UNIVERSITATEA DE ȘTIINȚE AGRONOMICE
ȘI MEDICINĂ VETERINARĂ – BUCUREȘTI

FACULTATEA DE ZOOTEHNIE

LUCRĂRI ȘTIINȚIFICE
SCIENTIFIC PAPERS

SERIA D

VOL. LII

ZOOTEHNIE
ANIMAL SCIENCE

The 38th International Session of Scientific Communications of the Faculty of Animal Science,
- Bucharest, Romania -

TOTAL PUBLISHING
BUCHAREST, 2009

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

TOTAL PUBLISHING
Tehnoredactor: Paul Marcu
Casa Presei Libere nr 1, Corp C, Et. 1, Sector 1, București
Tel.: 021.317.91.61; 0722.689.243
totalpublishing@gmail.com

SUMMARY

1. GENETICS AND BREEDING

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5. TECHNOLOGIES OF THE AGRO FOOD PRODUCTS PROCESSING

6. WILF LIFE MANAGEMENT, FISHERY AND AQUACULTURE

1. GENETICS AND BREEDING

RESEARCHES REGARDING THE STUDY OF THE BOMBYX MORI L. HYBRID COMBINATIONS FOR THE SPRING REARINGS

CERCETARI PRIVIND STUDIUL COMBINATIILOR HIBRIDE BOMBYX MORI L. DESTINATE CRESTERILOR DE PRIMAVARA

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Key words: silkworm, hybrid combinations, heterosis, shell cocoon weight, fiber length.

SUMMARY

The assurance of the genetic progress within the silkworm populations is made by applying the selection for the closed reproductive animal populations and by controlling the copulation.

The cross-breeding is a widely spread sericulture method, used to increase the quantitative and qualitative cocoon production.

These theoretical ideas were the foundation for the process of obtaining the simple hybrids S8 x AC29/T (Ana 1), AC29/T x S8 (Ana 2), AC/T x B1 (Cislau 1), B1 x AC/T (Cislau 2).

Using crossing methods twenty F1 hybrid combinations were created. Out of these the simple hybrids were chosen as they present uniform and stable characters, marking hybrid vigor. These hybrids were created for the hilly and plain areas.

Out of twenty hybrid combinations, obtained by the crossings between five silkworm races with Japanese and Chinese characters, two reciprocal and direct hybrids stand out, with the following characterization:

- hatchability: 94,7 – 97,5 %;
- cocoon production/box: 29,2 – 3,8 kg;
- raw cocoon weight: 2,298 – 2, 439 g;
- fiber length: 1268 – 1410 m;
- reeling silk: 42,1 – 46,8%.

The heterosis has influenced the main larvae biological qualities and the cocoon’s technological characters.

1. MATERIALS AND METHODS

The first stage to create hybrids was the parental races selection, based on their own performances. In this stage there were strictly studied twenty Japanese races (AB, J90, B1, N5, N1, SK2, S8, Fuyo, Hebar 1/18, Vratza 65) and Chinese races (B75, AC29/T, AC, AO, B2, P4/T, N2, Tokay, V66, Hebar 211). Five silkworm races (AC29/T, AC/T, B75, S8, B1) were chosen as hybrid parents based on characteristics with significant influence upon the quantity and quality of the cocoon production. From their crossing twenty F1 hybrid combinations were obtained which were studied for two years. Each hybrid was reared within three cycles of 0,5 g eggs, following the technical and optimal directions of silkworm rearing (Tzenov P. et all, 1994; Grekov D. et all, 2005).

Out of the 20 studied hybrids, 4 stood out based of their qualities: S8 x AC29/T (Ana 1), AC29/T x S8 (Ana 2), AC/T x B1 (Cislau 1), B1 x AC/T (Cislau 2).

The data in the paper work, presented from a statistical point of view, represent the average of the two years of study, using the witness hybrid Triumf for data comparison. In the same time, the heterosis intensity was calculated comparing the results with the midparent value (MP) and the higher parent (HP).

2. RESULTS AND DISCUSSIONS

Analyzing the data from the table 1, it shows that hatchability has values between 94,7–94,5%, always being above the witness' values. The cocoon production is statistically significant, being higher then the one of the witness. The maximum values of 33,67 kg/box and 32,27 kg/box belong to S8 x AC29/T and B1 x AC/T hybrids. It is remarkable for this character a positive heterosis, having between 22,4–45,42% more then the hybrids average and between 18,9 – 28,34 % more then the best parent.

The raw cocoon technological characters are specified in table 2. The raw cocoon weight is between 2,2 – 2,4 g and the shell cocoon weight is between 483–511 mg. The new hybrids present higher values then the witness hybrid, statistically significant, for both of the characters. Analyzed from the heterosis perspective, it also stands out positive values for these characters.

There were recorded high values for dry cocoon weight: 910 and 1049 mg (Table 3). The cocoon size is evaluated by the size of the two longitudinal and transversal axles. The hybrid longitudinal axle measures 3,56 – 3,80 cm and the transversal axle 1,99–2,14 cm. The silk fiber characteristics (Table 4) show a fiber length of 1268–1410 m and a reeling percentage of 42,1–46,8%.

For the two analyzed characters, the new hybrid combinations have superior values then the ones of the witness and a powerful heterosis effect. The obtained data are framed into the parameters accepted by the international scientific paper works (Bentea M. si colab.,2008; Matei A. si colab., 2007; Matei A. si colab.,2006; Rajann K.L., Puttaraju H.P.,1998; Gupta B.K. si colab.,1992; Won – Bon Jeong si colab., 1990).

Table 1

The hatching and the cocoon production for the new hybrid combinations

Hybrid	Hatching (%)			Cocoon production/box (kg)		
	X ± Sx	Heterosis (%)		X ± Sx	Heterosis (%)	
		MP	HP		MP	MP
S8 x AC29/T	97,5 ± 0,17 ***	+5,25	+3,74	33,67 ± 1,214 **	+22,40	+18,9
AC29/T x S8	95,5 ± 0,11 **	+2,99	+1,25	31,08 ± 3,326 *	+15,24	+11,3
AC/T x B1	96,5 ± 0,80 **	+2,73	+1,39	29,20 ± 1,133 *	+31,10	+21,36
B1 x AC/T	94,7 ± 1,03	+4,74	+3,82	32,27 ± 2,202 **	+45,42	+28,34
Witness-Triumf	93,8 ± 1,2	-	-	26,60 ± 1,123	-	-

* $P < 0,05$; ** $P < 0,01$; *** $P < 0,001$

MP: midparent; HP: higher parent

Table 2

The raw cocoon technological characters for the new hybrid combinations

Hybrid	Raw cocoon weight (mg)			Shell cocoon weight (mg)		
	X ± Sx	Heterosis (%)		X ± Sx	Heterosis (%)	
		MP	HP		MP	MP
S8 x AC29/T	2312 ± 45 **	+6,40	-0,31	483 ± 7 ***	+8,00	+2,02
AC29/T x S8	2298 ± 46 *	+2,40	-0,94	511 ± 6 ***	+3,65	+2,66
AC/T x B1	2408 ± 48 ***	+10,45	+3,79	497 ± 6 ***	+10,60	+7,80
B1 x AC/T	2439 ± 49 ***	+11,8	+5,12	507 ± 7 ***	+12,90	+9,90
Witness-Triumf	2147 ± 45	-	-	435 ± 6	-	-

* P < 0,05; ** P < 0,01; *** P < 0,001
MP: midparent; HP: higher parent

Table 3

The dry cocoon technological characters for the new hybrid combinations

Hybrid	Dry cocoon weight (mg)			Longitudinal axis (cm)			Transversal axis (cm)		
	X ± Sx	Heterosis (%)		X ± Sx	Heterozis (%)		X ± Sx	Heterozis (%)	
		MP	HP		MP	HP		MP	HP
S8 x AC29/T	910 ± 29	+4,1	+0,33	3,64 ± 0,05	+1,1	-3,7	2,04 ± 0,02	0,49	-5,99
AC29/T x S8	921 ± 21	+5,4	+1,54	3,56 ± 0,02	-1,1	-5,8	1,99 ± 0,02	-1,90	-9,00
AC/T x B1	1024 ± 31 ***	+18,4	+14,5	3,79 ± 0,04 ***	+3,5	+0,26	2,09 ± 0,03	+0,96	-7,10
B1 x AC/T	1041 ± 23 ***	+20,9	+17,3	3,80 ± 0,05 ***	+3,8	+0,5	2,14 ± 0,05	+8,60	-4,80
Witness - Triumf	864 ± 20	-	-	3,51 ± 0,01	-	-	2,15 ±0,01	-	-

* P < 0,05; ** P < 0,01; *** P < 0,001
MP: midparent; HP: higher parent

Table 4

The fiber technological characters for the new hybrid combinations

Hybrid	Filament length (m)			Raw silk (%)		
	X± Sx	Heterosis (%)		X ± Sx	Heterosis (%)	
		MP	HP		MP	MP
S8 x AC29/T	1268 ± 32 *	+2,01	+1,42	42,1 ± 1,4 *	+8,21	+5,00
AC29/T x S8	1280 ± 20 *	+6,28	+1,50	44,2 ± 1,5 **	+12,00	+8,76
AC/T x B1	1384 ± 24 ***	+8,72	+1,33	46,2 ± 1,3 ***	+13,30	+10,00
B1 x AC/T	1410 ± 22 ***	+10,3	+1,10	46,8 ± 2,0 ***	+3,40	+10,20
Witness-Triumf	1185 ± 32	-	-	38,2 ± 1,8	-	-

* P < 0,05; ** P < 0,01; *** P < 0,001
MP: midparent; HP: higher parent

3. CONCLUSIONS

Out of twenty hybrid combinations obtained by the crossings between five silkworm races with Japanese and Chinese characters, two reciprocal and direct hybrids stand out, with the following characterization:

- hatchability: 94,7 – 97,5 %;
- cocoon production/box: 29,2 – 3,8 kg;
- raw cocoon weight: 2,298 – 2, 439 g;
- fiber length: 1268 – 1410 m;
- reeling silk: 42,1 – 46,8%.

The heterosis has influenced the main larvae biological qualities and the cocoon's technological characters.

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IMPROVING OF BROWN BREED FROM RESEARCH AND DEVELOPMENT STATION FOR BOVINE RAISING ARAD

AMELIORAREA RASEI BRUNA LA STAȚIUNEA DE CERCETARE – DEZVOLTARE PENTRU CREŞTEREA BOVINELOR ARAD

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Key words: Romanian Brown breed, improvement, adaptability, longevity.
Cuvinte cheie: rasa Bruna, ameliorare, adaptabilitate, longevitate

SUMMARY

The aim of this study was to evaluate the efficiency of improving process, adaptability and productive longevity of one nucleus of Romanian Brown breed from Research and Development Station for Bovine Raising – Arad along of eleven years on the plain aria. Analyzed animals have been housed free with a feeding specific to the plain area very good balanced in energy, protein, minerals and vitamins, adapted to the production and raising requirements. Concerning to the average milk yield obtained into the year 1997 was 6281 kg comparing with the 7908 kg milk average that has been obtained in 2007. These explain the productive adaptation of elite nucleus comparable with standards of American Brown Swiss breed. At the moment we start to genotype the Brown cattle from our station for the k-casein and β-lactoglobulin genes in order to improve milk quality. The most probative act of population adaptability, formed in our research station is the high productive level accomplished and a productive longevity over 6 lactation in condition of plain area, known that this breed in origin and formation history has predominant comprise the mountain and hilly areas.

1. MATERIALS AND METHODS

Research has been accomplished on the elite nucleus of Romanian Brown breed from Research and Development Station for Bovine Raising – Arad. The herd comes from purchase of Brown breed heifers with higher genetic potential from Sighet and Margineni stations that has go trough a adaptive and improvement process to the specific plain area, action concretize not only trough accomplish productions but also trough useful zoo-economic characteristics.

All animals have been housed free with a feeding specific to the plain area very good balanced in energy, protein, minerals and vitamins, adapted to the production and raising requirements. During the summer time the feeding have made with Sudan grass, 30% corn silage, concentrate mixture and minerals supplements according to the accomplish productive level. During the winter time the ratio has consist in alfalfa hay, Sudan grass, corn silage and concentrate according productive level and physiological statue. We have to mention that the nucleus from our station is into a continuum process of improvement using to the artificial insemination semen from sires belong to the Brown Swiss breed.

From 2008 we start to genotype the Brown cattle from our station for the k-casein (CSN3) and β-lactoglobulin (BLG) genes. Polymorphism at the CSN3 and BLG genes was detected by PCR-RFLP method described by Medrano and Cordoba (Medrano, 1990). Detection of allelic variant both genes were done by electrophoresis in 3.5% agarose gel stained with ethidium bromide, in a horizontal electrophoresis system. All gels were photographed for analysis of data using gel doc equipment.

2. RESULTS AND DISCUSSIONS

In our research we take in study the accomplish production level and productive longevity. Evolution of milk production dynamic is shown in table no.1.

Table 1

Dynamic of milk production of bull mothers during of years

Year	No. of animal	Average production E.M.					Body weight	Anterior height	Posterior height
		Milk (kg)	Fat		Protein				
			kg	%	kg	%			
1997	5	6281	234	3,37	-	-	617	132	136
1998	4	5628	209	3,73	-	-	579	134	135
1999	6	5798	215	3,72	-	-	579	135	138
2000	6	5837	218	3,74	-	-	598	137	139
2001	23	5995	236	3,92	-	-	548	134	136
2002	15	7117	278	3,90	241	3,18	574	136	137
2003	22	7460	292	3,93	248	3,20	613	136	138
2004	26	7237	281	3,89	243	3,21	654	137	138
2005	28	7846	301	3,83	258	3,24	636	136	138
2006	26	7898	315	4,00	261	3,26	644	138	139
2007	19	7908	306	3,87	267	3,38	631	138	139

According to presented data a significant increase in number of elite animals to the 23 exemplars it is observed from 2001 getting to a number of 28 animals in 2005. In order to obtain such grate result we have used for the artificial inseminal bulls with breeding value for milk yield between 120 and 126%, as we presented in table no. 2.

Table 2

Bulls used for artificial insemination

Name	Cod	BV%	+ Milk kg	+Fat kg
Hugal 49	50960	125	583	35.52
Emu	50919	126	253	36
Erivan	50917	126	700	36,5
Jessie	50952	120	542	26,7
Majestic	50953	125	866	29.9
Juvize	51524	121	987	35

Concerning to the average milk yield in charters no.1 and 2 can be observed an ascendant curve and significant jump between 2001 and 2002, act explain trough the entry in production of bull's daughters belong to American Brown Swiss breed. Those animals form Brown Swiss breed has act on elite dairy cattle selected and adapted to our farm conditions. The milk average over 7000 kg has been constant maintained starting with 2002, act that explain the productive adaptation of elite nucleus comparable with standards of American Brown Swiss breed.

Figure 1. Milk production of bull mothers during of years

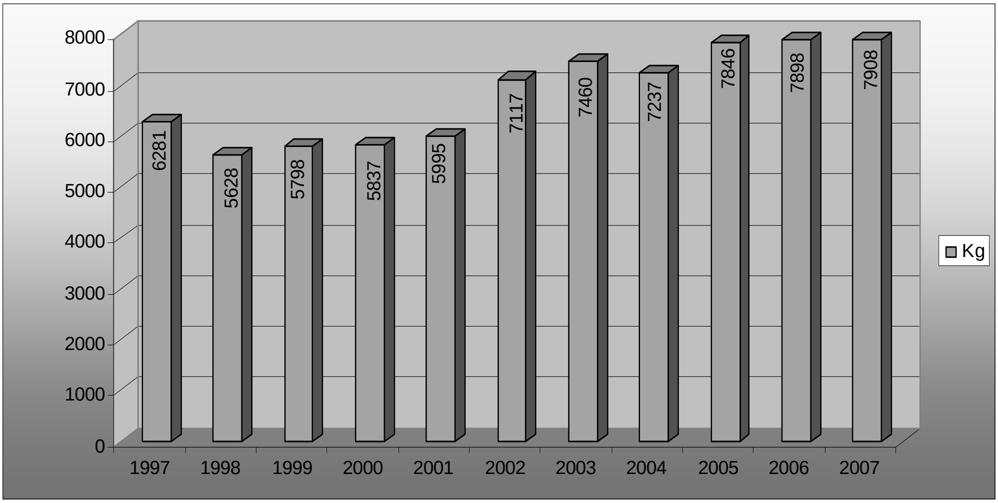
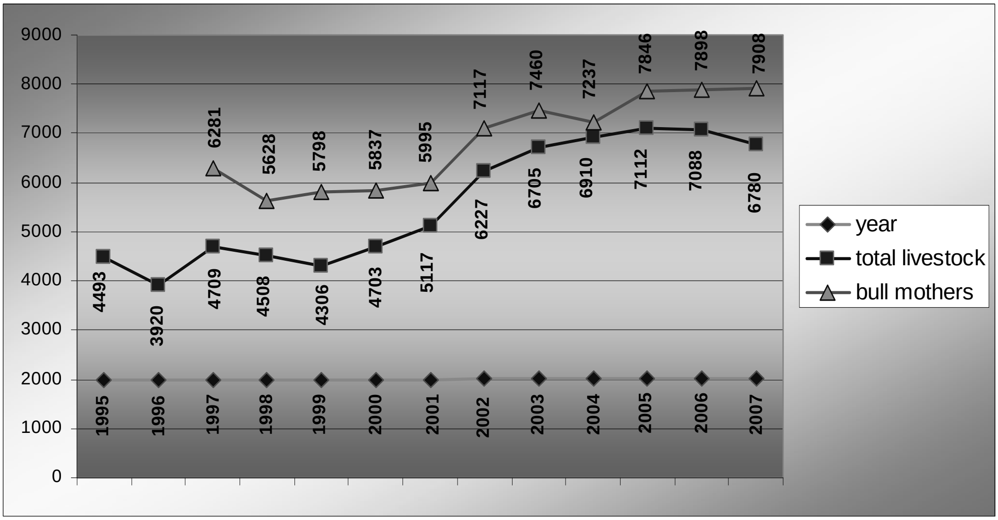
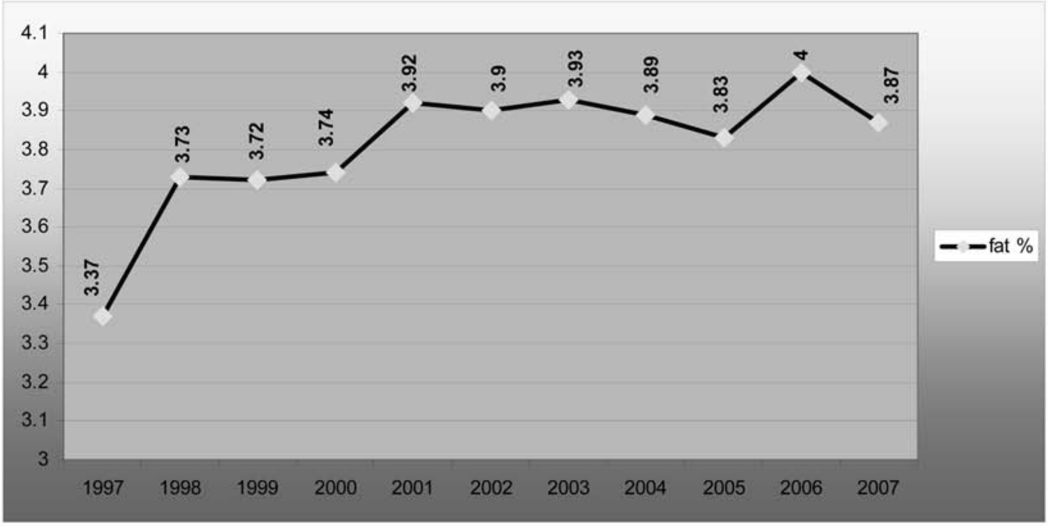


Figure 2. Milk production of bull mothers vs. total livestock during of years



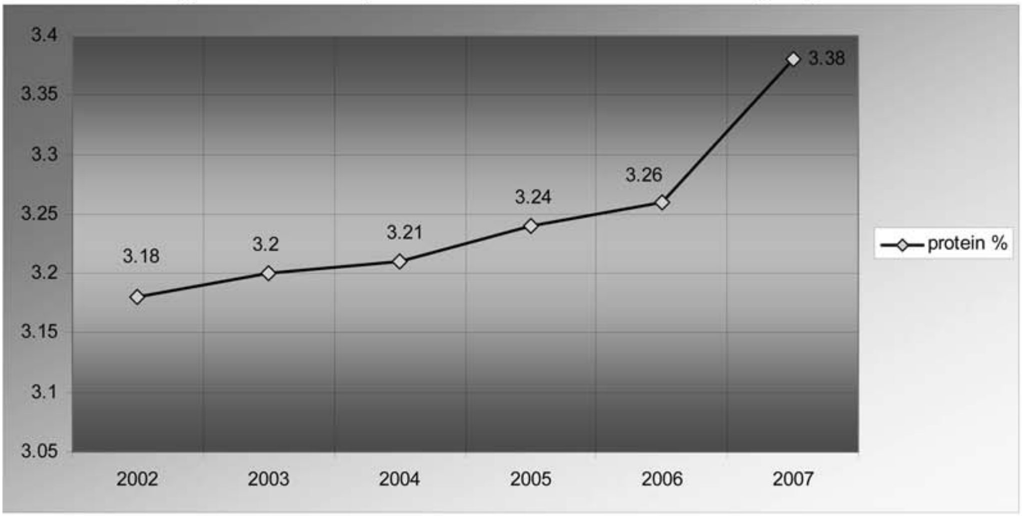
Concerning to the fat quantity it is visible a progressive increasing from 234 kg in 1997 to 315 kg in 2006 and 306 kg in 2007. If this fat quantity is shown in percent is registered an ascendant curve from 3.3% in 1997 to 4.0% in 2006 and 3.87% in 2007. This increasing of fat percent was influenced by the selection pressure trough used sires.

Figure 3. Fat production of bulls mothers during of years



Protein quantity shown in percent it is concretize trough a ascendant curve from 3.18% in 2002 to 3.38% in 2007.

Figure 4. Protein production of bulls mothers during of years



Regarding genotyping of cattle for CSN3 and BLG genes in our study we find three polymorphism: AA, AB and BB.

The results of alleles and genotypes frequencies are shown in charters 5 and 6.

