in the muscle the highest quantity of mercury (101,03 μg/kg) and copper (540 μg/kg). The level of mercury found in the rapacious carp muscle (101,03 μg/kg) overtook the quantity found in the liver (46 μg/kg). In rapacious carp, making a comparison between the level of lead in the muscle (24,88 μg/kg) and the one found in the liver (340 μg/kg), it results that the organ was the main structure for lead storage in this fish.

Cadmium levels didn't exceed in muscle 10,82 μg/kg (in pike perch), neither in infected, nor in uninfected fish. Furthermore, in rapacious carp, there can be noticed the difference between cadmium levels in the muscle (1,39 μg/kg) and in the liver (36,00 μg/kg) in the table above.

Perch, that was found heavily parasitised, showed the lowest levels of heavy metals in the muscle, generally: Lead 24,00 μg/kg; Cadmium 0,98 μg/kg; Zinc 4070 μg/kg (versus rudd: 7880 μg/kg).

Biochemical analysis revealed only for lead higher levels in the parasite than in the hosts tissues: 420 μg/kg in the larvae by comparison with 35,83 μg/kg in pike perch muscle and 340 μg/kg in rapacious carp liver. Only small quantities of cadmium and mercury have been found in the larvae, though (0,5 μg/kg cadmium and 0,9 μg/kg mercury in the larvae, versus fish tissues -from 31,56 mercury in pike perch to 101,03 mercury in rapacious carp). The situation might be due to the larvae's inability to store the two heavy metals.

Table 1

Heavy metal values found in fish, larvae, water, plant and sediment samples

Pb detection limit in muscle (A.A.S.G.O.): 1.0 µg/kg; *Hg* detection limit in muscle (A.A.S.S.O.): 0.1 µg/kg; *Cd* detection limit in muscle (A.A.S.S.O.): 0.1 µg/kg; *Cu* detection limit in muscle (A.A.S.G.O.): 100 µg/kg; *Zn* detection limit in muscle (A.A.S.G.O.): 20 µg/kg

Sample type	Fish species	Pb (µg/kg)	HG (µg/kg)	Cd (µg/kg)	Cu (µg/kg)	Zn (µg/kg)
FISH	Silver carp	22,75	Abs.	6,72	330,00	3810,00
	Pike perch	35,83	31,56	10,82	160,00	4700,00
	Roach	14,21	48,92	7,28	270,00	4740,00
	Rudd	96,03	23,93	4,25	660,00	7800,00
	Carp bream	15,67	Abs.	1,20	450,00	5330,00
	Perch	24,00	35,81	0,98	380,00	4070,00
	Rapacious carp	24,88 (M*)	101,03 (M)	1,39 (M) 36,00 (L)	540,00 -	4080,00 -
	Rapacious carp	340,00 (L*)	46,00 (L)			
Larvae		420,00	0,9	0,5	-	-
WATER		0,600	Abs.	Abs.	3	39.780
Aquatic plant- Common reed leaves (*Phragmites communis*)		132	-	7	730	21.740
SEDIMENTS		1,492	15,03	Abs.	5360	3

**M-muscle; L-liver*

The amount of lead we found in the *Eustrongylides* sp. larvae (almost 11 times higher than in fish –the highest value of Pb in pike perch was of 35,83 whereas the amount found in the larvae was much higher, of 420 µg /kg. All these values were registred at a very low level of Pb detection in the water, plant and sediment, which folllows that at least for this element, the larvae acted as biological filters of their hosts. Nonetheless, the larvae could be good indicators of a chronic environmental pollution.

3. CONCLUSIONS

As a result of the study it follows that the third and fourth larval stages of the nematode *Eustrogylides* sp. were able to take in important quantities of lead in their hosts. Furthermore, counter to the general view, the third and fourth larval stages of nematodes absorbed, in certain circumstances, more or less, lead, cadmium and mercury, even when the metals were found undetectable in the water.

Among other matters, it remains to be established further:

- which species of *Eustrogylides* have been involved in the matter, and why encysted larvae cannot successfully absorb heavy metals in their hosts;

- why, in the same ecosystem, some unparasitised fish (like silver carp and carp bream) don't take up mercury at all in their flesh;

- why the species of fish which were found parasitised intensely (e.g. rapacious carp) have shown greater quantities of heavy metal in their flesh than in the liver, organ that -in fish- plays the role of an integrator of physiological and biochemical functions.