Figure 5. The frequency of CSN3 and BLG genotypes

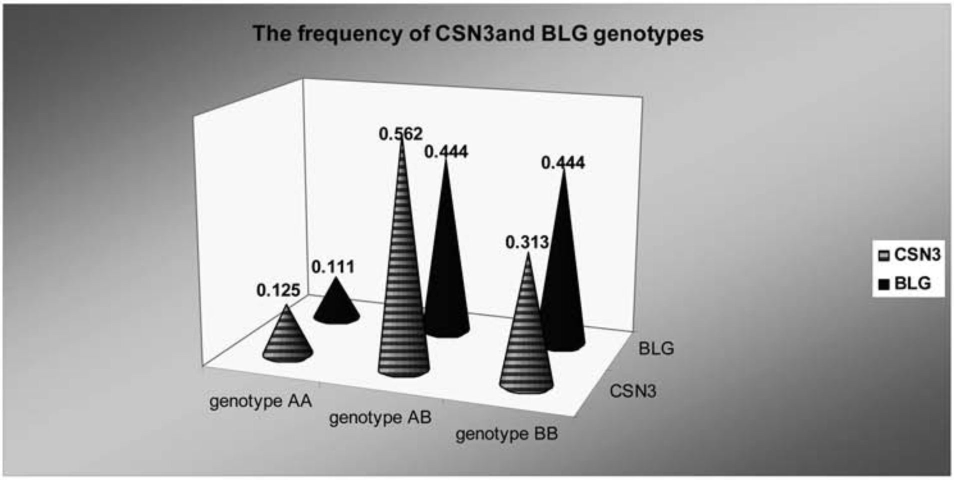
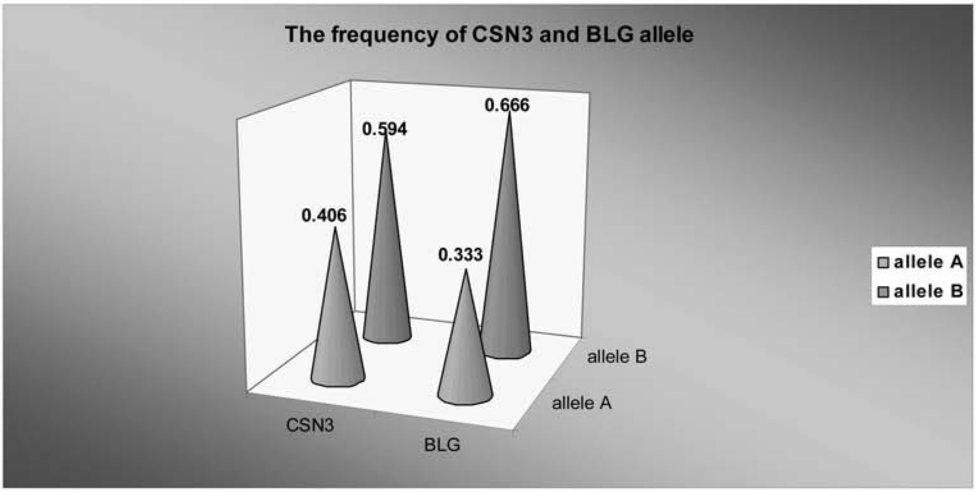


Figure 6. The frequency of CSN3 and BLG allele



The highest frequencies of B allele in Romanian Brown cattle were observed for BLG gene (0.666).

3. CONCLUSIONS

The fundamental factor used in improvement and consolidation activity of Brown breed herd from our research station was not only the selection pressure trough using of sires and providing of optimal conditions of housing and nutrition according to the age and physiological category but also the heterozis effect manifested.

It should be noted that in 2006/2007 year, the classification made by ANARZ, in descending order by average milk yield, fat and protein on standard lactation in mature equivalent per all country, from top of the 50 cows included in milk production control 10 cows belonging to our farm. The first two cattle had a production of: 8913 and 8367 kg milk, 348 and 339 kg fat (3.91% and 4.04%), with 303 and 291 kg protein (3.40 and 3.47%) respectively.

In selection nucleus the fat percent had a progressive increasing from 3.3% in 1997 to 4.0% in 2006 and 3.87% in 2007. This increasing of fat percent was influenced by the selection pressure trough used sires. Protein quantity (in percent) it is concretizing trough an ascendant curve from 3.18% in 2002 to 3.26% in 2006 and 3,38% in 2007. This increasing of protein quantity is explaining trough use at artificial insemination of high breeding value sires.

The calculated CSN3 and BLG A and B allele frequencies for Brown cattle until now is pA=0.406, pB=0.594 and pA=0.333, pB=0.666, respectively (this study is supported by project no. 299392/MADR and World Bank). The genotyping of cattle for CSN3 and BLG genes aims the selection of superior animals, those with genotype BB, in order to increase the milk quality in our farm.

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IMPROVEMEN PROJECT OF ELITE CATTLE FROM RESEARCH AND DEVELOPMENT STATION FOR BOVINE RAISING ARAD

PROIECT DE AMELIORARE A NUCLEULUI DE ELITĂ DE LA STAȚIUNEA DE CERCETARE DEZVOLTARE PENTRU CREŞTEREA BOVINELOR ARAD

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Key words: breeding value, Romanian Simmental, German Fleckvieh bulls
Cuvinte cheie: valoare de ameliorare, Baltata Romaneasca,. tauri de rasa Fleckvieh

SUMMARY

The objectives of this study were to estimate breeding values of Romanian Simmental cattle elite nucleus from Research and Development Station for Bovine Raising – Arad. Because in the our farm are all needed data for a long term improvement program, we considered necessary in this paper to sketch a possible way to improve the selection of the herd of cattle Simmental Romanian Fleckvieh type. For this we take in consideration the following population parameters: size of selection herd; difference of selection; heritability of interested trait; breeding value of bulls used in the process of improvement; the interval between generations.

1. MATERIALS AND METHODS

Since 2002 the herd of Romanian Simmental dairy cattle bred which had an average production of over 5500 kg milk (3.80% fat and 3.22% protein) to complete lactation was inseminated with frozen semen derived from German Fleckvieh bulls bred, tested in direction of transmission the capacity of milk synthesis, outdoor character and qualities of fitness.

In this regard, to obtain the first generation were used to artificial insemination the next bulls:

Table 1

Name	**Cod**	**VAL%**	**+ Milk kg**	**+Fat kg**
Holster	51.424	108	404	9
Stelzig	51.309	110	753	10
Romlet	51.377	117	798	27
Repweis	57.376	101	414	8

Choosing to artificial insemination the bulls above referred have as object improvement of external characteristics, particularly in the size, muscles, foundation and udder correctness but not least the breeding value in direction of milk synthesis capacity.

Obtained generation was closely monitored for the development and reliability of exterior body, eliminating the less variants at age of 27 to 28 months (heifers) by sale.

Plus variants remaining for constitute of nucleus breeding had 16 to 17 months at first insemination (420 - 430 kg) and 25 to 26 months to first calving (550 to 600 kg). Average of milk yield in completed lactation of those exemplars was 6875 kg milk with

4.01% fat and 3.29% protein. To achieve this production certainly had competed the special maintenance conditions and an optimal feeding.

Next, the entire nucleus was appreciated individual for their morpho-productive characteristics, accomplishing the nomination of mating, using to the insemination bulls with a milk breeding value between 117 and 127%:

Table 2

Name	Cod	VAL%	+ Milk kg	+Fat kg
Hower	51.264	122	572	24
Eirich	51.375	119	976	25
Samut	51.305	122	876	35
Geber	51.387	129	1263	43
Lotary	51.185	143	1057	66
Sigmo	51.258	117	790	23
Renker	51.658	127	1546	48

Next we will describe the stages of selection and its effects. Currently the farm has a herd of 300 cows Romanian Simmental Fleckvieh type breed whose average value is 7154 kilograms milk in normal lactation with dispersion of 1103.62 kilograms and 276.15 kg ± 34.84 kg fat.

2. RESULTS AND DISCUSSIONS

In Table 3 are given the genetic parameters of current and proposed livestock to be made as result of selection.

Table 3

Genetic parameters of actual and designed type

Actual type		Designed type	
Milk	7154±1103.62	Milk	9000
Fat	276.15±34.84	Fat	405

In the first stage of work we proposed to calculate the intensity of selection that can be made on the farm, according to formula:

$$R = \frac{E}{F}$$

R = intensity of selection (percentage of animals retained for breeding);
E = percentage of actual replacement;
F = average number of females produced annually from one cow (0.4 calves).

$$E = \frac{100}{v_2 - v_1}$$

Whiter: v_2 = age of reform (7 year);
v_1 = age at first calving (2, 3 years).

$$E = \frac{100}{7 - 2.3} = 21.28 \qquad R = \frac{21.28}{0.4} = 53\%$$

It follows result that in the farm where we want to maintain constant livestock size, it is possible to produce the next generation with 53% from the respective livestock. The next step for our project is the calculation of minimum requirements E_M, namely minimum values for these two characters (milk and fat) that must have cows to be allowed in the selection nucleus, after following relationship:

$$E_M = \overline{X} \pm K \cdot S$$

Whiter: $\overline{X}$ = Average population;
K = weighting coeff. of normal distribution whose values are standardized;
S = standard deviation.

In our case the numerical parameters are: E_{ML}=7154±0x1103.62=7154
E_{MG}=276.15±0x34.84=276.15

It follows that into the selection group should be included all cattle from farm that produced 7154 kg milk and 276.15 kg fat. To remove as much as possible the influence of environmental factors, namely to bring the phenotypic value of individuals to genotypic value is adjusted yields of milk and fat by age and season of parturition. These adjustments are made using coefficients calculated for each individual for the both characters, after that will be calculated the averaging adjusted to the entire lot of selection.

In our case the adjusted average on entire lot for milk production is 8127 kg milk and 317.87 kg fat.

Once calculated those adjusted average, we started to calculate the actual capacity of probable production (CPP) using its formula for calculating:

$$CPP = \overline{X}_p + b_1(X_1 - \overline{X}_p)$$

Whiter: $\overline{X}_p$ =average farm production (from average yields adjusted individual),
X_1 = the average of the individual adjusted by age and season;
b_1 = correction coefficient of probable production capacity

$$b_1 = \frac{n \cdot R}{1 + (n - 1) \cdot R}$$

Whiter: n = number of lactations;
R = coefficient of repeatability of respective character.

Calculating of production capacity expected was done for all animals of the lot, and then we started to determine the average CPP and dispersion indicators on all selection nucleus, which in our case is:

CPP=8127+0.61x782.63 = 8601 for milk
CPP = 317.84+0.65x3.151 = 338.68 for fat.

The next step was passed to calculate the expected breeding value (VAP) using the relation:

$$VAP = \overline{X + b_1}(X_i - X_p)$$

Whiter: X_i = probable capacity of the individual (I);
X_p = average on farm of probable production capacity;
b_1 = = regression coefficient of genotype to own genotype.

For one single lactation b1 = h2 of properties, for more lactation it will be:

$$b_1 = \frac{n \cdot h^2}{1 + (n-1) \cdot R}$$

Whiter: n = number of lactation;
R = coefficient of regression.

The mean regression coefficient calculated in successive cycles within the livestock was R = 0.39 for milk and 0.49 for fat. In this regard, taking into account a number of studies made in Romania, the average of b_1 for the both characters is 0.39 for milk and 1.58 to for fat.

Once calculated $\overline{X_{VAP}}$ for each cow from selection lot was established $\overline{X_{VAP}}$ for respective lot for milk and fat.

VAP_{milk}= 8601+0.40x332=8734

VAP_{fat}= 338.68+1.58x36.30=396.78

In the same time we have calculated the dispersion index for the both characters, obtaining the next values given in table no. 4.

The expected breeding value for milk, as shown in the table is 8734 kg and 396.78 kg fat. To reach the target of 9000 kg milk, have be made a genetic improvement of 266 kg milk. To obtain this genetic progress is necessary to make a difference in selection of 877 kg milk.

$$S = \frac{g}{h^2} = \frac{266}{0.3} = 877$$

Table 4

Average of expected breeding value and dispersion indices in studied herd

Specification kg	X	±S_X	S	V%	Limits of variability
Milk production unajusted	7154	195.17	1103.62	15.35	6318 –8832
Total quantity of fat unajusted	276.15	6.42	34.84	12.34	206.32 – 336.77
Milk production ajusted	8127	128.15	1082	12.65	6318 – 10430
Total quantity of fat ajusted	317.87	4.52	36.14	11.37	212.51 – 409
Probable capacity of milk yield	8601	52.47	419.73	4.88	8302 – 10487
Probable capacity of fat yield	338.68	2.37	18.94	5.59	320.07 – 422.30
Probable milk breeding value	8734	19,13	153,04	1,75	8602 – 9402
Probable fat breeding value	396,78	3,03	24,24	6,12	350,71 - 512,75

Next it will be use frozen semen from bulls that were progeny tested and had a progeny average milk production at least 10000 liters milk.

Knowing the production X_{VAP} of selection nucleus and breeding value of used males we can calculate the difference of total selection:

$$S_{T+M} = \frac{P_T + P_M}{2} - \overline{X_P}$$

Whiter: S_{T+M} = difference of selection given by the maternal and paternal form;
P_T = male phenotype;
P_M = female phenotype.
$\overline{X_P}$ = average population from come selection nucleus.

$$S_{T+M} = \frac{10000 + 8734}{2} - 7154 = 2213$$

S_{T+M} = 2213 kg,
and genetic gain will be: $g = h^2 \cdot S$
$g = 0.3x2213 = 664$

Genetic gain proposed to achieve is 266 kg milk, and from our calculation result that on generations is obtain 664 kg. To calculate the number of generations necessary to achieve the proposed aim is divided the genetic gain that must accomplish to the genetic gain obtained per generation. In these way we have obtain the number of generations necessary to achieve the proposed production: 266:664=0.40 generations

Because in dairy cattle the range between generations is approximately 5.5 years, the genetic gain in milk production design will be completed in 2.2 years. VAP average amount of fat in the selection lot is 396.78 kg, and designed livestock must to reach 405 kg. In this case it needs a genetic gain of 8.22 kg.

Breeding value of used male is at least 400 kg and heritability of character is 0.50. In this case it must make a difference in the selection of 16.44 kg to obtain the proposed genetic progress.

S = 8.22:0.50 = 16.44 kilograms

The difference in selection will be:

$$S_{T+M} = \frac{400 + 396.78}{2} - 276.15 = 122.24$$

$$S_{T+M} = 122.24$$

g = 0.50x122.24= 61.12
g= 61.12 kg fat per generation
8.22:61.12= 0.13 generations and 0.75 years respectively

3. CONCLUSIONS

Finally to achieve the proposed milk production is required 2.2 years, due to relatively small heritability of this character, while the fat target is achieved in only 0.75 years due to higher heritability of character.

We have to mention that the calculation of these parameters was considered production until 2007. In these conditions currently in the herd is produced both parameters in terms of milk production and the fat, respectively 9000 kg milk and 405 kg fat as a genetic potential, with a special emphasis on securing of optimum maintenance conditions so that this potential can be manifested.

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INFLUENCE OF THE SELECTION PRESSURE ON THE HAEMOGLOBIN ALLELE FASTENING IN THE ROMANIAN SHEEP BREEDS

INFLUENȚA PRESIUNII DE SELECȚIE ASUPRA FIXĂRII ALELELOR HEMOGLOBINICE LA RASELE ROMÂNEŞTI DE OVINE

GH. HRINCĂ, G. VICOVAN

Key words: haemoglobin, selection, sheep
Cuvinte cheie: hemoglobină, selecție, ovine

SUMMARY

The paper analyses the dynamics of the haemoglobin alleles in different ecotypes of the principal four sheep breeds which live in Romania (Merinos, Tsigai, Tsurcana and Karakul) depending on the meteorological, geographical and climate conditions, on the selection methods and on the technological breeding factors of the living area of these sheep breeds. The study points out the selection advantage of a certain type of haemoglobin under the influence of different environmental conditions and breeding technological factors in sheep, as well as the importance of utilization of the haemoglobin system to improve the selection systems for the breeding of this species of farm animals.

INTRODUCTION

The biochemical polymorphism, especially the polymorphism of haemoglobin and potassium, has a decisive role for the ecogenetic differentiation of the sheep breeds. Being known the adaptive value of the haemoglobin system, in the sheep breeds, the genetic structure at the locus Hb is modified and then is consolidated, depending on the environment parameters from the most various geographic zones (2, 3). The unequal distribution of the haemoglobin genes and genotypes within the different sheep breeds is due to the selection advantage which is conferred by one of the Hb allele and which is determined by the natural meteorological, geographical and climate conditions, as well as by the selection and breeding technologies which are specific for each breed, zone and country (1, 2, 3). The purpose of this study is to analyse the dynamics of the haemoglobin alleles in different ecotypes of different sheep breeds which live in Romania. The evolution of the haemoglobin system was pursued under the influence of different parameters of artificial and natural selection.

1. MATERIALS AND METHODS

The investigations were carried on the four principal sheep breeds which live and are exploited in Romania: Merinos, Tsigai, Tsurcana and Karakul.

The haemotypification of the individuals at the Hb locus was achieved by the horizontal electrophoresis method, having the starch gel as substrate and using a solution stabilized at pH=8.9 of Tris EDTANa$_2$ and boric acid (10/1/0.75) as electrolyte (5).

There were calculated the frequency distributions of the haemoglobin alleles.

2. RESULTS AND DISCUSSIONS

Among the components of the natural environment (from the point of view of weather, geographical and climatic parameters), the altitude represents an important factor of variability at the determinant locus of haemoglobin; it actions by its characteristics: atmospheric pressure, irradiation, atmospheric draughts, air composition, precipitations, quantitative and qualitative aspect of pastures etc. The general and constant feature is that the lower the altitude is, the more frequent the allele Hb^B is, the allele Hb^A having a limited spreading; the higher the relief height becomes, the more the frequency of Hb^B decreases and the allele Hb^A registers more significant values.

Thus, in the Tsigai breed, the lowest frequency of the allele Hb^A (6.04%) is in the flocks which live in the plain (Ruşețu, Secuieni). Its frequency begins to lightly increase in sheep from the hill zones (Moroieni) (8.50%); in both Tsigai ecotypes the allele Hb^B is very spread (over 90%). In the plateau and pre-mountain regions (Miercurea-Ciuc), the allele Hb^A is much more frequent (62.50%) than the allele Hb^B (37.50%). In the mountain ecotype (Mureş), the allele Hb^A reach the highest frequency level of this sheep breed (84.86%), the allele Hb^B having a decreased spread (fig. 1).

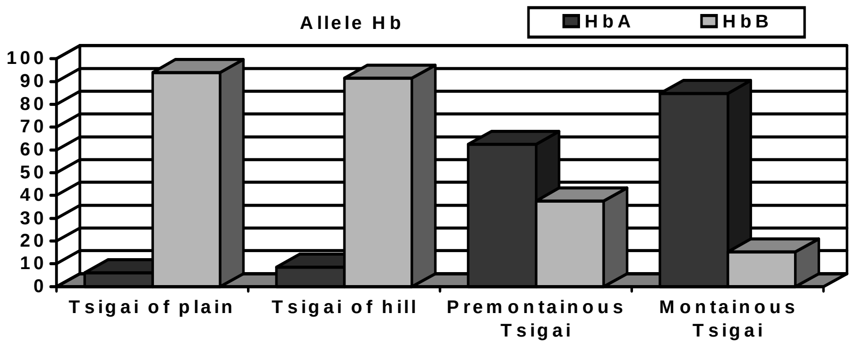

Figure 1. Allelic structure at the Hb locus in different ecotypes of Tsigai from Romania

A similar configuration of the haemoglobin table is recorded in the Tsurcana breed. But here, the distributional amplitude of the Hb alleles is much larger. Thus, in the plain (Arad, Hungary) there is almost only the allele Hb^B (97%), the allele Hb^A being sporadically met (3%). In the hill, the allele Hb^A varies between 10% and 17% (Tsurcana from Popauti or Moroieni). In the Tsurcana sheep from plateau and pre-mountain zones the frequency of the allele Hb^A is lightly higher, but in comparison with the Tsigai from the similar zones, it is low enough (21%), the allele Hb^B prevailing (79%). Instead, in the Tsurcana of the mountainous regions (The Meridionali Mountains or The Metalliferous Mountains) only or almost only the allele Hb^A is met (100%, respectively 98%), the allele Hb^B being negligible (fig. 2).

The air temperature of the sheep habitat can constitute one of the factors of haemoglobin allele distribution. For example, the Karakul breed from Romania lives under the temperately continental climate and it is localised in the North-East of Moldavia (mainly, in Popauti-Botosani). Once, the Karakul sheep was bred in other places of the South of Romania (Pestera-Constantza, Ruşetsu-Buzau). In all cases, in all

Karakul ecotypes the allele Hb^B is prevalent (about 90%), the frequency of the allele Hb^A varying between 6% and 10%. In the Karakul which lives in the dessert zones (Uzbekistan, Iran) the allele Hb^A has a significant incidence (between 31%-36%), but it is not higher that allele Hb^B (about 65%); but advancing towards the East and then to the Centre of Europe, its frequency gradually diminishes (Karakul of Romania, Hungary, Poland) and in some ecotypes the allele Hb^A disappears; it is the case of the German Karakul, this breed being monotypical for the allele Hb^B at the locus Hb (fig…3…). In the same context, in the Karakul of the South of Romania, the allele Hb^A registers a lightly higher frequency (9%) than in the Karakul from the Moldavia (6%) (1, 4, 5).

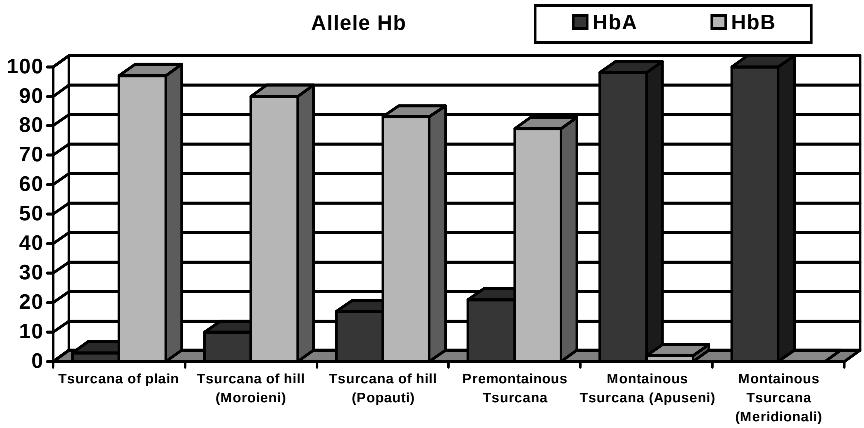

Figure 2. Allelic structure at the Hb locus in different ecotypes of Tsurcana from Romania

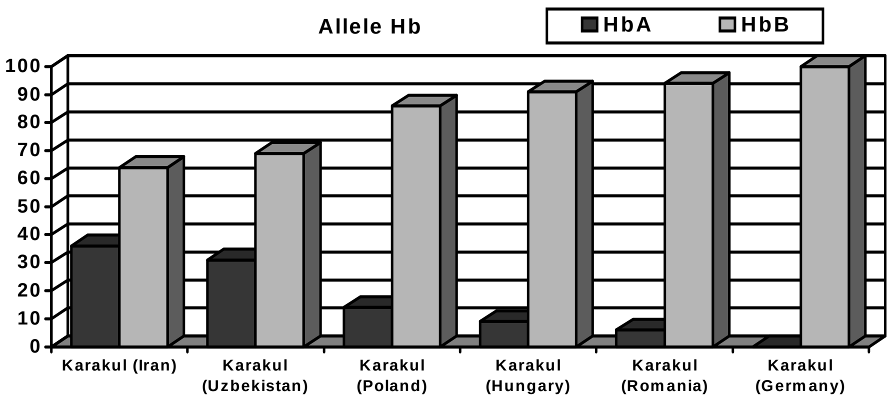

Figure 3. Allelic structure at the Hb locus in different ecotypes of Karakul

Therefore, the cases discussed till now demonstrate that the extreme temperatures (acute cold or sultry heats) or the extreme forms of relief (dessert or mountain) favour the fixing of the allele Hb^A and the temperatures situated in the biological comfort zone or the moderate forms of relief (forest steppe, hill etc) are correlated with a more emphasized fixing of the allele Hb^B.

The nutritional factor offered by the flora composition of the grasslands of environmental conditions in which the sheep live can contribute to the configuration of the haemoglobin system. In the Merinos of Palas, which is localised in Dobrogea, where the pastures are relatively rich, the allele Hb^B is of five times frequent than the allele Hb^A. In fact, in the European countries, the richer and more various pasturages determine higher incidences of the allele Hb^B in comparison with those ones of the allele Hb^A, while the parsimonious pasturages of the Australia, Tasmania and South Africa lead to increasing of the allele Hb^A, which is almost at the same level of the one of the allele Hb^B (fig. 4). Beside the temperature, the composition of the pasturages can explain the decreasing trend of the allele Hb^A from the Iranian or Uzbekistanian Karakul (under the condition of arid, dry grazing) at the different ecotypes of Karakul of the Europe (with better pasturages) (1, 4, 5) (fig. 3).

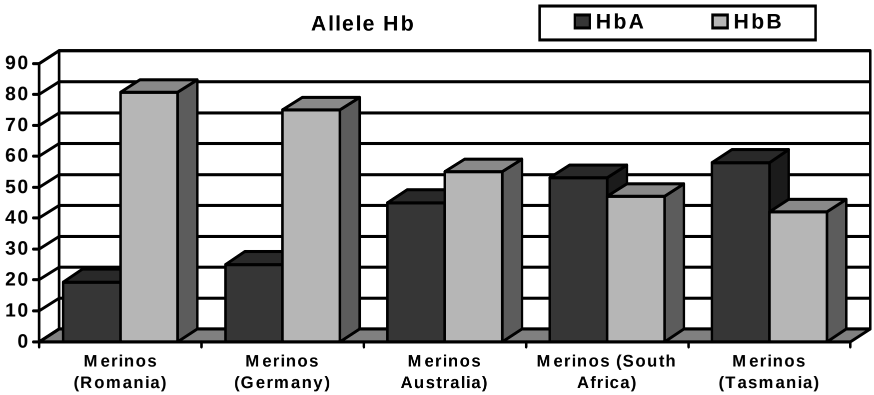

Figure 4. Allelic structure at the Hb locus in different ecotypes of Merinos

Sometimes, the artificial selection, practiced during many years, can overwhelmingly modify the distribution from the level of the Hb locus. Thus, the selection systems applied to obtain progeny generations of high biological values in the Merinos sheep led to an ascensional evolution of the allele Hb^A from 19.30 % in 1975 at 23.84 in 1988 and at 34.38% in 1992 (fig. 5).

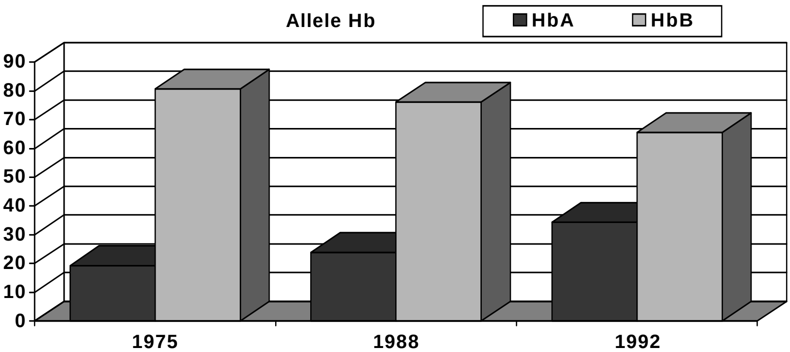

Figure 5. Dynamics of the Hb alleles in the Merinos of Palas between 1976 and 1992

The selection methods practiced in the sheep of Karakul type, to obtain valuable lamb pelts, determines some modifications concerning the distribution of the two haemoglobin alleles. Thus, the allele Hb^A has a lower incidence in the greyish variety (5.51) in comparison with the coloured variety (6.98%) and, especially, with the black variety (7.34%). The greyish colour of Karakul is associated with a genetic flaw named *double stomach* with lethal effect and which is correlated with the presence of the allele Hb^A, especially in homozygous state (1). To avoid the later losses caused by mortality, the lambs which present obvious albinism signs at their birth (that could be an indicator of the lethal factor) are slaughtered. That is why, the allele Hb^A is less frequent in the greyish sheep than in the other colour varieties (fig. 6).

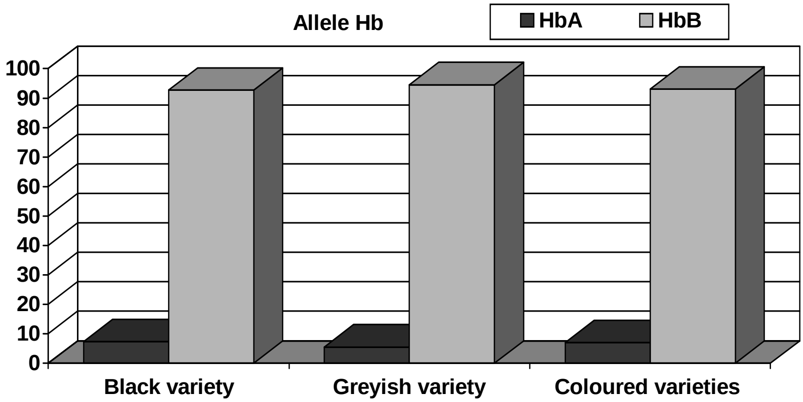

Figure 6. Allelic structure at the Hb locus in the colour varieties of the Karakul of Botosani

The natural selection associated with the one practised by man led to the elimination from flocks of those sheep which supported the most hardly the deficit foraging, the extreme temperatures, emphasized humidity or excessive drought and this way the allele Hb^A is better preserved. Under better foddering conditions and in a more favourable microclimate the allele Hb^B is more fixed in sheep populations. Therefore, in the biological respect, allele Hb^A is characterized by a great selection advantage in comparison with the allele Hb^B. In a great measure, the selective advantage of the allele Hb^A is due to the biophysical, biochemical and physiological peculiarities of the haemoglobin molecule of type A (saturation capacity with oxygen, dissociation curve of oxyhaemoglobin, erythrocyte load with haemoglobin, metabolic profile of the erythrocyte) (1). Therefore, the haemoglobin system, beside the potassium system, represents one of the important populational mechanisms of the apparition of the sheep ecotypes.

All these experimental data is in accordance with the hypothesis that the genetic structure at the Hb locus in sheep is determined by genetic mechanisms of the physiological homeostasis, under the complex action of the meteo-geo-climatic and technological factors of the specific spreading area for the respective breeds or populations of animals.

3. CONCLUSIONS

1. In the Romanian sheep breeds, the haemoglobin alleles present a considerable dynamics depending on the meteorological, geographical and climate conditions, on the selection methods and on the technological breeding factors of the living area of these sheep breeds.

2. The allele Hb^A has a selective advantage against the allele Hb^B because the precarious environmental and breeding conditions favour a more emphasized fastening of the allele Hb^A, while the environmental and technological factors situated in the biological comfort zone determine a vast fixing of the allele Hb^B.

3. The dependence of the haemoglobin system on the natural and artificial factors of the sheep habitats can be used to improve the selection systems for the breeding of this species of farm animals.

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NOMADIC SHEEP BREEDING IN THE AEGEAN REGION, TURKEY (A CASE EXAMPLE OF ISPARTA)

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Key words: nomadic sheep breeding, economical analysis, pirit sheep, aegean region

SUMMARY

The aim of this study is to introduce the Nomadic Sheep Breeding System, its importance in the econonical life, and its effects on the crossover of the sheep genotype in the city by means of the observations and surveys carried out on the registered nomadic sheep breeders of Isparta City Breeding Sheep – Goat Breeder's Association. Some nomadic sheep breeders living on cities with high altitude, such as Denizli, Isparta, Afyon, and Usak, in the Interior Aegean Region, where there is a cold and rainy climate during the falls and winter seasons migrate to Aydin City so that they can spend the winter and spring seasons there. They live in tents woven of goat hair. In this life style, two or three families who are close relatives with one another and who have 250-400 head sheep migrate altogether. The animals shelter temporarily in places, called as "bed", which are surrounded with simple fences. Nomads from Isparta have tried to convert their sheep into a form with no tail bringing Sakiz and Kivircik croosbred or Kivircik rams from the cities of Aydin and Izmir. It has been observed that, in their flocks which have different crossbred types and are not in a single structure, they prefer a sheep genotype which can give twin births, which has high milk productivity, which is completely white, and which is close to Kivircik genotype. The folk of the region has named this genotype as "Pirit". While the annual income obtained in nomadic flocks is 45.070 TL (20.68485 EUR) total expenditure is 6.150 TL (2.82254 EUR) ; thus, the net income is 38.925 TL (17.86231 EUR). In an average family of four members monthly income per member is 810,9375 TL (0.37175 EUR).The number of enterprises dealing with nomadic sheep breeding has been decreasing due to the prohibition of forest areas and the high levels of fiscal punishment applied. The contribution of the production to the country's economy provided by the sheep grazed in pastures/areas called as" Forest Area" or "Treasury Land" has been ignored. We claim that with regards to the development of the nomadic sheep breeding of the city of Isparta and the sustainabilty of it, and for the purpose of generating the desired sheep type in the city,its spread, and stud flow, an improvement model must be developed and applied on the nomadic sheep flocks which will speed up the change process of the sheep breeding in the region. For this reason, some legal arrangements must be made to determine the boundaries of the available pasture areas and for their utilization. A cooperative or a company should also be established for a better marketing and evaluation of the products in present production conditions.

INTRODUCTION

The first animals to be domesticated, after the dog, were sheep and goats. Sheep are multi-purpose animals, producing meat, milk, skins and wool/hair sheep production is a crucial sector of human activity and in case the industry declines, large areas will be adversely affected, leading to the loss of a culture that has survived virtually unchanged for centuries (Zygoyiannis, 2006).

Turkey has been one of the major sheep and goat producers of Europe and the West Asia and North Africa (WANA) region in the 20th century (Gürsoy, 2006). Sheep and goat management systems in Turkey evolved through thousands of years of adaptation and adjustment to the natural resources, climate, topography and the ever-changing production environments. There are three general systems, the sedentary, transhumant and nomadic (Yalcın, 1986; Kaymakcı and Sonmez, 1996). Sheep and goats followed a declining trend since the early 1980s and are no longer the major meat and milk supplying species (Kaymakçı et.al., 2005; Bardakcıoglu et.al.2007). The nomadic system is declining because it cannot keep up with the social and economic changes and is practiced only in the sheep industry mainly in the Southeast and Eastern Turkey and involves about 10% of the flocks in these regions (Gürsoy, 2006).

The number of the sheep in Turkey has been 23.974.591 according to the 2008 year end statistics, decreasing 5,84% with respect to 2007 (Anonim 2008). This number has been falling continuously because of the migration to cities from rural areas caused by terror in Eastern Anatolia, and caused by the narrowing pasture areas in Central and Western Anatolia. Sheep breeders in cities with high altitude in Inner Aegean Region which has a cold and rainy climate in the winter and the autumn migrate to the city of Aydin. They live in tents woven of goat hair. The sheep shelter temporarily in places, called as “bed”, which are surrounded with simple fences (Yılmaz et. al., 2009). They make a migration circulation following the vegatation inside the city and among cities. While the number of nomadic sheep has decreased, the number of families who deal with nomadic sheep breeding has fallen in recent years depending on some reasons such as the restriction of pasture areas, applied fiscal punishment, and having an unorganized production.

Nomadic sheep breeding is commonly done in the Aegean Region, especially in the cities of Denizli and Isparta. Flock owners, migrating to the cities Aydin and Izmir, have tried for years to turn their flocks from fat- tailed into thin tailed buying Kivircik or Kivircik-Sakiz crossbred rams there. While nomads of the city of Denizli, who started to cross their flocks 20-25 years ago, have completed the transfer into Sakiz-Kivircik sheep genotype, which is absolutely resistant to the regional conditions and has a high reproductive performance and a high milk yield. It can be said that sheep breederes of Isparta are still at the beginning of this process. An unsystematic crossing has started either in the nomadic flocks or in the other flocks in the city. Since Kivrcik is resistant to poor conditions, a Kivircik blood dominant genotype is required here which has a high reproductive performance because namely the climatic conditions in the region are harsher than in Denizli City. There are few enterprises having single sheep bred. Some of the flocks are in a structure that has been composed of a mixed crossbred of fat- tailed, wedge tailed, and thin tailed Sakiz-Kivircik crossbred or Kivircik rams.

This study was done to introduce the nomadic sheep breeding system, its economical importance, and its effects on the change of the sheep genotype in the city, depending on the observations in the region and the survey results carried out on the nomadic sheep breeders who are registered members of Isparta City Breeding Sheep – Goat Breeder’s Association.

1. MATERIALS AND METHODS

In this study, results of the observations and surveys carried out on the registered nomadic sheep twenty four breeders of Isparta City Breeding Sheep – Goat Breeder's Association were used. Each member has a family consisting of average four members and has 250-400 heads sheep. All members are close relatives with one another and migrate altogether.

2. RESULTS AND DISCUSSION

Approximately 15-20 years ago, the sheep genotype started to change via the nomadic sheep breeders in the region where the dominant sheep genotype was commonly Daglic Breed. Daglic breed is a fat- tailed genotype, and in the region, the demand for fat-tailed breeds has been decreasing. Since the marketing conditions of this regionally dominant and fat- tailed genotype Daglic have changed, unsystematic crossbreedings have been done by the breeders in order to change the type into a primarily thin tail form. Today, the Daglic genotype can hardly be seen in the region, which once used to be the regional breed years ago in cities (Denizli, Isparta, Afyon, Usak, Eskişehir, Kütahya) in the Interior Aegean Region (Yalçın, 1986). The nomads have tried to convert the sheep into a form thin tailed bringing Sakiz-Kivircik crossbred or Kivircik rams from the cities of Aydin and Izmir(Yilmaz et.al., 2009a). It has been observed that, in their flocks which have different crossbred types and are not in a single structure, the desired sheep genotype is the one which can give twin births the most, which has high milk productivity, which is completely white, and which is close to Kivircik genotype. The folk of the region (The cities of Denizli, Isparta) have named this genotype as "Pirit". Similarly, "Pirit" is a preferred genotype in the cities of Afyon and Usak. In order for a complete determination of this genotype, studies at molecular genetics level should be done.

It has also been observed that some of these breeders have been in a trial to increase the reproductive performance of the genotype crossbreeding it with the material Akkaraman, Ivesi, and Merinos rams and sheep brought from the nearby cities in addition to the former genotype. Akkaraman, Merinos, and Ivesi Breeds are fatty tailed and are bred in the cities in the east of Isparta. The average lamb number per sheep is one in the whole region, except for the nomadic sheep breeders. The genotype, named as "Pirit", could be said to be the desired genotype in the city. This genotype is desired to be the one which has a reproductivity performance over 1,5 per sheep, a high milk productivity, a physical appearance of a white larger body and thin tail, and a Kivircik phenotype structure carrying a little Sakiz blood.

1. Nomadic Sheep Breeding System and the Migration Circulation

In the Western Anatolia, family enterprises that deal with nomadic sheep breeding migrate to coastal regions (to the cities of Aydin and Izmir) from their iner regions (Cities of Isparta and Denizli) for 6 months (December-May) to spend the winter and spring seasons. Pasturing, in this system based on nomadic livestock, has made up a living and cultural style from lowlands to highlands during the spring and from highlands to lowlands during the falls depending on the season. The annual flock management has been formed according to the climate changes, and consequently to the development of grass. Sheep breeders of Isparta city setle down on the high plateaues of the city during the hot summer seasons starting in mid May. The sheep which are pastured there for a month or two are taken to lower areas from higher plateaues. From July until October, they utilize stubble fields in villages. Nomadic flocks are moved to the City of Aydin in December, where they are kept in very large rented pastures (1000-2000 sq metres) for six months, and are moved back again in May (Figure 1).

In the migration circulation of interior province, nomads, who setle down on the highest plateaues, move down to another area later. Nomadic flocks that stay there for 30-45 days, are then taken to their own villages, and are pastured on stubble fields for 40 days. They move to neighbour villages and utilize the stubble fields there, then move back to their own villages at last. Nomads, who return to their own villages in order to be able to make their preparations to other cities, complete their preparations in 15-20 days, and migrate to the city of Aydin (Figure 1). In this way, before the inter city migration starts, they migrate to at least 5 different areas in the city of Isparta, developing a circulation model according to the harvesting seasons and seasonal grass growth so that they can have a more econoımical production.

2. Flock Management

Apart from their economical importance, the nomadic sheep breeding whose historical past dates back too early times and which has descended from ancestors is a life style in this city, similarly to the other cities, that has been going on for centuries. It is a lifestyle of families of 4-5 members, living in tents made of hair, and migrating to different areas during certain periods of the year. In this lifestyle, 2 or 3 families migrate together who are close relatives and who have 200-400 heads sheep. 2 or 3 families having totally 1000-1500 heads sheep rent the same pasture area. In this way, they can co-operate during the maintenance and feeding of the flocks and the migration. Women and children play an active role in maintenance, feeding and milking the sheep. Women also do the cheese making, and men provide the marketing mainly the lamb, cheese and other products.

In each flock, seven rams are kept within the year, and a ram is kept in the flock for only three years. 120-130 lambs are obtained in 100 sheep. Following the lambs birth they are weaned in 4-5 months and immediately marketed. The sheep whose lambs have been sold are milked twice a day, and the ones whose lambs havent been sold yet are not milked, and the whole milk is left to their lambs.

Figure 1. Nomadic circulation in Isparta City and inter-cities

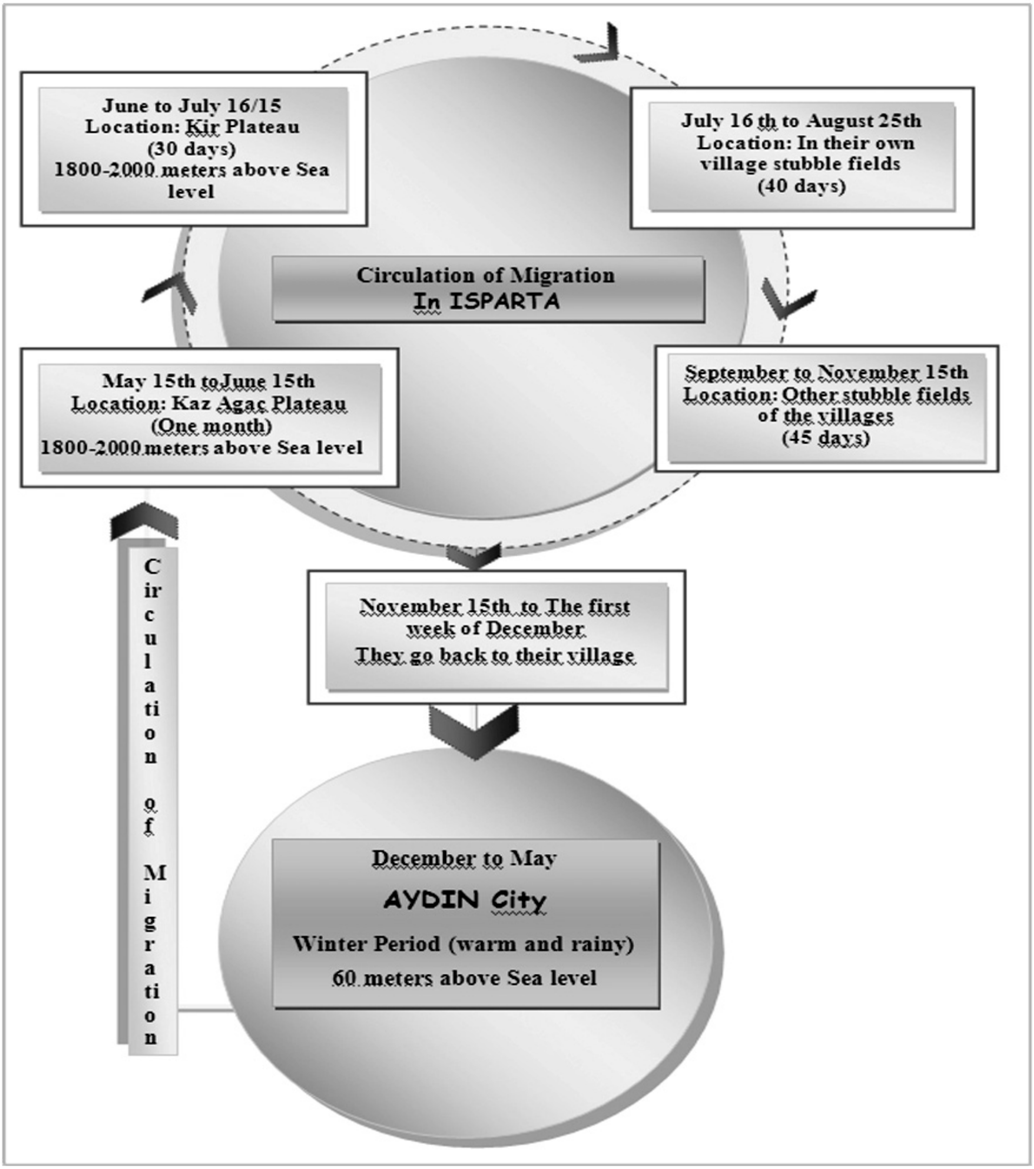

Table 1

Some management parameters of nomadic sheep flocks

Mature female sheep per family	250- 400 heads
Mating period	During the year
The most intense birth months	December - January-February
Weaning time of the lambs (4-5 months of age)	August-September
Marketing time of the lambs (4-5 months of age)	May

As seen in Figure 1, the sheep mated during the period from June until August in Isparta City, which has a high altitude and cooler summer months give their births in the coastal city of Aydin, which has warmer winters in late December and January. However, since there are rams continuously in the flocks, mating season could be extented to a period of four or five months. The sheep which are in their latest 3 months pregnancy period, and which are fed especially in stubble fields are not given extra feeding.