REFERENCES

1. *Baruš, V., Jarkovsky, J., Prokeš, M.– Philometra ovata* (Nematoda: Philometroidea): a potential sentinel species of heavy metal accumulation, In: Parasitol Res 100:929-933, Springer-Verlag, 2006
2. *Bergey, L., Weis, S. J., Weis P.* – Mercury uptake by estuarine species *Palaemonetes pugio* and *Fundulus heteroclitus* compared with their parasites, *Probopyrus pandalicola* and *Eustrongylides* sp., In: Marine Pollution Bulletin, Vol. 44, Iss. 10, 1046-1050, Elsevier Sci. Ltd., 2002
3. *Malek, M. Haseli, M., Mobedi, I., Gahjali, M.R., MacKenzie, K* – Parasites as heavy metal bioindicators in the shark *Carcharhinus dussumieri* from the Persian Gulf, Parasitology, 134, 1053-1056, Cambridge University Press, 2007
4. *Sures, B.* – Accumulation of heavy metals by intestinal helmints in fish: an overview and perspective, In: Parasitology, 126, S53-S60, Cambridge University Press, 2003
5. *Tekin-Özan, S., Kir, I.* – Accumulation of some heavy metals in Raphidascaris acus (Bloch 1779) and its host (E. L., 1758), Turkiye parazitoloji dergisi (Acta Parasitologica Turcica), Cilt 31, Sayi 4, 2007
6. *Terry, A. D., Chambers, C., Isinguzo, I.* – Cestoidea (Phylum Platyhelminthes), In: Fish diseases and disorders, vol. 1, 391-408, P.T.K. Woo, 2006

The 39th International Session of Scientific Communications of the Faculty of Animal Science, Bucharest, Romania
Scientific papers (seria D; vol. LIII) – Animal Science

RESULTS CONCERNING THE FATTENING OF HALFBREEDS STEMMING FROM THE CROSSING OF TURCANA BREED WITH ILE DE FRANCE BREED

I.CĂLIN[1], I. PĂDEANU,[2] C. PASCAL[3], S. DĂRĂBAN[4]
1 - USAMV Bucuresti; 2 – USAMV Timisoara; 3 – USAMV Ia i; 4 – USAMV Cluj-Napoca

Key words: meat production, body weight, daily weight gain, food conversion capacity, specific consumption, halfbreeds

SUMMARY

In this paper we have presented the results concerning the effect of crossing Turcana breed with rams of the specialized meat breed Ile de France, in the first generation of halfbreeds and estimation of quantitative parameters of meat and under conditions of intensive fattening.

Comparative whit the lambs from Turcana breed, to be improved in the halfbreeds there render evident a higher fattening aptitude.

The results pointed out that the young halfbreeds responded well to the intensive fattening system. The fattening parameters are: 198,5 g daily weight gain and 38,84 kg body weight feed consumption depending on age and weight.

These parameters prove that the young halfbreeds Ile de France with Turcana they have a very good fattening aptitude and this system should be practiced in the fattening farms.

The importance of sheep breeding is highlighted by the diversity of the obtained productions: milk, meat, wool, leather and by the economic importance of these productions reflected in an increasing demand, both on a intern and on an international level, especially for the meat and milk products.

The increase of these productions constitutes a prioritary objective for all breeders who action through several levers: the amelioration of the productive capacity of the autochthonous breeds (especially in the direction of meat production increasing), the realization of an efficient selection (especially in the direction of the milk production amelioration) and the constitution of selection nuclei, the improvement of exploitation and breeding condition etc.

The demand for the sheep meat of superior quality has become bigger and bigger both at the level of the consumers in our country and in a series of countries in the Near East and Middle East and even in West.

In essence, for the increasing of the quantitative and qualitative meat production, a series of urgent measures are necessary, which aims especially towards the re-organization of the intensive-industrial fattening technology of the young sheep and the re-making of the fattening complexes of the rams, because this category is the most solicited and assures the biggest economic efficiency.

A rapid and efficient way for the increasing of the meat production is the usage of the industrial crossing, good results obtaining in this way by the peculiar combinative capacities usage of our autochthonous breeds with specialized breeds in meat production Border – Leicester, Suffolk, Southdown, Texel and Ile de France.