Lambings occur between February and May in coastal regions which have well pastures conditions and the lambs are fed most economically in these pastures. Lambs reaching marketing weight are marketed in this region. Aydın Province is a marketplace for nomads. After the sale of the lambs, nomads migrate back to high-altitude cities. After May, sheep whose lambs have been sold are milked and cheese is made from this milk and the cheese is marketed in Isparta City (Table 1).

3.Economical Analysis of Nomadic Sheep Breeding

In the Figures below (Tables 2 and 3**)**, an average productivity and the yearly income of a nomadic flock consiting of average 250 head sheep were calculated according to the lowest profit margins. The calculations were made assuming the infertility rate was 8%, and the fertilization rate per sheep to was 1,2, and each year, 30 breeding sheep were added to the flock. The income of the 30 added sheep was excluded while calculations were made. The price paid for per kg carcass for the lambs which have a desired carcass weight of 13-14 kgs as sucklings is 13-16 TL. The market price of a lamb which is 12 months old is 250 TL, and 25 lambs at this age are marketed anually. The calculations related to milk and cheese production were made according to the assumptions that a sheep is milked for 5 months, that 200 grs milk is obtained from per sheep, and that 1 kg cheese is made from 4 kgs of milk. Beside the main incomes of lamb meat and cheese, the income obtained from the sales of the extracted rams and sheep from the flock was also included into the total income. In Table 2, the annual expenses of the breeders are given.

Table 2

Resources of income in a nomadic flock and the income obtained

Income		
Lamb carcass (kg)	(13 g carcass **x** 12,5 TL) **x** 194 head	31.525
12 months old lamb	25 head **x** 250 TL	6.250
Cheese: (40 kg milk /4 X30 gün X 5 ay)	(10 kg cheese **x** 150 days) **x** 4.0 TL	6.000
1 rame	1 rame x 250 TL	250
Wool	500gr **x** 200 head **x** 0.5 kurus	50
10 sheep x100 TL	10 **x** 100 TL	1.000
Total Income		45.075

Although the rent for pasturing the nomadic flocks in the cities migrated to is generally paid by 3-4 families, here it was thought that only one family defrayed it. Feeding is provided due 3-4 months payments from their own regions. In the table of expenses, the major expenses were given in their highest values and other trivial expenses were ignored.

Table 3

Expenses in Nomadic Flock

Costs		
Land rent (Pasture rent for 1 year)	2 000	2000
Truck Rent (1 year)	1.800	1800
Feding Expenses(1kg/year)		
Barley	330 kurus / 5 000kg	1650
Vetch Hay	300 kurus/1000kg	300
Wheat Hay	200 kurus / 2 000kg	400
	Total	6150

Table 4

Net income statement

Total annual income	45.075 TL (20.68485 EUR)
Total annual expenditure	6.150 TL (2.82254 EUR)
Annual net income	38.925 TL (17.86231 EUR)
Monthly net income	3243,75 TL (1488.37304EUR)
The monthly income per capita in a family with 4 people	810,9375 TL (0.37175 EUR)

As seen in Table 4, the total annual income level provided in nomadic flocks is 45.070 TL (20.68485 EUR), and the total expenditure is 6.150 TL (2.82254 EUR), thus the annual net income is 38.925 TL (17.86231EUR), and the least monthly income per member in an average family of 4 is 810,9375 TL (0.37175 EUR). When thought that the minimum wage in Turkey is 690,82 TL (0.316,41 EUR), it will easily be seen that this sector is a good business sector and that its contribution to the production is significant (table 4).

The number of the sheep in Turkey decreased 5,84% with respect to 2007 (Anonim 2008). This has been a continious fall recently. However, in Europe, the total sheep and goat populations remained relatively stable in 2007 relative to 2006. This may be seen in the light of the slight downward trend recorded in the last years. The main EU (European Union) sheep producing Member States are the United Kingdom, Spain and Greece, while the major goat producers are Greece, Spain and France. From 2006 to 2007, EU sheep and goat meat production in tonnes decreased 3% while meat supply, mainly from New Zealand (86%), remained relatively stable. Sheep and goat prices were in 2007 relatively (Dıas et. al., 2008). During the last thirty years period, Iranian policy makers paid special attention to nomads' development program (Jahromi, 2008). As for the Kyrgyz Republic, the government considers the sheep industry as a high priority and there are now a number of donors actively supporting aspects of sheep production and marketing, including EU and the World Bank (Tjaart and Veen, 2009).

The number of nomadic sheep has been decreasing in recent years depending on some reasons such as the restriction of pasture areas, applied fiscal punishment, and having an unorganized production. As result of this the number of families who deal with nomadic sheep breeding has been falling, as well. Recent Turkish governments have ignored animal production and haven’t had any stable development policies.

3. CONCLUSIONS AND RECOMMENDATION

With no extra hand feeding and with no extra charge, the production porvided by these naturally fed nomadic sheep, which are pastured in areas called as forest land or treasury lands hired legally from the headman of the village, and its contribution to the county’s economy has been ignored. And by ignoring them and the families who can only deal with this business area-their sole source of income- has been eliminated. In addition to these, a tradition that has been going on in the region has been forced to their extinction.

Some fundamental problems observed in the flocks are the gradual narrowing of pasture areas, and the displeasement for not achieving the desired genotype, the problems met in marketing the products, and the need for an economical organization. Throughout the city, there are approximately 35 nomadic sheep breeders, 24 of whom are members of the Association of Breed Sheep&Goat Breeders, Isparta City. The support of the Breeders Union in the city is important for the solutions of the nomadic sheep breeders who have gathered for the first time under an organizational structure. A breeding programme model should be developed and put into action for the breed flow and the creation of a new desired genotype in the city. This model to be applied should be carried out with the nomadic flocks that speed up the changing process of the sheep bereeding in the region. In order for the products to be better evaluated and marketed, cooperatives or companies should be established. The suitable pasture areas in the migrated cities should first be determined according to the needs of the flocks and the families so that they can be used effectively as pastures, and then these areas should be put into a legal status by the Union to facilitate their utilization regularly in the following years. When managed well, the sheep and the goat have significant effects on the fight against weeds, on the decrease of the fire risk, and for the protection and the development of the habitat.

ACKNOWLEDGEMENTS

We are grateful to the nomadic sheep breeder members of Isparta City Breeding Sheep–Goat Breeder’s Association and to the Association for their invaluable contribution to our study at every stage.

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RESEARCHES REGARDING THE IMPROVEMENT OF MEAT PRODUCTION AT THE LOCAL SHEEP BREEDS BY CROSSBREEDING WITH SPECIALIZED BREEDS
A. THE WEIGHT INCREASE AHD THE SPECIFIC FODDER CONSUMPTION AT FATTENING

CERCETĂRI PRIVIND AMELIORAREA PRODUCȚIEI DE CARNE LA RASELE AUTOHTONE DE OVINE PRIN ÎNCRUCIŞARE CU RASE SPECIALIZATE
A.CREŞTEREA ÎN GREUTATE ŞI CONSUMUL SPECIFIC DE FURAJE, LA ÎNGRĂŞARE

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CAMELIA-ZOIA-ZAMFIR, WALTER-IOAN SAUER

Cuvinte cheie: hibrizi, spor de creştere în greutate, UNC (unitate nutritivă carne), spor mediu zilnic.
Keywords: hybrids, weight increase rate, UNC (nutritive unit of meat), average daily gain increase

SUMMARY

The researches were made on lots of hybrids comparatively to 4 lots of lambs from local sheep breeds, totalizing a number of 157 animals, subject to fattening during a period of 60-92 days. As a result of fattening there were remarked the hybrids from all the 4 combinations which made weight increasing rates higher with 17,43-24,7% and smaller specific consumptions with 5,35-16,64% comparatively to the lots of contemporaries from the mother breeds. The differences are very significant in the statistical point of view. The hybridization proves itself to be an efficient method of improving the meat production at the local sheep breeds.

1. MATERIALS AND METHODS

There were subject to control fattening 4 lots of hybrids (male weaned lambs), comparatively to 4 lots of contemporaries from the mother breeds as follows:

I. 37 animals F1 Suffolk x Palas Merino comparatively to 24 animals Palas Merino. (intensive fattening)

II. 19 animals F1 Texel x Meat Line comparatively to 20 animals Meat line - Palas. (intensive fattening)

III.12 animals F1 GCN x Țigaie comparatively to 15 animals Țigaie. (intensive fattening)

IV.15 animals F1 GCN x Țurcană comparatively to 15 animals Țurcană. (intensive fattening)

The lambs from the lots subject to fattening were weighed in the beginning of the fattening period and on its end, determining the weight increasing rates. Daily there were weighed the fodders given to each lot and every other day the rests of fodder that were not consumed. It was calculated the specific consumption of fodders for each lot. The period of fattening was of 60-92 days. The structure of the ratio used at fattening is presented in the tables 1 and 2.

Note: GCN –German Breed with Black Head.

Table 1

The structure of the ratio used at the fattening of the first three pairs of lots

Sorts of fodders	Proportion in the mixture (%)	SU (%)	UNC at 100 kg mixture	PBD kg at 100 kg mixture
Mixed fodder	80	69,6	85,6	12,5
Chopped Lucerne hay	20	17,0	11,8	2,1
Total	100	86,6	97,4	14,6

Table 2

The structure of the ratio used at the fattening of GCN lambs x Turcana and Turcana

Sorts of fodders	Proportion in the mixture (%)	SU (%)	UNC at 100 kg mixture	PBD kg at 100 kg mixture
Mixed fodder	29	25,2	28,2	4,24
Chopped hill hay	71	60,4	51,1	3,83
Total	100	85,6	79,3	8,07

In table 3 it is presented the physical structure of the mixed fodder used at the lambs' fattening.

Table 3

The physical structure of the mixed fodder

Technical Specifications		TA 9304 lamb growing
Meat Energy	(UNC/kg)	1,07
Digestible raw protein for ruminators	(g/kg)	155,84
Raw protein	(%)	15,81
Raw fat	(%)	2,45
Raw Cellulose	(%)	7,18
Ashe	(%)	6,81
Calcium	(%)	1,09
Total Phosphor	(%)	0,45
Total of chlorides	(%)	0,02
A Vitamin	(UI/kg)	9647,05
D3 Vitamin	(UI/kg)	2193,75
E Vitamin	(mg/kg)	19,67
Cuprum	(mg/kg)	13,69
Iodine	(mg/kg)	0,74
Iron	(mg/kg)	58,75
Manghan	(mg/kg)	49,42
Selenium	(mg/kg)	0,37
Zinc	(mg/kg)	305,11

All the obtained data were processed and statistically interpreted.

2. RESULTS AND DISCUSSIONS

In our country there is a small number of scientific works regarding the improvement of meat production at the local sheep breeds by crossbreeding with meat breeds [1], [2]. From the data presented in table 4 it results that the Suffolk x Palas Merino hybrids made a total increasing rate (in 60 days of fattening) of 18,46 kg it being higher with 17,43% comparatively to their contemporaries from Palas Merino breed. The average daily increase at the hybrids was of 304.84 g/animal beside 259.71 g/animal at the mother breed. The age of reaching the body weight of 40 kg was at the hybrids of 142 days, smaller with 27 days of fattening comparatively to Palas Merino breed. The differences between the hybrids and the mother breed are very significant in the statistical point of view.

Table 4

The weight increase at the control fattening (60 days) at the Suffolk x Palas Merino hybrids comparatively to the mother breed

Specification	UM	Genotype		± Differences between crossbreds and mother breed	
		Suffolk x Palas Merino	Palas Merino	Absolute values	%
		X ± sx	X ± sx		
Weight in the beginning of fattening	kg	21,94±0,8090	18,73±0,7795	-	-
Weight in the end of fattening	kg	40,39±0,8116	34,85±0,8026	-	-
The total rate of weight increase	kg	18,46±0,4565	15,72±0,6426	+ 2,74	+ 17,43
Average daily gain increase	g	304,84±7,3996	259,71±10,4647	+ 45,13	+ 17,37
Age of reaching the weight of 40 kg	days	141,86±2,7738	169,17±6,7889	- 27	-

Note: The differences between genotypes are very significant (Fisher Test P < 0,001).

In table 5 there are presented the results of the fattening of Texel x Meat line hybrids, comparatively to the mother breed.

It is noticed that the Texel x Meat line hybrids made at fattening a total increase of 18.98 kg, besides 16,14 kg at Meat line -Palas. The average daily gain increase was of 316,42 g/cap besides 268,96 g/animal at the mother breed. The hybrids made a live weight of 40 kg at the age of 142 days, earlier with 14 days comparatively to Meat line - Palas. The differences are very significant through Fisher test.

Table 5

The weight increase during the period of control fattening (60 days) at the Texel x Meat line-Palas hybrids comparatively to the mother breed

Specification	UM	Genotype		± Differences between crossbreds and mother breed	
		Texel x Meat line-Palas	Meat line - Palas	Absolute values	%
		X ± sx	X ± sx		
1	2	3	4	5	6
Weight in the beginning of fattening	kg	22,93±0,5599	21,3±1,1755	-	-
Weight in the end of fattening	kg	41,91±0,6833	37,4±1,3787	-	-
The total rate of weight increase	kg	18,98±0,5246	16,14±0,5246	-	-
Average daily gain increase	g	316,42±8,7380	268,96±8,7466	+ 47,46	+ 17,6
Age of reaching the weight of 40 kg	days	141,53±3,9018	155,25±3,8250	+ 13,72	-

Note: The differences between genotypes are very significant (Fisher Test, P < 0,001).

Table 6

The weight increase during the control fattening at the hybrids of German with Black Head x Țigaie, comparatively to the mother breed

Specification	UM	Genotype		± Differences between crossbreds and mother breed	
		German with Black Head x Țigaie	Țigaie	Absolute Values	%
		X ± sx	X ± sx		
Weight in the beginning of fattening	kg	17,12±0,8081	15,9±0,6163	-	-
Weight in the end of fattening	kg	37,40±0,6290	35,27±1,1327	-	-
The total rate of weight increase	kg	20,28±0,6608	19,37±0,9089	+ 4,02*	+ 24,7*
Average daily gain increase	g	263,75±16,0085	211,2±9,3743	+ 52,55	+ 24,9
Age of reaching the weight of 40 kg	days	178,6±9,2593	206,13±6,4887	- 27,53	-
Period of fattening	days	77	92	-	-

Note: The differences between genotypes are very significant (Fisher Test, P < 0,001).
* The difference of increasing rate made in 77 days of fattening.

From the data of table 6 it results that the hybrids of GCN x Țigaie made at the control fattening a total increasing rate of 20,28 kg higher with 4,02 kg comparatively to Țigaie breed which made (in 77 days of fattening) only 16,3 kg. The average daily gain incrasing rate at the hybrids was of 263.75 g/animal, higher with 24,9% comparatively to Țigaie. The hybrids made a live weight of 40 kg at the age of 179 days, earlier with 28 days comparatively to Ţigaie. The differences between the 2 lots are very significant in the statistical point of view.

Table 7

The weight increase during the period of control fattening (80 days) at the hybrids of German with Black Head x Ţurcană comparatively to the mother breed

Specification	UM	Genotype		± Differences between crossbreds and mother breed	
		German with Black Head x Ţurcana	Ţurcana	Absolute values	%
		X ± sx	X ± sx		
Weight in the beginning of fattening	kg	20,78±1,4934	17,49±0,2417	-	-
Weight in the end of fattening	kg	37,18±0,4564	31,25±0,2942	-	-
The total rate of weight increase	kg	16,41±0,0875	13,76±0,0610	+ 2,65	+ 19,3
Average daily gain increase	g	205,30±1,0888	172,07±0,7589	+ 33,23	+ 19,3
Age of reaching the weight of 40 kg	days	164,00±2,2928	200,93±1,9235	- 36,93	-

Note: The differences between genotypes are very significant (Fisher Test, P < 0,001).

In table 7 there are presented the results of the fattening of hybrids from GCN x Ţurcana genotype comparatively to Ţurcana breed. From the table it results that the hybrids made in 80 days of fattening an increase of 16,41 kg/animal higher with 2,65 kg comparatively to the Ţurcana breed. The average daily gain increasing rate at the hybrids was of 205,3 g/animal beside 172,02 g/animal at the Ţurcana breed. The hybrids made the live weight of 40 kg at the age of 164 days, earlier with 37 days comparatively to the Ţurcana breed. The obtained data are very significant in the statistical point of view.

Table 8

The specific consumption of fodders at the hybrids comparatively to the mother breeds.

Genotype	UNC per kg of increasing rate	± Differences beside the mother breed		kg PBD per kg of increasing rate	± Differences beside the mother breed	
		Absolute values	%		Absolute values	%
Suffolk x Palas Merino	4,79	- 0,58	- 10,8	0,718	- 0,086	- 11,0
Palas Merino	5,37			0,804		
Texel x Meat line	4,53	- 0,40	- 8,1	0,679	- 0,060	- 8,1
Meat line -Palas	4,93			0,739		
GCN x Ţigaie	5,61	- 1,12	- 16,64	0,841	- 0,167	- 16,6
Ţigaie	6,73			1,008		
GCN x Ţurcana	7,07	- 0,40	- 5,35	0,732	- 0,07	- 8,7
Ţurcana	7,47			0,802		

In table 8 it is presented the fodder consumption per lots which were subject to fattening.

It is noticed that the hybrids had a specific consumption (UNC) smaller with 5,35-16,64% comparatively to the local sheep breeds. Also, the consumption of PBD per kilogram of increasing rate at the hybrids was smaller with 8,1-16,6% comparatively to the contemporaries from the mother breeds.

3. CONCLUSIONS

From the presented data the following conclusions rise:

All the 4 types of hybrids obtained by crossbreeding of 3 meat breeds with the local sheep breeds made weight increasing rates higher with 17,43-24,7% at fattening and specific consumptions smaller with 5,35-16,64%. The differences between hybrids and mother breeds are significant in the statistical point of view.

In the given case, the hybridization with meat breeds proves to be an efficient method to increase the meat production at the local sheep breeds.

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RESEARCHES REGARDING THE IMPROVEMENT OF MEAT PRODUCTION AT THE LOCAL SHEEP BREEDS BY CROSSBREEDING WITH SPECIALIZED BREEDS
B. THE OUTPUT AT SLAUGHTERING AND THE QUALITY INDICATORS OF THE CARCASSES

CERCETĂRI PRIVIND AMELIORAREA PRODUCȚIEI DE CARNE LA RASELE AUTOHTONE DE OVINE PRIN ÎNCRUCIŞARE CU RASE SPECIALIZATE
B.RANDAMENTUL LA SACRIFICARE ŞI INDICII DE CALITATE AI CARCASELOR

GABRIEL VICOVAN, ADRIANA VICOVAN, AURELIAN IDA,
ANA ENCIU, AUREL GĂLĂȚAN

Cuvinte cheie: hibridare, carcase, randament la sacrificare, jigou.
Key words: hybridization, carcasses, output at slaughtering, mutton leg.

SUMMARY

The researches were made on 51 fattened hybrid lambs and from the mother breeds which were slaughtered at the live weight of 35-41 kg.

It was determined the output at slaughtering, the dimensions and certain indicators of the carcass, the tissue structure of the carcasses and their classification after EUROP grid.

From the obtained data it raised the fact that by hybridizing the local breeds with meat breeds, the output at slaughtering increased significantly, the quantity of muscles from the carcass, the rate of bones decreased, and the carcasses were included by their conformation in the E, U and R classes after the European grid.

1. MATERIALS AND METHODS

After ending the control fattening, from all the studied variants of crossbreeding and the mother breeds (witness lots) there were slaughtered 3-10 lambs each at the live weight of 35-41 kg.

Per variants of crossbreeding, the live weight at the hybrids and at the mother breed was similar (the difference not exceeding 1 kg).

Before slaughtering the lambs were haircut and subject of a diet of 24 h. After slaughtering the lambs were flayed and the warm carcasses were weighted, the head, the internal organs, the gastric – intestinal mass, full and emptied by the content and it was determined the empty live weight (through the difference through the live weight and the weight of the content from the pre-stomachs, stomach and intestines).

There were made measurements on the carcass the tailoring ribbon, the compass and the slide rule being used (see figure 1).

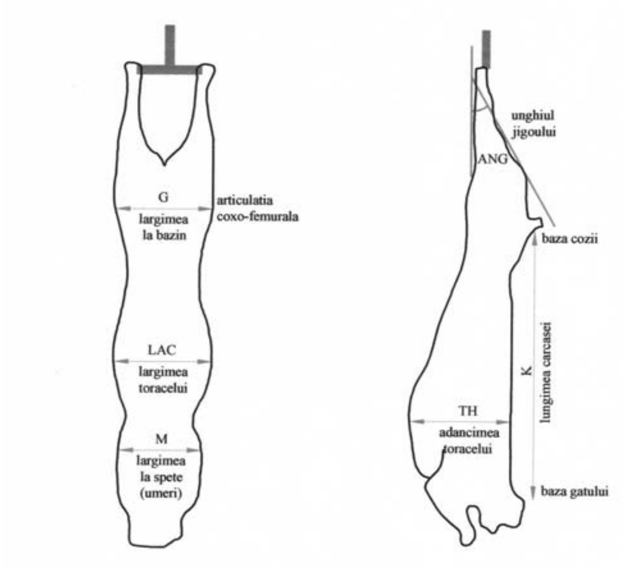

Figure 1 – Measurements on carcass

By reporting the pelvis breadth (between the thigh articulations) to the length of the carcass it was obtained the compactness indicator of the carcass $\left(I_C = \frac{G}{K} \right)$.

By reporting the pelvis breadth to the length of the mutton leg it was obtained the compactness indicator of the mutton leg $\left(I_J = \frac{G}{F} \right)$.

After weighing the cooled carcasses (for 24 h at 2-4^{0}C) they were photographed and evaluated according to EUROP grid [1]. It was established the output at slaughtering 1 (through reporting the weight of the cooled carcass to the live weight) and the output 2 (through reporting the weight of the cooled carcass to the empty live weight). All the determinations regarding the tissue composition of the carcasses were made on the right half of the carcass. The mutton leg was separated by sectioning the articulation between L6 vertebra and the sacrum bone. It was separated the back by sectioning the muscles and ligaments which assure its link to the body. After the separation of the mutton leg and the omoplate, the rest of the carcass which has as bone basis the cervical, dorsal, lumbar vertebras, the ribs and the stern resulted. Each of the above anatomy pieces was dissected, the muscles and the fat (of covering and inter-muscular) were separated and the bones were weighted. Because of the lack of space we shall present only the results at the level of the semi-carcass. Al weightings were made in grams on an electronic weighting machine with a precision of ± 5 g. There were determined: the surface of the section of the Longissimus dorsi (SLD) muscle at the level of the last rib and the surface of the section of the pulp (SP) (having as base the femur and the muscles: rectus femoris, vastus lateralis, vastus intermedius, sartorius, semimembranosus, adductor, pectineus, gracilis, semitendinosus, partial gluteus and biceps femoris) made at the half of the femur, perpendicularly on its axe.

The contour of the surfaces was copied on calc paper, and their size was determined on the computer. From the surface of the pulp section the surface of the femur section was excluded. All data were statistically processed and for the signification of the differences the Fisher test [4] was used.

2. RESULTS AND DISCUSSIONS

In our country, similar researches regarding the output at slaughtering and the quality indicators of the carcasses were made by C.Pascal [3], M.Mochnacs, quoted by [3] and others, and from the made researches abroad it can be noticed that of E.Laville and co-lab. [2]. In table 1 it is presented the output at slaughtering.

Table 1

The output at slaughtering at hybrids comparatively to the mother breed

Genotype	The output at slaughtering		Differences between hybrids and mother breed ± percent points	
	R1	R2	R1	R2
Suffolk x Palas Merino	48,36	52,37	+ 3,8	+ 1,5
Palas Merino	44,60	50,83		
Texel x Meat-line	51,34	56,11	+ 3,0	- 0,8
Meat-line-Palas	48,35	56,94		
GCN x Ţigaie	46,93	53,60	+ 2,2	+ 0,8
Ţigaie	44,7	52,8		
GCN x Ţurcană	44,4	51,8	+ 1,2	+ 3,3
Ţurcană	43,2	48,5		

It is noticed that the output 1 at hybrids was bigger with 1.2 to 3.8 percent points comparatively to the local sheep breeds. Regarding the output 2 the differences are also in the favor of the hybrids with an exception, that of: Meat-line-Palas has the output 2 bigger with 0,8 percent points, comparatively to the Texel x Meat-line genotype.

In table 2 there are presented certain dimensions of the carcasses and the carcass indicators.

From the table it results that all hybrids were superior to the mother breeds under the aspect of the three carcass indicators of the surface of m.Longissimus dorsi and of the surface of the pulp section. The differences are significant ($p < 0,01$).

From the hybrids it was remarked the Texel x Meat-line-Palas genotype which had both the most compact carcass and the mutton legs and the biggest sections' surfaces.

Between the mother breeds Meat-line-Palas was remarked, which, as value, excelled all the local breeds and even certain hybrids under the aspect of the indicators of carcass and mutton leg's compactness and of the surfaces of Longissimus dorsi and of the pulp.

The results presented so far shows the fact that by hybridizing with meat breeds the output at slaughtering, the body shape and that of the carcass and the muscle coverage of the carcass can be improved significantly at the local breeds.

Tabelul 2

The length, the perimeter of the mutton leg and the carcass indicators at the hybrid genotypes comparatively to the local breeds

Genotype	Length of the mutton leg (cm)	Perimeter of the mutton leg (cm)	I_C	I_J	S LD (cm^2)	SP (cm^2)
Suffolk x Palas Merino	24,33	47,67	0,32	0,88	16,5	146,0
Palas Merino	26,67	41,33	0,32	0,77	15,11	116,1
Texel x Meat-line	23,38	48,75	0,38	0,99	19,8	159,1
Meat-line-Palas	24,83	47,83	0,37	0,96	17,7	146,8
GCN x Ţigaie	25,0	48,58	0,32	0,85	14,32	123,5
Ţigaie	25,88	43,63	0,32	0,78	13,41	109,7
GCN x Ţurcană	24,25	43,67	0,31	0,82	13,43	113,0
Ţurcană	28,33	41,67	0,30	0,66	12,02	103,4

In table 3 there are presented the result of the dissection of the right semi-carcass at all hybrids, comparatively to the mother breeds.

Table 3

The tissue structure of the carcass

Genotype	Tissue structure (%)				Differences between hybrids and mother breed (± percent points)		
	Muscles	Fat	Bones	Proportion muscles-bones	Muscles	Fat	Bones
Suffolk x Palas Merino	60,96	17,55	21,39	2,85	+ 3,54	- 1,70	- 1,75
Palas Merino	57,42	19,25	23,14	2,48			
Texel x Meat-line	64,93	14,80	20,14	3,22	+ 3,63	- 2,69	- 0,82
Meat-line-Palas	61,30	17,49	20,96	2,92			
GCN x Ţigaie	53,69	24,23	21,91	2,45	+ 2,13	+ 0,01	- 215
Ţigaie	51,56	24,22	24,06	2,14			
GCN x Ţurcană	59,50	17,46	23,08	2,58	+ 2,5	+ 0,04	- 2,29
Ţurcană	57,00	17,42	25,37	2,25			

As it can be noticed at all hybrids, the carcasses had a significantly bigger quantity of muscles (with 2.13-3.63 percent points) comparatively to the mother breeds.

At all hybrids and local breeds it can be noticed an excessive development of the skeleton (maybe due to the high density of the bone tissue) comparatively to certain meat breeds and hybrids from EU [2]. The carcasses of the hybrids had a significantly smaller quantity of bones comparatively to the mother breeds (with 2-3 percent points, excepting the carcasses from the Texel x Meat-line and Meat-line-Palas genotypes where the difference was less than 1 percent point). Under the aspect of the fat quantity from the carcass there are remarked the carcasses with cu excess of fat from GCN x Ţigaie and Ţigaie genotypes (24% fat).

In table 4 it is presented the evaluation of 51 carcasses, after EUROP grid.

Table 4

Evaluation of the carcasses after EUROP grid

Genotype	Number of the classified carcasses	Class by conformation					Class by fattening degree				
		E	U	R	O	P	1	2	3	4	5
Suffolk x Palas Merino	3	-	2	1	-	-	-	2	1	-	-
Palas Merino	9	-	-	4	5	-	-	4	5	-	-
Texel x Meat-line	4	1	3	-	-	-	-	4	-	-	-
Meat-line-Palas	9	-	9	-	-	-	-	8	1	-	-
GCN x Ţigaie	6	-	-	6	-	-	-	1	5	-	-
Ţigaie	4	-	-	-	4	-	-	-	2	2	-
GCN x Ţurcană	6	-	-	5	-	1	-	-	3	3	-
Ţurcană	10	-	-	-	2	8	-	7	3	-	-

From the table it is noticed that the best carcasses under the aspect of conformation and the degree of fattening were at the hybrids of Texel x Meat-line (E and U classes, respectively class 2, by the degree of fattening) being followed by Meat-line-Palas with all carcasses from U class and 2, 3 u classes by the estate of fattening.

The hybrids of Suffolk x Palas Merino had the carcasses from U and R classes, comparatively to mother breed at which 55% from the carcasses were from O class (not required on EU market).

Regarding the hybrids of GCN x Ţigaie and GCN x Ţurcană, the carcasses entered the R class (middle) by conformation, and by the degree of fattening in 2- 3 classes (required on the market), however regarding the GCN x Ţurcană genotype, from the table it can be noticed that a carcass from the 6 evaluated (17%) entered P class (not required on market).

The carcasses of Ţigaie breed entered all in O class, and by the degree of fattening, 50% of them were from class 4 (too fat, not required on market).

The carcasses from the Țurcană breed enter the last class, P, in a proportion of 80%, and by the degree of fattening in classes 2-3.

The evaluation of the 51 carcasses has shown the fact that hybridizing the local breeds with meat breeds improves significantly the conformation of the carcasses, they being enclosed in E, U and R classes, in high percent (95%).

3. CONCLUSIONS

By hybridizing the local breeds with breeds specialized for the meat production the output at slaughtering increases with 1.2-3.8 percent points, the conformation of the carcasses, the carcass indicators, especially the indicator of mutton leg's compactness are also improved having significantly higher values at the carcasses of the hybrids.

Regarding the tissue structure of the carcasses it is remarked the rate of muscles at the hybrids, higher with 2.13-3.63 percent points and a lighter skeleton with 0.82-2.29 percent points, comparatively to the local breeds.

The carcasses of the hybrids were enclosed by conformation, in the E, U and R classes, required on the European Union market. Regarding the local sheep breeds, the made researches have shown that only at Palas Merino 44% from carcasses were from R class, at Țigaie all carcasses were from O class, and at Țurcană 20% from carcasses were included in O class, the rest being from P class.

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THE EFFECT OF OESTRUS SYNCHRONIZATION ON THE GROWTH CHARACTERISTICS OF LAMBS UNDER EXTENSIVE PRODUCTION SYSTEM IN TWO DIFFERENT PERIODS

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Key words: Chios & Kivircik lamb, synchronization, lamb productivity, live weight, survival rate

SUMMARY

The aim of this study was to determine the effect of oestrus synchronization on the growth characteristics of the lambs under extensive production system in two different periods. In this study, the estrus cycle of the ewes was synchronized in two different periods (before and during the mating seasons). Each year, totally 124 heads Kivircik ewes from two farms that are members of Adnan Menderes University-Group Sheep Breeding Program (ADU-GKYP), and 8 Chios rams from ADU-GKYP upper flock were mated, and together with the produced 325 Chios & Kivircik lambs, provided the animal material of the study The oestrus cycles of these ewes were synchronized with intra-vaginal progestagen sponges impregnated with 30 mg cronolone. After 14 days, sponges were removed and the females received an intramuscular injection 500 IU (PMSG), and five or six ewes were mated with Chios rams. This research lasted for three years and detailed flock recordings were kept. The average birth weight of the lambs, the weight of lambs 100 days old and the marketing weight (Kivircik x Chios F_1), were 3.18kg 19.71kg and 29.10 kg respectively. Lambing season**,** birth type, and sex of lambs were found significantly effective on birth weight, which is an important factor in lamb production (P< 0.01). In this research, daily live weight rises of lambs in 100 days and in marketing period were 166.84g and 167.48g. For the mentioned characteristics, year**,** sex of lambs, and the method of growth were significantly important (P<0.01). Survival rate of lambs until 100 days age and until the time of marketing were 66.81% and 63.57% respectively. The effect of years were significant (p<0.01).

INTRODUCTION

The mating season in sheep in Western Anatolia is between August and December. For this reason, if mating could be made applicable earlier than autumn, lambing would be economically very important in the area. Early lamb is an important source of income for the sheep breeders. Therefore, a lambing season beginning in the early autumn will be important (Demiroren, 2001). According to the research done in the City of Aydin, the main source of the sheep breeders' income was determined to be the income obtained from lambs (Karaca, et al., 1998). To increase the fertilization and to arrange the synchronization of estrus, hormonal effects are used in sheep breeding. Progestagen and prostaglandin analogues are widely used for estrus synchronization in sheep PMSG (Pregnant Mare Serum Gonadotrophin) is injected into muscle at the end of the synchronization treatment (Kaymakci, 1979; Askin, 1982; Sonmez and Kaymakci, 1987; Alacam, 1993; Tempest and Minter, 1987; Kaymakci and Sonmez 1996). Among the known advantages of estrus synchronization, especially in the marketing season, it is quite significant in sheep breeding to produce a single pattern of lamb in age and in live-weight, and to use the work power in a more productive way during the following period.

The mating season of the sheep is between August and December in Western Anatolia. For this reason, early autumn lambing is has a great economic importance. Early lamb meat and sheep milk are important income sources. Therefore, early production is significant starting the lambing season in the autumn (Demiroren, 2001). It has been apparently observed in the studies carried out on Aydin region sheep population that lamb income is the main income in sheep breeding (Karaca et.al., 1998). In the region two main factors are significant for an economical sheep breeding. One of these is the condition of the pastures before birth and the marketing seasons, and the other is the number of weaned lambs during the annual aggregate animal sale seasons. During the marketing season, a high number of the lambs which have been excluded from breeding sheep and which have reached marketing weight will increase the income that the sheep breeders will get through sheep breeding, and so will be able to provide sheep breeding business to be more challenging. (Yilmaz and Altin, 2004)

Hormonal effects have been used in sheep breeding both to increase the fertilization and to synchronize estrus. In the regulation or synchronization of estrus, progesterone or its derivatives are widely used. The usage of pregnant mare serum, Gonadotropini PMSG, is usually followed by the Progesteron application. (Kaymakci, 1979; Askin, 1982;Sonmez and Kaymakci, 1987; Alacam, 1993; Tempest and Minter, 1987; Kaymakci and Sonmez, 1996). Among the known advantages of estrus synchronization, especially in the marketing season, it can be said that it is quite significant in sheep breeding to produce a single pattern of lamb in age and in live-weight, and to use the work power in a more productive way during the following period. In some regions in a certain period of the year, breeders market their lambs at the same time (after weaning), and for this reason, at other times the number of lamb butchery is too low.

Lamb production could also be arranged with the synchronization of births and with the synchronization in non- breeding season in order to be marketed in the season when the price is the highest. In this way, a standard size lambs, approximately at the same age and at close live-weights, could be provided for the sheep breeders (Askin and Kaymakci, 1991).

Using hexogen hormone and cumulative lamb birth, lambs can be provided to reach the necessary weights by making use of the period just before the beginning of the dry summer when the pasture resources are sufficient. If lambing time is correctly set, the sheep will benefit more effectively from meadows and pastures (Williams et al., 1992). For a profitable sheep breeding, the number of lambs should be high not only at birth, but also in the marketing period. Therefore, according to the results of the growth, fertilization criteria become effective economically.

Mating season of the sheep is about 3 to 4 months (from June to September), and the birth period of the sheep gets around about a period of 3-5 months in the region of Aydin. Because of this long period, there are significant differences among the lambs, which are the biggest income of the breeders, in their live-weights in the marketing period in the region of Aydin. In addition, this long period will prevent the sheep breeders from using their work power more effectively, and from planning lamb growth and milking.

In this study, it was aimed to determine the effect of Oestrus Synchronization on some growth characteristics of lambs under extensive production systems and the contributions to animal breeding applications. The satisfaction of the breeders by the results of this study will indicate that this study is a successful work.

1. MATERIALS AND METHODS

1.1 Material

This study was conducted in the village of Kasapli in the Kocarli district of Aydin-Turkey (37° 45’02.59’’ N and 27° 34’ 35.24’ E) at an altitude of 28 meters above sea level. In this study, each year, totally 124 heads Kivircik ewes from two farms that are members of Adnan Menderes University-Group Sheep Breeding Program (ADU-GKYP), and 8 Chios rams from ADU-GKYP upper flock were mated and together with the produced 325 Chios & Kivircik lambs provided the animal material of the study.

1.2 Method

Records of animal material have been kept by ADU-GKYP since 1994. The determination of the ages was made through the records of the farms. The animal material was divided into two groups randomly in both flocks. First group and second group ewes were synchronized in the first week of the month of May and in the middle of the month of June respectively. The estrus cycles of the ewes were synchronized with intra-vaginal progestagen sponges impregnated with 30 mg cronolone. Sponges were removed after 12 days in the first group and after 14 days in the second, and the females received an intramuscular injection 500 İU (PMSG) and five or six ewes were mated with each ram. Rams were joined back into flocks for non-pregnant sheep 20 days later than the second group mating. Parameters of the lambs which were born from non-pregnant sheep were not taken into account in this study. Birth records, birth weights, live-weights in the 100th day, the marketing weights and fate of the lambs were recorded every year. The annual maintenance-feeding and the applied flock management were also recorded.

First group and second group ewes started lambing in the first week of October and in the first week of December respectively. Ewes were separated from their lambs three days after birth. In this short period, when the ewes were not sent to the pasture, silage and a little barley were given to the flocks. Only the ewes were grazed after the fourth day. Ten days after the births, ewes and lambs were sent to the pasture area together. The ewes and the lambs were pastured in the field area starting at the end of February until mid April, and later were pastured on hilly areas. The southern part of the village consists of hills and mountains, while northern sides there are composed of corn and cotton fields. These fields used by breeders as a pasture can only be used after harvesting season (October to December), and before planting season (February to April). Main pasture area is a hilly area which has olive trees. This area is used for pasture throughout the year, except for the harvesting season for olive from October to February once in two years (Yilmaz et al., 2009). In the first and the third years of our study, sheep were forbidden into hilly areas because of the olive harvesting; thus, flocks which were not pastured enough were given barley and corn silage.

Parameters of Kivircik x Chios (F 1) lambs related to their births, live-weights for the 100^{th} days and weaning dates, daily live-weight rises, and their survival rates were examined. The weaning period is also the marketing period in the region. The statistical analysis of data was made by means of the SAS statistical program (SAS Institute İnc., 1999)

2. RESULTS AND DISCUSSIONS

2.1. Live-weights

The values of the lambs' birth weights, the 100th day and marketing weaning period live-weights, and the daily live-weight rises were given in Table 1. As seen in Table 1, the birth type and sex were found to have had a quite significant effect on the birth weight, which is a very important characteristics for lamb production ($P<0.01$). Year, farm, and mother age are not significant statistically. As for groups, it was observed that the second group births had greater birth weights than the first group births. The reason of this was the better pasture conditions during the last period of the pregnancy in the second group.

As the lamb number increased at birth, the birth weight decreased as expected. The relation between the ewe's live weight and the lamb's birth weight is significant ($p<0.01$), and they are directly proportional. For this reason it is important for the ewes to be well fed in the last period of their pregnancy.

The effect of the years on the 100th day and marketing period live-weights and on the daily live-weight rises until these periods was also found significant($p<0.01$). The lambs were seen to have the greatest values in the second year with regards to the live-weights for the 100th day and marketing (weaning) periods. The effect of the longer usage of the pastures in the second year was also observed here.

In this study, the management differences the farmers displayed with regards to the 100th day live-weights and live weight rises were found significant statistically ($p<0.01$). İt was observed that the second farm had higher values than the first farm. The effect of the periods on the 100th day and marketing (weaning) period live-weights was found insignificant. The superiority of the lambs born in the beginning of December was remarkable although this was not important for the marketing period. The effect of the mother age on the development of the lamb was more distinctive during the marketing period. The lowest performances among the mother age groups were observed on the lambs born by mothers of 7 years old or older.

The effect of the sex on the so-called characteristics was found quite significant ($p<0.01$). Males were observed better than females. In addition, in the lams which sucked their mothers alone, the development features were obviously higher ($p<0.01$). The marketing weight of a lamb which grew up as the only lamb was 31.52 kg, being a very good value. Birth weight and marketing age influenced the marketing weight positively and significantly. In other words, to provide heavier lambs at birth is important on account of marketing or economically.

Lambs were marketed after weaning when they were 150 days old in average. The marketing ages related for years were 161, 154, and 136 days respectively. Both farms marketed lambs approximately at the same age. The average marketing ages for the first and second group are 173 and 128 respectively.

Table 1

The average lowest squares and standard deviations related to the 100th day and marketing (weaning) periods live-weights and the daily live-weight rises in lambs

Classification	N	Birth wt (kg)	N	100thday live-wt. (kg)	100th Day Daily Live wt rise (g)	N	marketing (weaning) period live-wt (kg)	Marketing period Daily live-wt rise (g)
Years		NS		**	**		**	**
1st year	101	3.21±0.06	73	17.59±0.47 ^{a}	142.14±4.68 ^{a}	68	27.20±0.72 ^{a}	154.76±4.96 ^{a}
2nd year	117	3.18±0.07	95	21.64±0.42 ^{b}	182.13±4.17 ^{b}	92	31.29±0.50 ^{b}	183.04±3.46 ^{b}
3rd year	107	3.16±0.07	86	19.91±0.45 ^{c}	164.81±4.45 ^{c}	85	28.81±1.40 ^{ab}	164.64±9.62 ^{ab}
Farm		OD		*	*		OD	OD
1	244	3.18±0.04	205	20.33±0.25 ^{a}	169.03±2.52 ^{a}	192	29.53±0.38	170.04±2.61
2	81	3.18±0.08	53	19.08±0.49 ^{b}	156.60±4.93 ^{b}	53	28.67±0.68	164.91±4.70
Period		**		NS	NS	NS	NS	NS
1	191	2.90±0.0^{a}	149	19.67±0.33	162.44±3.34	144	27.05±1.45	155.90±9.72
2	134	3.46±0.0^{b}	105	19.75±0.40	163.19±4.00	101	31.15±1.985	179.54±13.58
Age of ewe		NS	NS	NS	NS		**	*
2	44	3.05±0.10	37	19.27±0.65	158.43±6.52	36	28.10±0.80 ^{ab}	162.27±5.48 ^{ab}
3	51	3.21±0.10	41	20.01±0.67	165.86±6.70	38	28.70±0.86 ^{ab}	164.65±5.96 ^{ab}
4	66	3.17±0.08	59	20.83±0.50	174.09±6.44	57	30.63±0.65 ^{a}	177.92±4.46 ^{a}
5	60	3.31±0.08	41	20.01±0.56	165.72±5.59	41	30.49±0.75 ^{ab}	174.72±5.19 ^{ab}
6	53	3.31±0.08	38	19.41±0.59	159.78±5.92	37	28.93±086 ^{ab}	166.38±5.87 ^{ab}
≥7	51	3.04±0.08	38	18.74±0.55	153.73±5.57	36	27.73±0.76 ^{b}	158.92±5.22 ^{b}
Birth type		**		-	-		-	
	103	3.99±0.0^{a}		-	-		-	
Single								
Twin	185	3.16±0.0^{b}		-	-		-	
Triplet	37	2.39±0.1^{c}		-	-		-	
Sex		**		**	**		**	**
Female	164	3.09±0.0^{a}	127	18.94±0.35 ^{a}	155.09±3.51 ^{a}	123	27.82±0.50 **a**	159.03±3.43 **a**
Male	161	3.27±0.0^{b}	127	20.48±0.34 ^{b}	164.07±3.49 ^{b}	122	30.38±0.52 ^{b}	175.92±3.56 ^{b}
Growth Type		-		**	**		**	**
Single		-	113	21.81±0.38 ^{a}	183.84±3.83 ^{a}	109	31.52±0.53 **a**	183.20±3.64 **a**
Multiple		-	141	17.61±0.35^{b}	141.79±3.48 ^{b}	136	26.67±0.53 ^{b}	151.76±3.63 ^{b}
Linear regression		-		-			-	
ewe wt. (kg)		0.025±0.007 **		-	-		-	-
Birth wt. (kg)		-		1.643±0.354 **	6.427±3.540		2.121±0.45 **	7.243±3.098*
Marketing age (day)		-		-	-		0.187±0.07*	0.022±0. 502
Overall mean	325	3.18	254	19.71	163.07	245	29.10	167.48

***** : P<0.05

******: P<0.01

NS: (Not Significant)

a, b, c :The differences among the averages indicated with different letters in a factor are significant (P<0.05).