1. MATERIAL AND METHOD

In order to obtain pertinent data, the material which was the object of the research was represented on two groups, the experimental group represented by a number of 25 halfbreeds between the Ţurcana breed and Ile de France breed and the trial group formed of 25 lambs of the Ţurcana breed.

The groups were made as homogenous as possible (see Table 1), taking into account both the age and the weight, so that, in this moment, there were no significant differences registered.

Table nr. 1

Weight of animals at the beginning of the experiment

Nr. crt	Specification	Trial group			Experimental group		
		n	X±sx	Cv %	n	X±sx	Cv %
1	Age of lambs at the beginning of the experiment	25	63,21±15,80	25,36	25	64,52±10,54	16,27
2	Weight of lambs at the beginning of the experiment	25	14,18±1,43	10,54	25	15,08±2,12	14,05

The young sheep, which was the object of this study, was introduced within the fattening complex at the age of approx. 2 month and the average weight between 14.18 – 15.08 kg and was individualized by branding and tattooing

During the experiment there was used the intensive fattening technology with a duration of 120.

Thus:

15 days – accommodation period
75 days – proper fattening period
30 days – finishing period

The young sheep subject to fattening was located in common boxes, insuring a density of 2.0 lambs per sqm and identical microclimate conditions.

The feeding of the lambs (see Table 2) was made with a unique mixture based on hill hay and combined fodder (made of corn, barley, grit of sun-flower, zoofort, bi calcic phosphate and salt).

Table 2

Structure and nutritive value of the unique mixture

Nr. crt	Specification	Structure of the unique mixture (%)		
		Accommodation stage	Fattening stage	Finishing stage
1	Fibers	18	35	23
2	Concentrates	74	60	72
3	Foofort and mineral nutr.	8	5	5
4	PBD/kg mixture	120,2	106,4	94,8
5	UN/kg mixture	0,93	0,86	0,94

For the purpose of quantification of the ameliorating breeding influence over the quantitative parameters at the Țurcana breed, the following indices were taken into account: the daily weight gain achieved by each group, the total gain for the entire period, the specific consumption and the benefit at sacrification in the two groups subject to the experiment.

Periodical weighing were made at each group for the settlement of the fattening features and the specific consumption were established for SU, UN and PBD/kg gain by weighing the administrated quantities and of the not–consumed remains.

2. RESULTS AND DISCUSSIONS

From the analysis of the obtained data, after the working out of the results related to this experiment (see Table 3), the following were ascertained:

Table 3

Value of quantitative parameters in meat production

Nr. crt	Specification	Trial group			Experimental group		
		n	X±sx	Cv %	n	X±sx	Cv %
1	Daily average gain g/ head/ day	25	158,12±19,25	11,54	25	202,53±25,3**	12,74
2	Total gain (kg/head/ fattening period)	25	18,97±2,41	12,44	25	24,30±3,12**	13,13
3	Final weight (kg)	25	33,15±3,45	10,59	25	39,38±4,52**	11,63

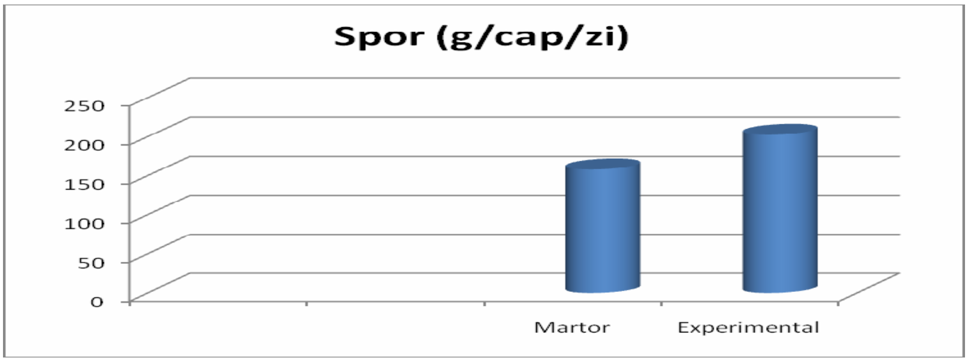
- the growth intensity was bigger at the experimental group, the halfbreed Ile de France × urcană achieving an average daily gain bigger with 28.08 % between the groups, recording differences distinctively significant.