2.2. Survival Rate in Lambs

In the study, the evaluation related with the survival rates of lambs after birth were given in Table 2. The effect of the year on the lambs' living power until their 100th day and marketing period was found significant (P<0.05 and P<0.01).

The survival rate was seen to be higher in the second year (2005-2006) of the study that lasted for 3 years than in the other years (2004-2005 and 2006-2007). The lowest value was seen in the first year of the study. The importance of the olive tree areas which were used as pastures during the second year was observed here too. It was thought that the last year's productivity was lower than the second year's but higher than the first year's for the reason that the third year of the study was the fertility year for olives, so these areas were prohibited as pastures resulting in poor feeding (pasturing). In addition to this, 2006 and 2007 years were too hot and dry.

Table 2

The average lowest squares and standard deviations related to the survival rates of the lambs until the 100th days and marketing periods

Classification	N	100th day survival rate	marketing periods survival rate
Year		*	**
1st year	99	60.78±3.69 a	49.49±4.00 a
2nd year	108	74.95±4.10 b	75.88±4.44 b
3rd year	103	64.70±4.23 ab	65.35±4.58 b
Farm		**	**
1	227	75.87±2.73 a	73.12±2.96 a
2	83	57.75±4.24 b	54.02±4.58 b
Period		*	NS
1	179	71.58±3.54 a	67.48±3.83
2	131	62.04±3.38 b	59.65±3.66
Age of ewe		**	**
2	41	84.08±6.07 a	86.75±6.57 a
3	49	55.72±5.78 b	50.55±6.25 c
4	63	75.35±4.95 a	73.60±5.36 ab
5	56	53.27±4.95 b	49.55±5.35 c
6	52	66.20±4.70 ab	61.15±5.09 bc
≥7	49	66.23±5.06 ab	59.83±5.47 bc
Sex		NS	NS
female	162	63.81±3.30	61.86±3.57
male	148	69.81±3.29	65.28±3.56
Growth type		**	**
single	118	83.10±3.64 a	79.83±3.94 a
twin	162	80.54±2.91 a	74.60±3.15 a
triplet	30	36.79±6.98 b	36.29±7.56 b
Linear regression			
birth wt (kg)		8.106±3.051**	7.459±3.301*
Overall mean	310	66.81	63.57

*   : P<0.05
**: P<0.01
NS: (Not Significant)
a, b, c :The differences among the averages indicated with different letters in a factor are significant(P<0.05).

The effect of the farm on the survival rate of the lambs until the 100th day and marketing period was found quite significant statistically (P<0.01). The better maintenance and management applied in the first farm resulted in a higher (approximately 20%) survival rate here. While the effect of the period on the 100th day survival rate was significant, its effect on the marketing period was found insignificant. The survival rate provided until the 100th day in the first and second groups were 71.58% and 62.04 respectively. The sheep were pastured in the cotton fields in September and afterwards, after the cotton had been harvested. It was thought that the first group sheep could have made use of the stubble before the birth and for a short time after the birth, and this could have had a positive influence on the feeding of the lambs which were in the sucking period, and thus they could have gone into the winter season more powerful. The effect of the mother age was found significant for both factors ($P<0.01$). Here, the survival rate was observed the highest in lambs which have mothers at especially 2 years old.

The 100th day survival rates of the lambs which were grown up as singles, twins, and triplets were found 83.10%, 80.54%, and 36.79% respectively, and the marketing period survival rates as 79.83%, 74.60%, and 36.29% respectively. Here, the 100th day and marketing period rates for the singles and twins are higher than the rates for triplets and close to each other's. The breeders, particularly, don't want triplets because of the increasing labor under existing conditions. For this reason, the most convenient birth can be said to be the twin births. Birth weight influenced the survival rate significantly ($P<0.05$ and $P<0.01$). Naturally, the survival chance of the lambs which are more lively and heavier at birth will be higher.

CONCLUSIONS

In this study, the average birth weight in the Kivircik x Chios F_1 lambs was found 3.18 kg. In some studies done in the region, the birth weight was found 3.56 kg for Kivircik lambs (Cemal et al., 2005), for Karya type and Menemen x Cine Ttype (F_1) lambs 3.45 kg and 3.43 kg respectively, and for Cine Capari lambs 2.75 kg (Karaca et al., 1999), again for Kivircik lambs 2.81 kg, for Chios x Kivircik F_1 crossbred lambs 2.94 kg, for Kivircik x Karya crossbreds 2.85 kg (Altin et al., 2003). In other studies done in different regions and on different genotypes, the birth weights were found 4.72 kg and 4.75 kg for Chios x Akkaraman F_1 and Kivircik x Akkaraman F_1 lambs respectively (Akcapinar et al., 2000), 4.45 kg and 4.25 kg for Chios x (Kivircik x Morkaraman) F_1 and Kivircik x (Chios x Morkaraman) F_1 crossbred lambs respectively (Ozbey et al., 2000), 3.69 kg for half etansif conditioned Kivircik lambs (Altinel et al., 1998), and 4.2 kg for village conditioned Akkaramans (Dag et al., 2000). As seen, the achieved results can be said at better levels in most public enterprises than the findings obtained in this study.

Generally, the average 100th day live-weight of the lambs in this study is 19.71 kg. In similar studies, the 90th and the 105th day live weights were found as 22.88 kg ad 25.67 kg for Chios x Kivircik F_1 lambs 21.84 and 24.26 kg for Kivircik x Akkaraman F_1 lambs respectively (Akcapinar et al., 2000). This weight was found as 25.48 and 25.99 kg for 105 days old Kivircik x (Chios x Morkaraman) F_1 and Chios x (Kivircik x Morkaraman) F_1 lambs respectively (Ozbey et al., 2000).

In our study, the averages of the100th day and the marketing period live-weight rise were found as 163g and 167g respectively. In a study done in breeding flocks in the same region, the marketing period daily live weight rise was determined as 158g for Kivircik lambs (Yarali and Karaca, 2004). At the 89-103 days and 103-117 days ages, the average daily live weight rises for Kivircik and Chios x Kivircik crossbred lambs were found as 197.4, 163.0 and 182.6, 175.9 g respectively (Altin et al., 2003).

In the City of Aydin, the weaning time and the marketing period is the same because the lambs are weaned to be marketed. At the end of this study lasted three years, the average marketing weight was found as 29.10 kg. In the studies carried out in ADU-GKYP, it was informed that the live weight of Kivircik lambs weaned at around 125 days old was 26.78 kg (Cemal et.al, 2007), and the live weights at 3 and 5 months old for Karya type lambs were 20.85 and 25.56 kg, for Menemen x Karya (F_1) lambs 21.71 and 23.83 kg and for Cine Capari lambs 21.32 and 25.20 respectively (Karaca et.al., 1999). In a study done in flock breeding conditions, the average live weight of Kivircik lambs at the marketing period is 21.90 kg (Yarali and Karaca, 2004).

In this study, the survival rate until the 100th day and the marketing period was 66.81% and 63.57% respectively. In a study done on Kivircik sheep in the same village, the 90th day survival rate was found 87.8%, (Koc, 2003). In another study done on breeding flocks, the survival rate of Kivircik lambs until the marketing period was 68% (Yarali and Karaca, 2004). The survival rates in different regions having different feeding and maintenance conditions until different times of weaning (90-120 days) were reported to be 85-98% for Kivircik lambs (Sonmez and Kizilay, 1972; Evrim et al., 1992; Celik, 1995; Altinel et al., 2000; Ceyhan et al., 2004); 89.51% for Chios x Kivircik (F_1) (Altinel et al., 1994); 50% for Chios lambs (Celik, 1995);100% and 70.6% in 90 days survival rate for Kivircik and Chios lambs respectively (Sonmez et al., 1975). In this study, the survival rates on the 100th day and in the marketing period were close to each other. For this reason, we can say that the real loss of the breeders is in the period between birth and the 100th day.

As a result, for a more profitable outcome in sheep breeding, which is influenced directly by the garden and field agriculture, it has been understood that more advantageous results can be achieved with respect to the lamb development and marketing than the normal production terms by synchronizing the oestrus and having earlier births. At the end of the study, it has been observed that the breeders were contended with the present situation and had a higher opinion of the lamb sales than in the previous years. The most important reason of this is the fact that a great majority of the lambs produced were left as sacrificial as a result of the births in the previous years dispersing in a longer period and that the cost of their feeding by hand for a long time. The easy and economic feeding of the lambs together with the improving pasture conditions in late January and early February has made the lamb sales more attractive for the breeders. To improve the maintenance and feeding conditions in farms will provide a more profitable production by influencing the development of the lambs and the survival rate positively until the marketing period. It is expected that the results of this study, carried out in the Kocarli district, Aydin City, will contribute to the rehabilitation programs done in the region and will provide a base for the future studies to be planned.

ACKNOWLEDGEMENTS

I would like to thank to The Scientific and Technical Research Council of Turkey (TUBİTAK), to the farm holders from where I provided the material, to Galip KARAPINAR and to Huseyin ISIK and to their families, and to the figures who have contributed to the establishment of ADU-GKYP from where the Chios rams used in the study were taken.

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SOME PROBLEMS OF WALACHIAN (ZACKEL) PHILOGENETIC SHEEP BREEDS GROUP AND THE PRAMENKA BREEDS

RASELE VALAHE (ZACKEL) SI RASELE PRAMENKA

C.DRAGANESCU, H.GROSU[1]

"Most breeds of livestock arose from community breeding in small region where a few herds located conveniently to each others exchanged breeding stock during the formation period of breed and relly established the breed by linebreeding to the best individuals within those herds."

J. Lush 1945 p.383

Key words: Taxonomy, breed and philogenetic breeds groups identification, description, denomination,

Cuvinte cheie: taxonomie, identificarea, descrierea, denumirea raselor si grupelor filogenetice

SUMMARY

The mixed wool sheep breeds from the SE Europe have been grouped as similar breeds (philetic group) under the name Zackel. The denomination Zackel, not use d in any country for any breed, was introduced by Nathusius (1880) as a German denomination for a breed denominated by Buffon and Darwin Walachian, and by Linnaeus O.a strepsiceros, as a fact that this breed have straight (in German zackel) horns, but this breed - Corkscrew horns Walachian, erroneus named also Racka (Rack=Serb), belong completly to other philetic group (Egipthian sheep). The real name of SE European mixed wool sheep, used or still used in most country of the region was Walachian-=Romanian. In the area of forme Yougoslavia this breed were denominated Promenka, and it is the tendensy to present them as independent similar-philetic group, even: 1. it is heterogenious and includ breed from other phyletic group (Ruda, Corkscrewhorns Walachian); 2. there are informations that it include Walacs breeds; 3. There are not informations that the Slavs breeng when they come to the region, sheep. This approach, possible produced by the fact that most breeds arose from community breeding in small regions, but also by the fact that the breeds can be historical documents, can produce many taxonomical confusions, with scientific and practical consequences in Animal Breeding, Conservation of AanGR and breed utilisation. The development of a real zootechnical tax onomy, connected with the zoological taxonomical ideas is necessary, and an intercountry cooperation for a corect application of it.

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A correct **breed identification, description, denomination and classification** , a correct taxonomical approach, is the sine qua non basis of a correct animal genetic improvement, conservation, utilization (fig 1). Without it are not possible communications, international and even national cooperation. As correctly suggested Pearl, taxonomy is the brick from which are build all the buildings of zootechnical knowledge (Draganescu 1998, 2003, 2009).

However in this field persist many errors. As Mason noticed (1951…1996) and we are stressed (1994…2009) frequently the some breed have different names, different breeds have the some name and some phylogenetic group are embarrassed. Now, our farm animal taxonomical science is at the paradigm of 19-th century, we have not a real taxonomical science (Draganescu 2006, 2009). S**ometimes research projects and essays have not a through scientific approach and increase confusions**

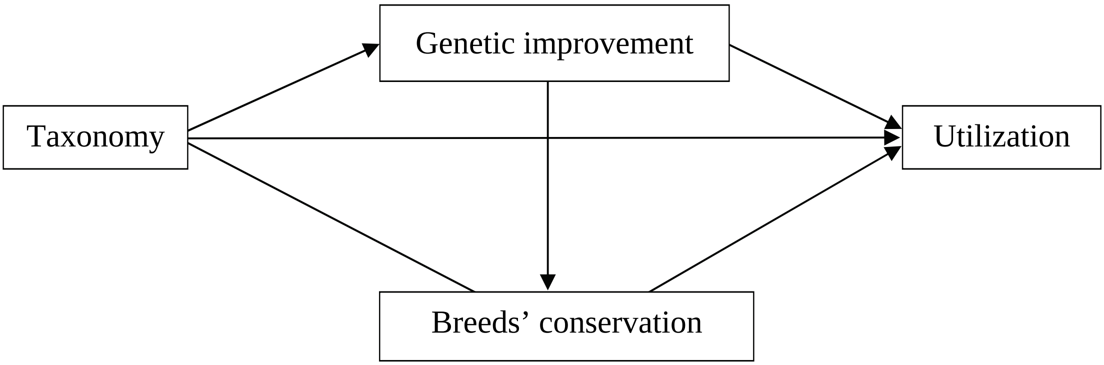

Fig. 1 - "Taxonomy is the the brick from which are build all buildings of zootechnical knowledge's" *(Draganescu 2003, idea Pearl R. 1922)*

The present paper is an attempt to analyze the present knowledge information's, to continue our previous investigations and make a modest contribution for a correct taxonomical clarification of the problems of the most important group of similar sheep breeds from South-East Europe, some how erroneous named from Nathusius (1880) to Simon (1993) Zackel breeds, by us (1994-2007) Walachian and perhaps of a subgroup of him-Promenka breeds, who tend to be presented as philetic independently. Sure we are conscience that with the present information's possibilities it is difficult to solve perfectly the problem of each breed **origin, of genealogical (phyletic) tree, moment of separation, and genetic distance between breeds, but such relativity can be accepted as a steep to the scientific truth.**

1. UNCLEARNESS', CONFUSIONS OR ERRORS OF SO COLD ZACKEL DENOMINATION

Most local sheep from the South East Europe use to belong to a mixed wool (some 25% kemps-hair**,** 75% transitional and fine fibbers)* or more uniform coarse wool, long thin tail breeds, usually named "Zackel"**.** The sheep from this group have also bare head and slight convex profile, horned (rams and some 15-20% of ewes), white (some 90%), but also grey or black (dominant to white), with face and legs white, brown or spotted (polymorphism with some fixation in some flocks and populations). There is a small-medium size breeds (37, 32-53, kg for ewes) breed with an angular (dolicomorphic) conformation) and milk, meat, wool production.

Result of community breeding in small regions, the breeds from the group Zackel are innumerable, with a large morphological variability, not clear identified, with group chance denomination and **seldom subjective changed "patriotic" denomination and, surce of an erroneous, scientific confusions**. Connected to te denomination Zackel, we note that:

- Any breed from this group is not named in his country Zackel; the problem is way?.
- Simon and Mason do not understood the some breeds under the name of Zakel.
- FAO, make just a national breed inventory, not a taxonomical classification and do not use the name Zackel.

The explication of this situation we found starting from a Mason (1986) explanation of the denomination. The name Zackel was introduced by Nathusius (1880) for two reasons: 1. He referred to the straight horn of Racka (in German. Zacke mean prong, strght horn). But "Racka" the, spectacular corkscrew horn breed from the Serbo-Panonian-W.Romanian area, belong to a completely different philetic group of sheep. It is descend from the old Egyptian sheep, and was named by Buffon (1780) and Darwin (1865) Valachian. 2. Linnaeus named this Egyptians type of breeds Ovis aries strepsiceros (straight horn) and. Nathusius (1880) translated the Linnaeus "strepsiceros" into german. Someone extended erroneous the Nathusius name to a phylogenetically different group of breeds, to all mixed wool breeds from SE Europe. We supposed (1998) that is done by Germans living in Romania, who use to call the "Valach" (Romanian) Zackel (people livind in mountains), and their sheep Valachian. As a conclusions the name Zackel can be use just for the Egyptian Phyletic group of sheep, represented in Europe just by Buffon and Darwin Valachia sheep, perhaps better named by Serbs "Corkscrew horns Valachian" (Valaska vitoroga) and erroneous named by Hungarian Racka (not noticing that mean Serbian), and perhaps in Kosovo-Metohian Baljuha.

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* The mixed wool of Romania Tsurcana is composed of two type of fibbers: (1) some **25% kemp (hair),** 8o% 25 cm long, ranging from 13 to 36 cm, and 64 microns, ranging from 41 to 97, and some 2o% 22,5 cm long (12-36) and 58 (37-81) micron finesse. (2) some **75% short fibbers** of some 8 cm (2-19 cm), with a finesse of 27 microns (17%, longer 2-6 cm), 3o microns (some 36%, 6-10 longer), and 47% of 32 (19-53) microns and 1o-19 cm long

2. THE CORRECT NAME FOR S-E EUROPE MIIXED WOOL SHEEP-VALACHIAN

The mixed wool sheep, transhumance, seldom sedentary breeds from SE Europe are perhaps originated from the old Scythian and Thrakian sheep, but possible also connected to the early West European mixed wool sheep (Spanish, Italian, Draganescu 1994, 1997).

The most used local name even now (it was changed in many cases during the last time) is Valachian (Valakhsaia, Valassky, Zuclechtena Valaska, Vlahicos, Walachenschanschaf etc) It is an explanation.

- The North Balkan breeds of the group generally named Valachian, were dispersed in a vast area, from Ural mountains to North Carpathians and Bosnian Mountains by Carpathian Transhumance shepherds (Sibiu, SW.Brasov centers), or by the "Valachian" (Romanian) former residents in this areas. Is possible that the North Balkan Valachian breeds are originated from Romanian Valachian breed (Tsurcana); the name Tsurcana, given by Romanian to this sheep is the oldest; etimologically having a Sanskrit origin, with the meaning sheep- goat.
- Besides the breed with such name (Vlahico group,Srna Vlaska, Kutovlaska) in South of Balkan Mountains area, the word Vlach use to by at least in Greece and Serbia synonyms to shepherd. Matley (1968) quoted also by Draganescu (2003) determine: "*The Vlach have managed to exist through the centuries almost exclusively by herding of livestock on mountain pastures.In fact, so strongly has herding become associated with the Vlachs that in parts of Greece the term vlakhos is used to denote a shephard, with no ethnic connotation, and since the Middle Ages the term Vlah has been used in Serbia and Bosnia as synonymous with mountain herder of an ethnic group"*

In Bulgaria Savov (1959) quoted by Ryder (1968, p.177) wrote "..The name..Tsigai.., Tsurcana for coarse-wooled sheep and Stogosh for the cross between them, wich are retained in Roania today, were use in Bulgaria as early as the eighteenth century". Mybe Mathley is correct: "*An understanding of the culture of Vlachs and its origins is important for the study of pastoral life in Balkan Peninsula"*.

We proposed for this group of breeds the name Valachian. Sure the problem must be analyzed by an "**Ethical zootehnical nomenclature comission**", as Draganescu proposed (2006,2009), similar to such zoological commission. It is however a complication.

The "Valachian" sheep have a mixed wool, with a high proportion (70-80 %) of fine and medium fine fiber of wool, and low proportion of kempt.(20-30%),. an adaptation for summering in mountain pasture and for wintering in open field. Seem to be an other group of breeds, very similarly morphological and by productivity to the first group (Albanian Shkodrane ?) but with more or less a contrarily proportion of fiber in their mixed wool. The problem of relationship between this two types of breeds is nor analyzed.

Table 1

Some different classification of "Zakel" breeds

I. Simon 1993 Group of similar breeds-7. Mountain breeds-6. Zackel

Nr. Local Breerdname	Internatonal Breedname	Country
1. Vlahico	Geek Zackel	Greece
2. Sarakatsanico	"	"
3. Sazakatsaniko	Mountain breeds	"
4. Boutsiko	"	"
5. Vlahico	"	"
6. Siteia	"	"
7. Karagouniko	Karagouniko	"
8. Kumi	Kumi	"
9. Myilini	Myelini	"
10. Lesvos	"	"
11. Florina	Pellagonia	"
12. Pellagonia	"	"
13. Serres	Serai	"
14. Sfakia	Sfakia	"
15. Glossa	Skopelos	"
16. Skopelos	"	"
17. Sumavska	Sumava	Czeech
18. Zuslachtena Valasska	Valachian	"
19. Pramenka	Yugoslavian Zackel	Yugoslavia
20. Sjenika	"	"
21. Svrljiska	"	"
22. Turcana	Romanian Zackel	Romania
23. Polka owsa gorska	Polish mountain	Polonia
24. Ruda Dubrovska	Dubrovnic	Croatsia
25. Licka ovca	Lika	"
26. Paska ovca	Pag island	"
27. Racka	Racka	Hungary

II. Stiojanovic 2003 Serbia and Montenegro Pramenka/Zackel

1. Pirotski soi	Pirot strain
2. Sjenicki soi	Sienica strain
3. Svrjisk soi	Svlijig strain
4. Bardoka	White Metohia strain
Baljusa	Baljusha/ variety of Bardoka
5. Vlasko/vitorogi soi	Vlashko/vitoroga strain
6. Krivovirski soi	Krivovir strain
7. Lipski soi	Lipa strain

III. Bulgaria 2006 present some 34 sheep breeds from which some 9 breeds with coarse wool, but just one Karakachan sheep, is indicated as typical Zackel

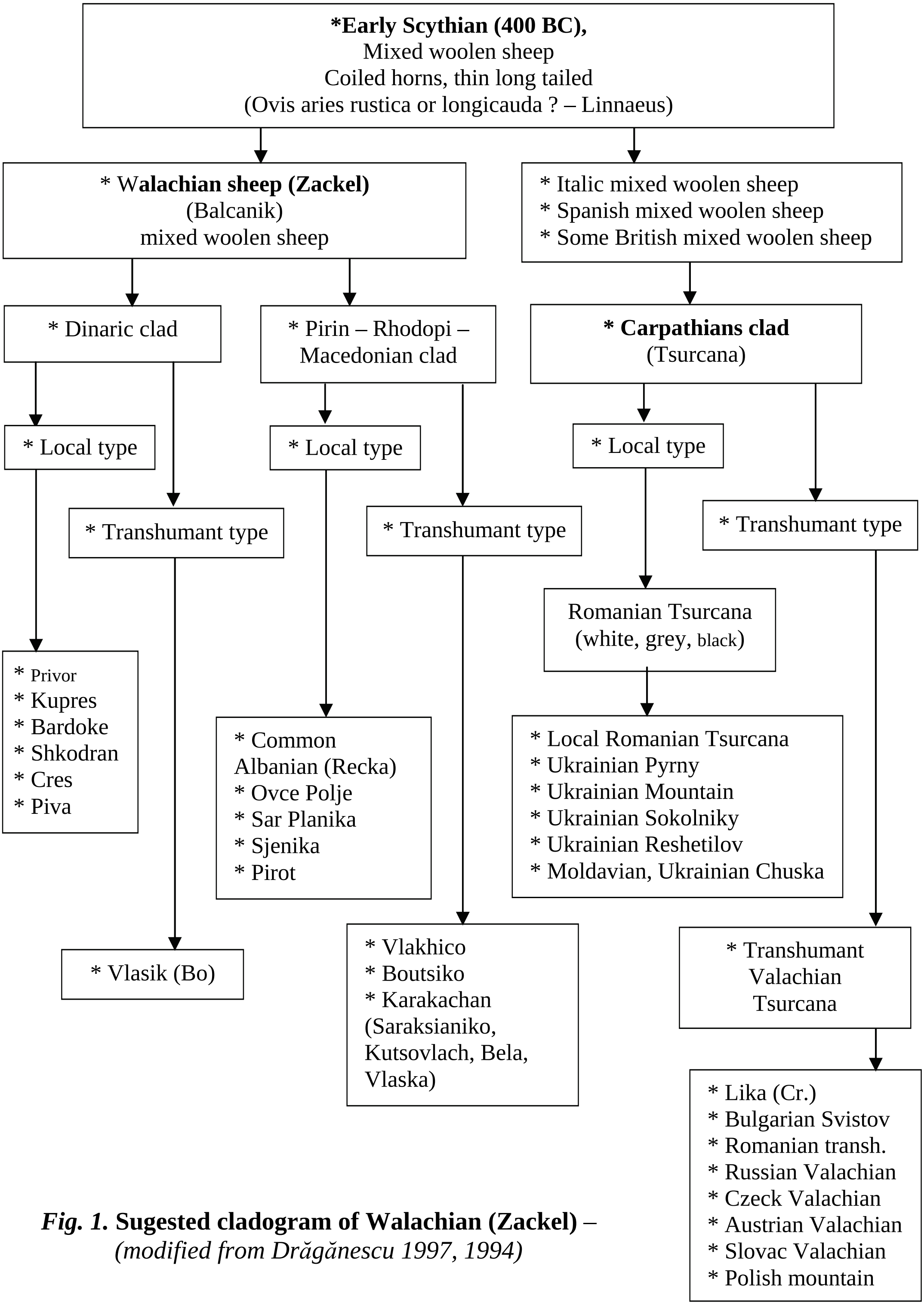

Fig. 1. **Sugested cladogram of Walachian (Zackel)** –
(modified from Drăgănescu 1997, 1994)

3. THE PRAMENKA GROUP-COMPONENT OF VALACHIAN (ZACKEL) GROUP

"An understanding of Vlachs culture and its origin is important for the study of pastoral life in the Balcan Peninsula" Matley 1968

3.1. THE PRAMENKA BREEDS. P**ramenka (*Paomenka=with open fleece (pramen=staple or lock -Mason*) is the Serbo-Croatian name of a group of mixed wool sheep breeds livind in the former Yugoslav space and generally accepted as synonym to "Zackel" (Mason, Simon, Belic, Stojanovici et al).** The name, number of breeds differ from author to author (table 1, Fig 1). Belic, in an Album of rasa Stoka" (Beograd 1951) present some 19 "Pramenka" "Variety", really not all from the same phyletic group, not all Pramenka(Zachel). Mason (1988) present some 18 Pramenka (synonym to Zackel) breeds, notating that some are really Ruda, and Stojanovici some 8 just in Serbia.

***Genetic diversity of native" Paomenk"a, generally of all Valachian breeds, was perhaps very large because the ecological niches are very divers and the community breeding promote an island structure of them with many emergent breeds*. <u>Such large number of local genetic populations (local breeds) of "Pramenka" attest the Lush (1945) even of Wright (1930) idea of breed creation mechanism</u>** presented before.

The problem is if such diversity of breeds is a real a homogenous group, with a common origine or not, if "Pramenka" is or not just a local name for some Valachian (Zackel) breedss. We consider<u> that Pramenka is a local name for many breeds different breeds, most from Valachian group, that it is not an an independent phyletic unity, even not homogenous group. We must accept that genetic distances between genetic populations are generally invers proportionally with thw geographical distances between them (</u>Wright, Malecot , Kimura) and is less probably that the genetic distances between all Balkan Valachian breeda is large. We must notice that i<u>n Pramenka group were introduced breeds who are clear different history. Sure some Macedonians breeds are the breeds of Vlach. Some Bosnian and perhaps Serbian and Croatian are also Valachian (Matley 1968), and Sarakatsan is considred as a type of "Greek" Vlachico (Zervas, quoted by Laga 1986). area.</u>)

<u>We note that in Romania the problem was solved in a different way, we are not sure that better. </u>As a result of a traditional community breeding, the Romanian Turcana (Valachian) breed has an island structure, with **easy visible different <u>emergent breeds</u>, each with different morphological.**

Conservation measures must be taken, and that impose al lest some clarification of possible relationships of Tsurcana sheep and "Pramenka" sheep, a correct identification (genetic distances) and denomination..

Production traits (foto 1.4). Some of them are: Transhumant Tsurcana from Sibiu-Alba districts and Novaci-Vaideeni, Valcea (Meridional Carpathians), Caransebes Tsurcana, Hatseg Tsurcana, Gray Tsurcana, located on Central Moldavia and middle Oriental Carpathians, Black Tsurcana, located in North Moldavia, Bistritsa-Maramuresh Tsurcana. Most of them are the origin point of many foreign breeds. Peasants still conserve most of emergent breeds on short and medium term. On long term some

Caransebes Tsurcana

Hatseg Tsurcana

3.2. THE BREED NAME AND THE STANDARD BREED DESCRIPTION. Generally the breed name is connected in the last century to the geographic region, as in others country (Bulgaria, Greece et.al) not to the phyletic group as in zoological taxonomy. That make a complication to the classification of breeds and allow errors (**Some of Pramenka breeds -Sar Planina, Sjenika, Svrljik- are presented by Mason as breeds from a Ruda Group, a diiferent phyletyc group; perhaps he considered that they are no Pramenka**). We not that in our "science" don't exist a SHORT-HANDED STANDARDIZED DESCRIPTION of each taxon, operational taxonomic unit (OTU=breed, line). The wool quality, an important sheep taxonomic character is not presented or unclear presented in all area of Valachian, of Pramenka group, especialii in some countries.

In the development of Farm animal Taxonomy, as a real science the problem of a phyletic denomination must be solved, as EAAP AnG Group of 1980-1994 year attempted (SIMON). **At the present level of farm taxonomical "science" (the level of 19-th century !) is difficult to put order in the classification , to establish a correct classification (a standard hierarchy of OTU) on the basis of phenotypic phylo-genetic, genotypic, relationships. We suggested a cladogram, a phyletic tree of Valachian breeds as a starting point for a real classification (Fig.1).** We accept that the best biological classification of breeds is one that reflects the pylogenetic relationships among them, the cladograms (Pankhreust 1991). We tried to do it by using historical, some comparative phenetic and breeding data from many sources, including EAAP (Simon 1993) and FAO (Scherf 2000). In view of the limitation and not well standardization of visible and productive traits data, of many unclear aspects of used taxonomic units, of repeated change of name of breeds, a correct classification of it is very difficult in the moment, but is necessary as a basis, as a starting point, for further researches on the breeds relationship (time of separation, genetic distances), within the four phyletic groups. That is the reason for witch we did it. (Draganescu 2002),, but we accept the necessity of further correction commensurate to the taxonomy development. The molecular genetic technique can hep this clarification, but we agree with Ruane (1999) that it can't replace the classical taxonomical methods and just can seconded them.

Until the development of a real Farm Animals Taxonomy and of a Farm Animals Convention on Nomenclature, is necessary to accept some regulation from the Zoological Taxonomy. The first is the priority of name; it is not allowed without a clear justification to change the first name given to a breed because the change can produce confusions. For that reason is necessary to make a correction of name introduced by chance, errors or others reasons. The present nomenclature procedures can be also a source of errors. In the past and even now the breeds name are changed. (Polish Valachian, named Polish mountain, Greek Vlahicos named Greek Zackel, Romanian Turcana named "Gymes Racka", Valaska vitoroga named Vitoroga Zackel etc). Perhaps the Farm Animal Taxonomy needs also an **ETHIC CODEX of nomenclature, as Zoological taxonomy has.**

3.3. A DIAGNOSTIC KEY FOR BREED IDENTIFICATION. For a correct identification denomination and classification of sheep breeds we think that is useful to have a diagnostic key. Accepting any suggestions for improvement, we propose for debate such a diagnostic key (Draganescu 2002)

3.4. WALACHIAN SHEEP BREEDS AND THE HUMAN HISTORY

"History and science go side by side in unraveling the mysteries of human and livestock migration."
Sandip Bannerjee

Generally the different nations from SE Europe have the tendency to overstate the different between them. The presence of related livestock breeds on this territory rise the problem of eliminate this exaggerations. The presence of Walachian and Tsigai breeds in South Rossia and Ukraine, in Slovakia, Check republic and Poland is connected with the former presence in this regions or Walachs. It is more or les clear that the Slavs and the Hungarians didn't come in this region with sheep and is probably that Greeks and Albanians were not sheep breeders. The difference between nations are in large part just apparent. The Bulgarian accept that they are Slavs, not Bulgarian but perhaps just thee language is a Slavonic one, and but genetically they are related to many present and former "nations".. The livestock taxonomy can contribute to the unraveling many mystery of human history. Paraphrasing Mayr "*an understanding of pastoral life of Vlachs and its origins can be important for the study of the of the history*"..

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Nota. Lucrarea este rezultatul cooperarii in cadrul proiectului ERFP “Studiul originei conservarii raselor de oi Promenka ca rase regionale transfrontaliere” (Belgrad 4-7 iunie 2009)**.**

ESTIMATION OF BREEDING VALUES FOR MILK PRODUCTION AND CLAW DISEASES AND THE GENETIC RELATIONSHIP BETWEEN THEM IN GERMAN HOLSTEIN COWS

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Key words: claw disorder, claw disorder status, milk yield, reliability, test-day records, threshold model

SUMMARY

Breeding values, heritabilities and genetic correlations for claw health and milk yield were estimated from data of around 22,000 cows. A total of around 68,008 observations were collected at the time of trimming. The results show that substantial genetic variation within the range of a heritability of 10 to 20 % exists. This is also illustrated by substantial differences between sire families. Correlations with milk yield were mostly marginal and thus point to the need of recording the disorders directly when working on genetic improvement for the entire population.

ABBREVIATION KEY: DD = Dermatitis digitalis, DID = Dermatitis interdigitalis, EBV = Estimating breeding value, KSG = Sole ulcer, LAM = Laminitis, VIT = the central agricultural computing centre in charge for record keeping and processing of all Holstein cows in Germany, WLD = White line disease, θ = link function, PR = probability of occurrence and μ = Overall mean.

INTRODUCTION

Disorders and diseases of the bovine hoof lead to economic losses due to involuntary culling, high costs of veterinary care, lower milk production, and discarded milk. The total losses of claw diseases are in terms of 3.7 % of operating profit per cow per year (Lange, 2004). Claw disorders can be diagnosed at the time of hoof trimming (e.g. König *et al.*, 2005; van der Waaij *et al.*, 2005), and data stemming from a detailed collection of these diagnoses can be subject to various kinds of analysis with respect to environmental and genetic factors.

The professional hoof trimmer René Pijl has been recording claw disorders at the time of hoof trimming in clients' herds electronically since 2000. The system used comprises of a personal digital assistant (PDA – pocket computer) equipped with custom-made software which is loaded from a data-base on a server at the office with all herd data necessary before the actual recording. This data contains information of all individual cows including their herd and stable identification. The server itself regularly connects to the central server of the milk recording agency to acquire the latest data stored (e.g. milk records, pedigree data, calving dates, etc.). On-farm, individual diagnoses are added and farm parameters such as housing system are updated when necessary.

The recorded data-base is an excellent basis for analyses of genetic and environmental effects as well as for relationships among different traits related to diseases of the bovine hoof. Laminitis is the most prominent disease found with a prevalence of around 34 %. Analyses so far have revealed strong environmental influences due to housing systems (type of cubicle and bedding), age and stage of lactation or milk yield at time of trimming. Heritabilities have been estimated for the five most frequent diseases and range from 6 to 12 % using linear models and from 8 to 33 % when applying threshold models (Swalve *et al.,* 2005; Pijl & Swalve, 2006; Swalve et al. 2008).

The question is whether an increase in milk yield in cattle is associated with a greater risk of certain claw diseases and has been discussed frequently (König et al., 2005, 2008). In current studies of hoof health, genetic influences more and more come into the focus. Consequently, a reduction of disease risk by conventional breeding methods is possible.

According to König et al. (2005), a high milk yield in the first two test days after calving is associated with an increased risk for claw and foot disorder in the same lactation, the genetic correlations were in the range of 0.057 to 0.336.

1. MATERIALS AND METHODS

The data used for the present study originates solely from the collection of René Pijl between 2000 and 2008, while he was working as a professional hoof trimmer in around 152 herds located in North-Western and North-Eastern Germany. The data comprised only Holstein cows, mostly in family farms with herd sizes of 50 to 120. The most five important disorders were used in this study. The total number of observations was 68,008 from about 22,000 cows.

The analysis presented here covers disorders and findings of the claws of the hind legs only. Disorders found at front legs are recorded but were found to be too rare to warrant further analysis. It should be noted that the claw disorder include sub-clinical as well as clinical cases. Therefore, we stick to the term “disorders” rather than using “diseases”. The disorders were coded either zero or one; i.e. the nature of the data was binary. Further data from the VIT central computing facility such as the individual milk yield records per lactation was merged with the existing data base.

To represent the relationships between claw disorders and milk yield the following different strategies were used:

[1] The correlation between breeding value (EBV) for claw disorders with official VIT-breeding value for milk: The estimation of breeding values for claw disorders was done with a Threshold-BLUP animal model (probit function) using the ASREML 2.a program. The following model was used:

$$PR\ (Y_{jklm} = 1) = \theta\ (\mu + BB_j + LN_k + DIMCL_l + AN_m + PU_m) \qquad (1)$$

Y_{ijklm} = treatment of claw disorder (1 = positive 0 = negative)
BB_j = fixed effect of herd-visit j (1,..., 625)
LN_k = fixed effect of lactation number k (k = 1, 2, …, ≥ 6)
$DIMCL_l$ = fixed effect of milk day l (l = 1, …, 8: with classes of 50 days)
AN_m = random animal effect for animal m (additive genetic variance)

PU_m = random permanent environmental effect of animal m

[2] EBVs for milk yield and claw disorders from our data was computed and the correlation between them was estimated: In this approach the random regression animal-model was applied on test-day milk records (ASREML 2.a program) to estimate the EBV for Milk with the following model:

$$y_{ghikln} = \mu + KL_g(LA_l) + ZKZ_h(LA_l) + BYS_i + \sum_{m=0}^{4} c_{lm}.f_{lm} + \sum_{m=0}^{4} b_{km}.a_{km} + \sum_{m=0}^{4} b_{km}.p_{km} + e_{ghikln} \quad (2)$$

$y_{ghijkln}$ = milk production on control day n in lactation l for animal k
$KL_g(LA_l)$ = fixed effect of the calf age g (five classes) in lactation l
$ZKZ_h(LA_l)$ = fixed effect of the between calf time h (six classes) in lactation l
BYS_i = fixed effect of the Herd-Year-Season i
f_{lm} = regression coefficient m of fixed lactation curve in lactation l
c_{lm} = m-th term of Ali & Schaeffer function of fixed lactation curve in lactation l with $c_{..0}=1$, $c_{..1}=dim/305$, $c_{..2}=(dim/305)^2$, $c_{..3}=ln(305/dim)$, $c_{..4}=(ln(305/dim))^2$
a_{km} u. p_{km} = m-th random regression coefficient of cow k for genetic effect and permanent environmental effect
b_{km} = m-th term of Ali & Schaeffer function of random lactation curve for animal k
e_{ghikln} = random residual error

[3] Estimation of the regression of claw disorders on milk yield: In the threshold model (GLIMMIX procedure in SAS 9.1), the following effects have been used. The hoof health status within the lactation here was considered as a variable per lactation (i. e. if a cow once or more than once in a lactation was sick, it was treated as ill, cows found healthy throughout the lactation were treated as healthy). The milk yield per lactation was used as a covariate. The model was:

$$PR\,(y_{jklm}=1) = \theta\,(\mu + BET_j + VIS(BET)_{jk} + LA_l + b1M + b2M^2 + PU_m) \quad (3a)$$
$$PR\,(y_{jklm}=1) = \theta\,(\mu + BET_j + VIS(BET)_{jk} + LA_l + b1M(LA_l) + b2M^2(LA_l) + PU_m) \quad (3b)$$

y_{jklm} = treatment of claw disorder for cow m
BET_j = fixed effect of herd j (1,…, 101)
$VIS(BET)_{jk}$ = fixed effect of visit date k nested within herd j (1, …,560)
LA_l = fixed effect of lactation number l (1, 2, 3, ≥ 4)
PU_m = permanent environmental effect of animal m
M = milk yield pro lactation
b1, b2 = linear and quadratic regression coefficient of claw disorder on milk yield

[4] Estimation of the genetic correlation between claw disorder status and milk yield (milk yield in the whole lactation) for heifer and for all cows: This was done applying bivariate analyses using a BLUP animal model (ASREML 2.a program) with claw

disorder treated as binary traits and milk yield as normally distributed variable. The following model was used for the bivariate analyses for all cows.

$PR\ (Y_{jklm} = 1) = \theta\ (\mu + LA_l + BET_j + VIS(BET)_{jk} + AN_m + PU_m)$

$MKG_{hijklm} = \mu + LA_l + BET_j + YS_i + ZKZ_k + KL_h + AN_m + PU_m + e_{hijklm}$

y_{jklm} = treatment of claw disorder

BET_j = fixed effect of herd j (1,…, 101)

$VIS(BET)_{jk}$ = fixed effect of visit date k nested within herd j (1, …,560)

LA_l = fixed effect lactation number l (1, 2, 3, $\geq$ 4)

MKG_{hijklm} = treatment milk yield pro lactation

YS_i = fixed effect of year-season i

ZKZ_k = fixed effect of calving interval k (in 6 classes)

KL_h = fixed effect of calf age h (in 5 classes)

AN_m = random animal effect for animal m (additive genetic variance)

PU_m = random permanent environmental effect of animal m

e_{hijklm} = random residual effect

The lactation number and permanent environmental effect had not to be included in the bivariate analyses for the heifers but the other effects were the same as in the bivariate model for all cows.

2. RESULTS AND DISCUSSIONS

The incidence rates for the five most important disorders found are described in Table 1.The most common claw disorder is laminitis.

Table 1

Frequency of claw disorders and claw health status for the first lactation and for all data

Claw disorder	All data (%)	Claw disorder status for all lactations (%)	Claw disorder status for first lactations (%)
LAM	34.07	44.08	40.16
DD	19.28	30.35	37.74
DID	12.07	21.86	14.35
WLD	13.91	18.62	16.19
KSG	7.10	10.60	6.71
No. of observations	68,008	26,309	8,761

With method 3, two models have been used to describe the phenotypic relationship between milk yield per lactation and the claw disorder status through the regression of claw disorder on milk yield. From model (3b), the effect of the covariate milk yield on claw disorder was not significant for all traits except Dermatitis interdigitales. According to model (3a), milk yield has significantly affected laminitis, Dermatitis digitales and Dermatitis interdigitales. The fitting of model (3b) with respect to the AIC value for all diseases was better than that of model (3a). The risk of laminitis (Fig. 1) increases more rapidly with increasing milk yield in first lactation than in the following lactations. After the third lactation, this relationship no longer exists. One reason could be that the heifers with high production are under stress. Therefore, they are more susceptible for this disease. Whereas after the third lactation, all cows with no respect to the production have the same risk for exhibiting the disease. For Dermatitis interdigitalis, the risk after lactation three and above 10,000 kg of milk is even decreasing (Fig. 2).

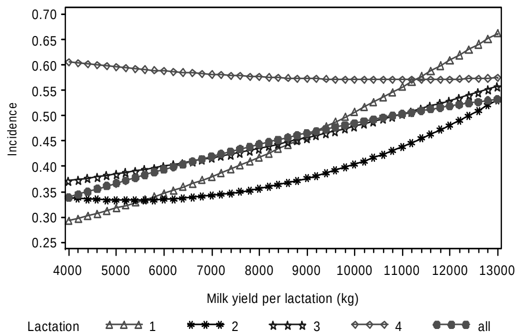

Fig. 1 Effect of milk yield on the occurrence of LAM for different and for all lactations

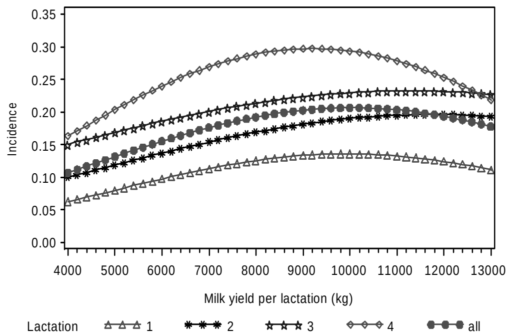

Fig. 2 Effect of milk yield on the occurrence of DID for different and for all lactations

Table 2 shows the genetic parameters for milk production and claw disorder according to the previous methods (1, 2 and 4). The first part of the table shows the correlation between the official breeding value (VIT-EBV) for milk yield and the own EBV for claw disorders in three groups depending on the reliability of EBV for claw disorders and the number of daughters. It was considered not only the number of daughters of bulls but also the reliability of the breeding values. In the last column of this part of the table are the correlations between EBV for young bulls. All correlations in this part for the five traits were not significant and weak. They range between -0.20 and 0.20. In the second part of the table 2 are the correlations between EBV for milk yield and claw disorder where the EBV for both traits were estimated from our data. The correlations in this part were not significant. They are between -0.11 and 0.17 and comparable to the genetic correlation for all cows, because almost the same data for the two methods were used.