The lambs of the Țurcana breed had a gain of approx. 158.12 g / head/ day, being within the standard limits of the breed and answering, by relatively good performances for the meat production, to the conditions of growth and to the intensive system of exploitation.

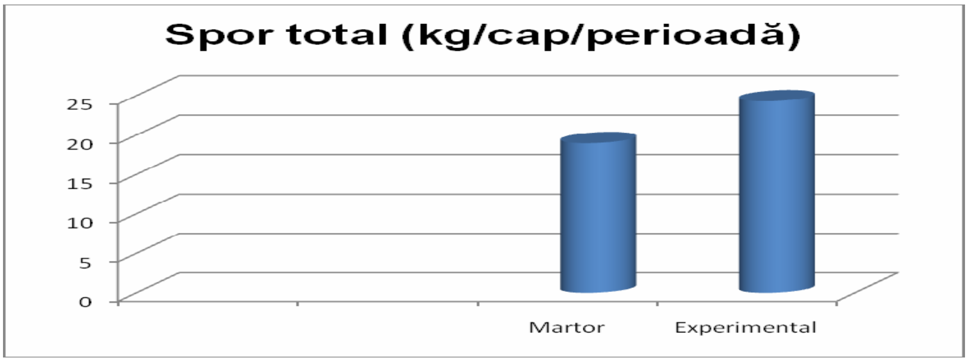
- the total gain achieved during the fattening period is recorded in the same co-ordinates, between the groups maintaining the distinctively significant differences. The Țurcana breed has a total weight growth of only 18,97 kg with 28,09 % less than the one realized by the experimental group.

- the final weight, consequence of the different rate of growth is bigger at the halfbreeds Ile de France× urcană with over 18 %. This difference of weight realized in the same conditions demonstrates the superiority of the paternal breed, a superiority which was materialized by precocity and growth rate superior in similar growth conditions, using the intensive fattening technology.

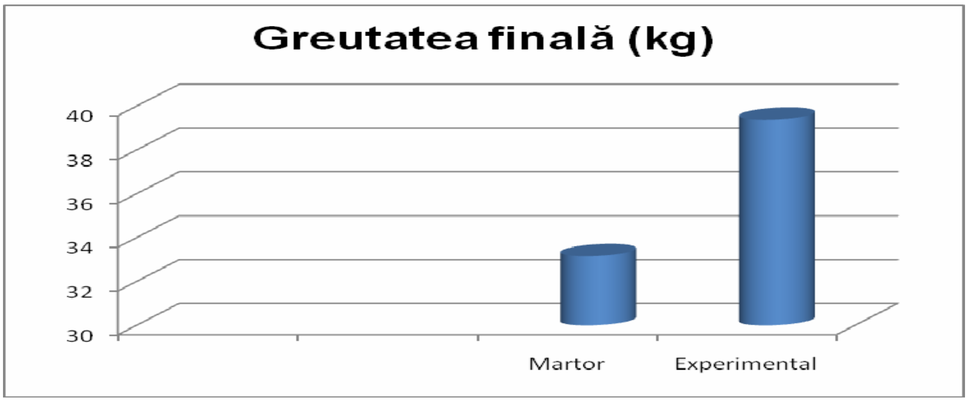
Variation of the daily average gain



Variation of total gain



Variation of final weight



The capacity of food valorification (*See Table no 4*) represents a parameter very important in the activity of breeding and fattening of sheep, conditioning the economicity and lucrativeness of this activity.

Table 4

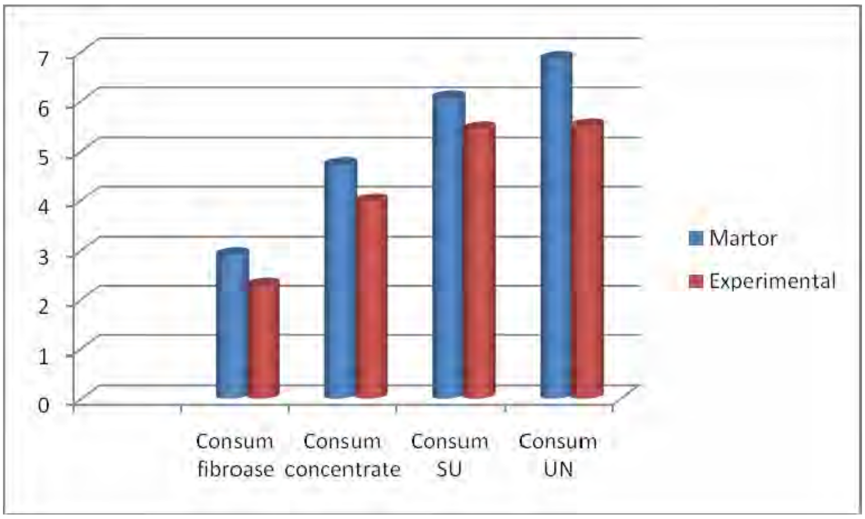
Capacity of food valorification (kg/kg gain)

Nr. crt	Specification	Trial Group			Experimental group		
		n	X±sx	Cv%	n	X±sx	Cv%
1	Fiber consumption	25	2,91±0,25	8,59	25	2,29±0,36	15,72
2	Concentrate consumption	25	4,72±0,84	17,79	25	3,98±0,62	15,57
3	SU Consumption	25	6,06±1,05	17,32	25	5,45±1,25	22,93
4	UN Consumption	25	6,86±1,25	18,22	25	5,51±1,22	22,14
5	PBD Consumption	25	576,22±43,4	7,53	25	514,9±45,2	8,77

According to the presented data, the halfbreeds Ile de France× urcană have a superior capacity of food conversion.

Thus, for the gain of body weight with one kg, the lambs of the Ţurcana breed made a bigger consumption at each indicator (with 27,07 % at fibers, 18,59 % at concentrates, 11,19 % at SU, 24,5 % at the energy and with cca 12 % at proteins) – which indicates a lower level of amelioration and a more reduced capacity of valorification of the conditions offered by the intensive fattening system.

Variation of food valorification capacity



The slaughterhouse features of the animals subject to this experiment (See Table 5), were highlighted by the analysis of the weight during sacrification, of the carcass weight and of the sacrification benefit.

Table 5

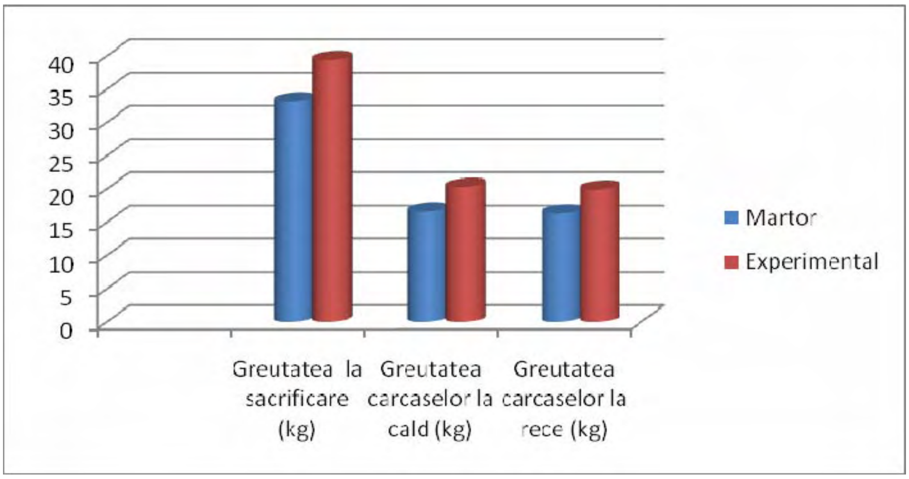
Slaugherhouse features

Nr. crt	Specification	Trial group			Experimental group		
		n	X±sx	Cv%	n	X±sx	Cv%
1	Average weight at sacrification (kg)	25	33,15±3,45	10,59	25	39,38±4,52	11,63
2	Average weight of carcass at hot(kg)	25	16,62±1,80	10,10	25	20,28±2,07	12,35
3	Average weight of carcass at cold (kg)	25	16,30±1,12	6,21	25	19,89±1,28	6,09
4	Randament la sacrificare Sacrification benefit (%)	25	50,16±4,12	8,21	25	51,5±5,20	10,09

Appreciated due to the slaughterhouse features, we can conclude as follows:

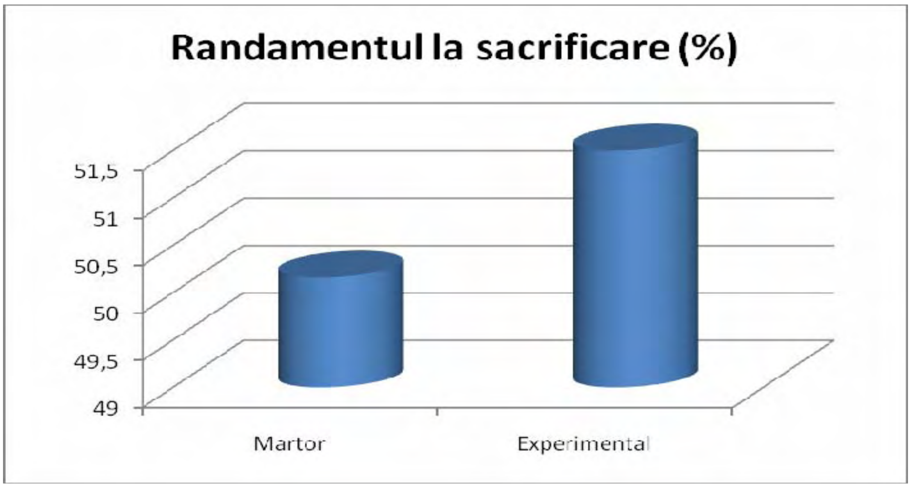
- the carcass weight at the halfbreed Ile de France× urcană has average values bigger with 22 % both at hot and cold due to the superior weight accumulated during the fattening period.

Variation of slaughterouse features



The sacrification benefit records values which are very closed (the difference being of approx. 2.6 % in favor to the experimental group) – which demonstrates that, in good fattening conditions, the young Ţurcana can make a good sacrification benefit.

Varia   ia randamentului la sacrificare



3. CONCLUSIONS

3.1. After the experiment of fattening the young rams of the two experimental groups (lambs of the Ţurcana and halfbreeds Ile de France× urcană) the final weight was 33,15±3,45 kg at the trial group, respectively 39,38±4,52 kg at the experimental group, demonstrating the genetic superiority of the halfbreeds (due to the action of the parental breed) as regards the growth energy.

3.2. For one kg of gain in live weight the energetic consumption was of 6,86 UN for the urcană lambs i de 5,51 UN for the halfbreeds which highlights the precocity and the bigger capacity of assimilation and food conversion at the lambs in the experimental group.

3.3. The slaughterhouse features were superior at the experimental group in comparison with the Ţurcana breed which demonstrates the economic efficiency of the usage during fattening of the halfbreeds with specialized breeds for meat production.

In order to make lucrative the growth and the exploitation of the Ţurcană breed sheep, it is recommended to crossbreed of those with low productions with Ile de France rams and the fattening in intensive system of the halfbreeds of the first generation due to de special features in the meat production.

REFERENCES

1. Călin, I. 2003 – Tehnologia cre terii ovinelor i caprinelor - Ed. Universităţii ,, Lucian Blaga " Sibiu.
2. Chivoiu, M 1991 – cercetari comparative privind aptitudinile de ingrasare a tineretului ovin din rasele Merinos si Tigaie in conditiile Complexului de ingrasare Pucioasa- Dambovita;
3. Ciolca, N, si col. 1975 – Influenta nivelului de proteina si energie asupra procesului de ingrasare a mieilor – Lucrare stiintifica Palas, vol II;
4. Moise, St. si col. – tehnologia de tip industrial de crestere si ingrasare a tineretului ovin pentru productia de carne;

5. Cosma, I. 1990 – cercetari comparative privind ingrasarea tineretului ovin din diferite rase la complexul de ingrasare Vernesti – Buzau;
6. Tafta, V. 1983 – Cresterea si exploatarea intensiva a ovinelor - Ed. Ceres Bucuresti
7. Tafta, V. , Zuhair, J. – Rezultate comparative privind ingrasarea intensiva a tineretului ovin de diferite rase si a oilor adulte.