The results of the estimation for heritabilities are also displayed in Table 2. As expected, the magnitude of the estimates differs most for disorders with low incidence rates. All estimates show that substantial genetic variation does indeed exist. This should warrant genetic selection in order to improve hoof health. Among the more frequent disorders, laminitis shows heritabilities in the range of 0.11 to 0.18. In relation to disease traits in general, heritabilities for laminitis are high and thus especially for this most frequent disease, cow populations would benefit from the implementation of genetic improvement programs. In part 3 of table 2 (column r_{g1} and r_{g2}) the genetic correlation between claw disorder and milk yield are presented. The correlation in the first lactation was higher than the others except WLD.

Table 2

Estimates of heritability from univariate and bivariate analyses for milk yield and claw disorder, genetic correlations and correlations between breeding values

Claw disorder trait	Correlation between EBV for claw and VIT-EBV for milk yield for the reliability of the EBV, last column of test bulls				Correlation between the two estimated EBV	Bivariate analyses between claw disorder status and milk yield per lactation				h^2 for claw disorder for all data
	≥ 70	≥ 80	≥ 85	*(≥ 2001)		$r_{g\,1}$	r_{g2}	h^2_1	h^2_2	
LAM	-0.05	0.04	0.01	-0.12	0.11	0.37	0.11	0.11	0.18	0.18
[1]P	(245)	(136)	(91)	(153)	(136)	0.08	0.05	0.02	0.02	0.01
DD	-0.19	-0.12	-0.04	0.19	-0.11	0.03	-0.04	0.09	0.13	0.10
[1]P	(143)	(65)	(32)	(94)	(65)	0.09	0.07	0.02	0.02	0.01
DID	0.14	(0.09	0.16	-0.06	0.03	0.47	0.05	0.14	0.20	0.18
[1]P	(172)	(87)	(42)	(100)	(87)	0.09	0.07	0.03	0.1	0.01
WLD	-0.09	-0.02	-0.01	-0.07	0.05	0.19	0.27	0.10	0.12	0.12
[1]P	(152)	(70)	(37)	(88)	(70)	0.10	0.07	0.03	0.02	0.01
KSG	0.03	0.13	-0.07	-0.09	0.17	0.27	0.12	0.15	0.17	0.11
[1]P	(103)	(35)	(16)	(39)	(35)	0.12	0.08	0.04	0.02	0.02
h^2 milk	0.40				0.38			0.47	0.32	

$h^2_{1,}$ $r_{g\,1}$ heritability and genetic correlation between milk yield and claw disorder for heifer.
$h^2_{2,}$ $r_{g\,2}$ heritability and genetic correlation between milk yield and claw disorder for all cows.
* (≥ 2001) correlation between VIT-EBV milk yield and EBV claw disorder for bulls from birth years between 2001 and 2003 and reliability between 40-65 %.
[1]P Numbers in parentheses denote the number of bulls included to calculate the correlation between the EBV; the other values in this line denote standard errors for the heritability estimates and the genetic correlations.

The entire data set contained about 51,000 animals. According to their breeding values, for each disorder the animal were assigned to a “resistance level”. The animal in the first quartile were assigned to “High”, the forth quartile were assigned to “Low”. Among the sires, five sires-of-sons with more than 10 sons were identified. The distribution of their sons into the resistance levels is given in Table 3. The sires-of-sons A and B do not show any specific pattern except sire D which shows a very favourable distribution of his sons for laminitis, Dermatitis digitalis, Dermatitis interdigitalis and sole ulcer but not for white line disease. For most cases, the sire and sons fall into the same quartile.

Table 3

Number of sons within quartiles of high / low EBV for the five most important claw disorders for five sires of sons (A to E; number of sons, number of observation and number of granddaughters)

Trait	quartiles	A N-son=21 N-obs=4264	B N-son =14 N-obs=2931	C N-son =14 N-obs=2038	D N-son =15 N-obs=2347	E N-son =11 N-obs=985
LAM	High	13*	1	9*	13*	6
	Low	5	9*	3	2	3
DD	High	3	12*	5	13*	2
	Low	16*	1	9*	1	5*
DID	High	6	4	6	11*	4
	Low	10*	6	5*	3	7*
WLD	High	6	3*	4	1	3
	Low	10	10	6*	10*	5
KSG	High	15*	1	7*	15*	8*
	Low	5	12*	5	-	2

* shows the quartil of father

It should be noted that C and D are sons of E. The results given in Table 3 thus reflect the heritabilites displayed in Table 2.

3. CONCLUSION

Based on a substantial amount of data the method of collecting observations on claw disorders at the time of hoof trimming can be regarded as having great potential. Estimates of heritabilities reveal substantial genetic variation which could be exploited. Genetic correlations with milk yield were marginal and thus indicate that genetic improvement of hoof health will not have adverse effects on milk yield.

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WITHERS HEIGHT COMPARATIVE ANALYSIS IN FIVE ROMANIAN HUCUL HORSE BLOODLINES

ANALIZA COMPARATIVĂ A CARACTERULUI TALIE ÎN CINCI LINII GENEALOGICE ROMÂNEŞTI ALE RASEI HUȚUL

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POGURSCHI ELENA, VLAD IULIAN

Key words: withers height, hucul, Goral, Hroby, Ousor, Pietrosu, Prislop, bloodline, Lucina

SUMMARY

Study of withers height average performances in a population have a huge importance because, regarding a population, the average of phenotypic value is equal with average of genotypic value. So, the studies of the withers height average value of characters offer us an idea about the population genetic level.

The biological material is represented by 538 hucul horse, on five bloodlines, divided in 20 stallion families (tab. 1) analyzed at 18, 30 and 42 months old, owned by Lucina hucul stood farm.

1. MATERIALS AND METHODS

The study of average performances for different characters in a population, have a great importance because, at the population level, the average of phenotypics value are equal with the average of genotypics value. That's mind that the study of average performances give us an ideea about the genetic level of population.

For realising the purposed objectives, biological material became from Lucina Stood Farm, Suceava county, represented by a sample with 538 hucul horses (242 males and 296 females), assigned in 5 bloodlines, divided at 20 stallion familys, presented in tab. 1.

Table 1

The allotment of biological matherial

Father's bloodline	Members/bloodline	Males number/bloodline	Females number/bloodline
GORAL	87	35	52
- Goral XV	10	5	5
- Goral XVI	50	17	33
- Goral XVII	1	0	1
- Goral XVIII	12	5	7
- Goral XIX	14	8	6
HROBY	177	84	93
- Hroby XVI	10	3	7

- Hroby XVII	13	6	7
- Hroby XVIII	3	1	2
- Hroby XIX	31	15	16
- Hroby XX	54	29	25
- Hroby XXI	66	30	36
OUŞOR	90	35	55
- Ouşor VII	29	9	20
- Ouşor VIII	39	15	24
- Ouşor IX	22	11	11
PIETROSU	91	44	47
- Pietrosu VIII	6	2	4
- Pietrosu IX	65	31	34
- Pietrosu X	20	11	9
PRISLOP	93	44	49
- Prislop VIII	26	14	12
- Prislop IX	62	27	35
- Prislop X	5	3	2
TOTAL	**538**	**242**	**296**

2. RESULTS AND DISCUSSIONS

The results regarding withers height for all 5 hucul bloodlines are presented in tab. 2.

Analysing the presented data we find that after the first age (1.5 years) the withers height average value are almost equals. The calculated value for Fisher test (*F=1.44*) indicate that between this 5 hucul bloodlines, with 95% probability, the differences regarding withers height are insignifiant.

Table 2

Withers height evolution in 5 hucul bloodlines

Bloodline	Age (years)											
	1,5				2,5				3,5			
	n	$\overline{X} \pm S_{\overline{X}}$	s	v%	n	$\overline{X} \pm S_{\overline{X}}$	s	v%	n	$\overline{X} \pm S_{\overline{X}}$	s	v%
Goral	87	128,02 ± 0,45	4,18	3,27	87	134,52 ± 0,31	2,9	2,16	87	138,18 ± 0,34	3,17	2,29
Hroby	177	128,44 ± 0,31	4,17	3,25	177	134,40 ± 0,25	3,26	2,43	177	138,18 ± 0,23	3,05	2,21
Ouşor	90	127,23 ± 0,38	3,58	2,81	90	132,43 ± 0,35	3,36	2,54	90	136,28 ± 0,34	3,24	2,38
Pietrosu	91	128,32 ± 0,44	4,22	3,29	91	134,56 ± 0,32	3,04	2,26	91	138,74 ± 0,46	4,43	3,19
Prislop	93	127,95 ± 0,4	3,87	3,02	93	134,06 ± 0,34	3,26	2,43	93	138,16 ± 0,33	3,19	2,31

At the second grading (2.5 years old), we observe that the biggest value for withers height belongs to the Hroby stallions and to the Pietrosu mares. Probably the cause is a better food improving, because this two bloodlines are know for the lowest value of withers height, in special Pietrosu bloodline. For the same reasons we explain also the lower value for withers from Ousor bloodline

At this age (2.5 years), the calculated value for Fisher test (*F=7.36*) indicate very significant differences, regarding the withers height, between all five bloodlines. Detailed analysis, using the Tukey test, punctuate that this differences are motivated by Ousor bloodline. Between performances of the other bloodlines the differences are insignificant.

After the third age (3.5 years), the males hierarchy is changing, the biggest withers height value belongs to Goral stallions, and for the mares the situation remain the same, females from Pietrosu bloodline being the tallest.

At the third grading the Fisher test calculated value (*F=7.07*) indicate very significant differences between all five bloodlines regarding the withers height. Analysing the Tukey test statistics we observe that the individs belongs to Ousor bloodline generate this differences.

All this differences could be explained by some genetic differences existance, between Ousor bloodline and the other four hucul bloodline. Thereby it's imperious necessary a selection intensification for improving the values for withers heigt in Ousor bloodline. It is also possible to find the causes in the inefficiency of comission for horse selection for explaining this wick performances. The inexistance of significant differences between the other for hucul bloodlines is the great genetic similutude consequence following the coupling sistem based on rotative interfamily crossbreeding.

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2. NUTRITION, ECOLOGY

THE INFLUENCE OF A SUPLEMENT THAT STIMULATE THE ACTIVITY OF RUMINAL MICROORGANISMS TO THE YOUTH OVINE RISED IN AN INTENSIVE EXPLOATATION SYSTEM

INFLUENTA UNUI PREPARAT DE STIMULARE A ACTIVITATII MICROORGANISMELOR RUMINALE LA TINERETUL OVIN INGRASAT IN SISTEM INTENSIV

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Cuvinte cheie: stimulare fermentatie ruminala, tineret ovin
Key words: ruminal fermentation stimulation, yout ovine

SUMMARY

The aim of our experiment was to evaluate the result of a preparation made up of micronutrients that would satisfy the requirements and to stimulate the young ovine ruminal microsymbionts activity on the first period of fattening. The supplementation levels are for 1 kg DM ration to microelements of 40 mg Zn, 0.4 mg Se and 0.6 mg Co, for vitamins is about 35 mg vit. E and 25 mg niacin, for enzime is about 4.5 g Forazyme and about 1.2 g *Sacharomyces cerevisiae*, Yea-Sacc[1026] string. In order to attain the required supplementation levels it was prepared the fodder product called RFNS (Ruminal Fermentation Nutritious Supplement) that was introduced in the forage of the lambs in a 2% ratio of the fodder. There were established two experimental groups of 10 lambs each, weaned at 120-160 days, weighing between 20 to 30 kg. Forage ratios were structured on the same components both for group L1 and group L2, lolium hay and a mixture of fodder (MF), on 44:56% proportion and for the L2 group was added RFNS. It was observed that forage intake, on the intensive exploiting system, had been greater with 3.42% regarding the lolium hay and with 2.68% for the FM; on the intensive exploiting system differences of daily gain of 33 g/lamb are also significant ($p<0.02$), by comparison with the control group; the effect of RFNS on the intensive exploiting system the number of protozoa/ml grew with 134.6%, and there is a predominance of the Entodinium genera with a less influence share, but there is a growing tendency for Diplodinium and Dasytricha. TGN/ml – the obtain results mean allow the estimation of tha fact that FSRN influences the number of ruminal bacteria that are by 37.6% higher in the intensive exploitation system, by comparison with TGN established at the control group; in the intensive exploitation system the number of protozoa/ml increased with 134.6%, under the influence of RFNS, and Entodinium protozoa prevailed by a share of less influenced, but the growing tendency of Diplodinium and Dasytricha genera is repreating; the stimulation of multiplication of the ruminal simbionts with a specific preparation (RFNS), reduces the production prices per 1 kg weight gain with 8.5% on the intensive exploitation system.

1.MATERIALS AND METHODS

World wide are used different types of forages that comprise elements who act directly and/or indirectly to ruminal micro organisms (vitamins, microelements, acidifiants, simple glucides), or by populating the digestive tube with useful micro organisms, probiotics.

The aim of our experiment was to evaluate the result of a preparation made up of micronutrients that would satisfy the requirements and to stimulate the young ovine ruminal microsymbionts activity on the first period of fattening.

There was created forage product that included microelements, vitamins, enzymes and yeasts live cultures, whose structure and supplementation level with micronutrients is displayed on the table 1.

Table 1

Level of supplemented nutrients by RFNS (Ruminal Fermentation Nutritious Supplement) 1 kg DM ration

RFNS structure		**Level of supplementation**
Nutrients	**Measurement unit**	
Zn	[mg]	40
Se	[mg]	0,4
Co	[mg]	0,6
Vitamin E	[mg]	35
Vitamin B_3	[mg]	25
Forazyme	[g]	4,5
Sacharomyces cerevisiae, Yea-Sacc^{1026} string	[g]	1,2

From data displayed on table 1, follos that the supplementation levels are for 1 kg DM ration to microelements of 40 mg Zn, 0.4 mg Se and 0.6 mg Co, for vitamins is about 35 mg vit. E and 25 mg niacin, for enzime is about 4.5 g Forazyme and about 1.2 g *Sacharomyces cerevisiae*, Yea-Sacc^{1026} string. In order to attain the required supplementation levels it was prepared the fodder product called RFNS (Ruminal Fermentation Nutritious Supplement) that was introduced in the forage of the lambs in a 2% ratio of the fodder.

There were established two experimental groups of 10 lambs each, weaned at 120-160 days, weighing between 20 to 30 kg. Forage ratios were structured on the same components both for group L1 and group L2, lolium hay and a mixture of fodder (MF), on 44:56% proportions and for the L2 group was added RFNS.

Table 2

The experiment design

Specification		**Group 1**	**Group 2**
n		11	11
Period		Fattening lambs aged between 120 to 160 days	
Feeding specification		Lolium hay (44%) Fodder mixture (56%) **R**	Lolim hay (44%) Fodder mixture (56%) **R+RFSN**
Aims	First phase	Nutritious and bioproductive indexes: body weight, gain weight, specific consumption	
	Second phase	Ruminant microbiological indexes: colony constitutive units, protozoa number and type.	

To evaluate the effect of this product during the experimental period, 40 days respectively, there were established the following parameters:

- nutritious and bioproductive parameters: body weight development, total gain, daily weight gain, and specific consumption.
- ruminanl microbiological parmeters: colony constitutive units (TGN/ml ruminal liquid), protozoa number and type.

2. RESULTS AND DISCUSSIONS

- Bioproductive and nutritious parameters

On this class of parameters it was recorded: forage intake, body weight development, and weight gain (total gain/period, daily weight gain), and specific consumption, exhibit in table 3

Table 3

Bioproductive indexes achieved by lambs during experimental period on intensive system

Specification		Group 1 R1				Group 1 R1 +RFNS				Diferences L_1-L_2	Test Mann-Whitney
		n	$X \pm S\bar{x}$	s	Cv %	n	$X \pm S\bar{x}$	s	Cv %		
Initial body weight[kg]		11	20,26±0,48	1,61	7,92	11	20,10±0,46	1,53	7,59	-0,16	0,97 ns
Final body weight[kg]		11	30,04±0,64	2,14	7,11	11	31,19±0,55	1,83	5,87	1,15	0,37 ns
Total weight[kg]		11	9,77±0,28	0,92	9,42	11	11,09±0,30	1,01	9,08	1,32	**0,02***
Daily mean weight[g]		11	244±6,93	23,02	9,42	11	277±7,59	25,19	9,08	33	**0,02***
Forage intake/group/period (kg)			Lolium hay 321,7	MF 360,5			Lolium hay 332,8	MF +RFSN 369,9			
Daily mean intake/lamb/day (kg)			0,731	0,819			0,756	0,841			
Percentage diferences (%)			100	100			103,42	102,68			
Specific consumption	UNC/ kg gain		6,28				5,7			0,58	
	PDIN g/kg gain		595,87				540,22			55,65	
	PDIE g/kg gain		604,25				532,27			71,98	

Forage intake was based by daily weighing of FM and of the hay (left over forage, respectively), in concordance with the quantities provided by the fodder recipe. To the lambs from control group (L1), the daily intake was 0.731 kg hay and 0.819 kg FM, and to L2 group that received RFNS, the intakes were 3.42% higher for the hay and 2.68% higher for the FM. To the group that received RFNS it can be noticed the tendency of a higher forage intake, fact that should be researched on the future studies in terms of an ad libitum foraging type to fattening lambs.

Body weight evolution and weight gain respectively were established by individual lambs' weighing from the two experimental groups, both at the beginning and at the end of the 40 days experimental period. The primary results as well as the comparison of the statistical values of body weight between the two groups are exhibit on table 3

The mean of the body weight values at the end of the experimental period is differentiated for the lambs intensively foraged; so for the L1 group is recorded a mean of about 30.04 ± 0,64 kg for this index, for the L2 group the weight mean 31.19 ± 0.55 kg is higher with 3.82%

Based on body weight data, it was established the total gain and daily mean weight as well as statistically analyzed data, are exhibited on the table 3

In the intensive exploiting system achieved growth gains are getting closer to the established level by the foraging R1 type recipe (300g/day/lamb), so, to the lambs from group L1, is achieved on an average a total gain of 9.77± 0,28 kg/period/lamb, and 244 ± 6,93 g daily mean gain/lamb. Because by L2 group lambs' forage supplementation with RFSN, the total mean gain of 11.09 ± 0.30 kg/period/lamb or the one of daily mean gain of about 277 ± 7.59 g, is higher with 13.52%, by comparison with the control group (L1), it can be appreciated that in the case of simplified recipes and with a higher ratio of fodder (56% of the total ingested DM), the ruminal microsymbionts could be stimulated on their fermentative and multiplication activity fact that can concur to the achievement of some higher weight gain at the levels comparable with the forage intake.

Testing the significance regarding the body weight and daily mean gain with the help of Mann-Whitney test is exhibit in table 3. From these data it can be noticed that body weight differences are not statistically provided, nevertheless the differences for the total gain of about 1.32 kg/lamb/period and for daily mean gain of 33 g/lamb, for the L2 group comparatively with the L1 group are being statistically provided at a $p<0.02$ significance level.

The specific intake is a relevance parameter because connects the forage intakes with their productive effect, which is formulated in UNC/kg gain, respectively PDIN (g) and PDIE (g)/kg weight gain. In the intensive exploitation system, the effect of the RFSN becomes obvious. The energetic specific intake at the lambs from group L2 in reduced by 9.24%, and the protean one decreases also by 9.34 to PDIN and with 11.92% to PDIE, in comparison with the values registered to the lambs from control group L1.

- Ruminal microbiological parameters

Total germs numbers (TGN/ml) – facilitating the multiplication circumstances for ruminal bacteria by providing some specific nutrients that allows the intervention of the nutritionist in organization of a higher microbial digestive protein quantity at the level of the intestine (PDIN). To evaluate the effect of RFSN there were provided homogeneity conditions for the groups, and it was kept a uniform foraging, and 3 hours after morning foraging there was collected ruminal liquid with the oesophageal probe, from 3 lambs, over a 3 days period. It was established the total germ number (NTG/ml), the mean results of this determination are presented in the table 4.

The means of the achieved values allows the observation that RFNS obviously influences the ruminal bacteria number which is by 37.6% much higher in number in the intensive exploiting system in comparison with NTG established for the control group.

Table 4

Number of germs from the ruminal fluid and number and type of the protozoa isolated from the ruminal liquid in lambs fed intensive

Specification	***Group 1 R1***			**Group 2 R1 + RFNS**			
TGN/ml	12,5x 10^9			17,2 x 10^9			
No./ml	**Genera %**			**Nr./ml**	**Genera %**		
	Entodinium	**Diplodinium**	**Dasytricha**		**Entodinium**	**Diplodinium**	**Dasytricha**
9804561	96,94	0,85	2,21	1320415	95,15	1,76	3,09

The number and type of protozoa, protozoa or infusers represent the ruminal micro fauna. In the rumen were identified over 120 species of infusers whose number vary, on different authors' opinion. Like bacteria the presence and the number of infusers depends mainly on the presence of some nutritive substratum came from ingested forage.

From the collected ruminal liquid there were performed also the determination of the number and identification of the protozoa genera, achieved data are exhibited on the table 4.

On the intensive feeding system is can be observed a growth of protozoa number/ml liquid from 980456 to 1320415, with 134.6%, and as for identified genera, the share of Entodinium specie is more reduced (96.94%-95.15%), but under the influence of RFSN there is a repeated tendency of increasing the Diplodinium specie from 0.85% to 1.76%, and Dasytricha from 2.21% to 3.09%, respectively.

- Economical aspects:

In order to establish if the economical use of RFNS in the forage of lambs destined for fattening, we start from the idea that the euro value of the productive effect (kg weight gain), has to be greater that the costs of the raw forage materials and the preparation of the forage. According to the acquired data, 1 kg gain of lambs fed on intensive exploitation system (L1) is charged with 0.846 euro, and to stimulate the activity of ruminal micro organisms with RFNS, we can obtain a kg gain with 0.774 euro. By using RFNS, there is observed a diminishing of costs with about 8.5%.

3. CONCLUSIONS

The influence of RFNS over the nutritious and bioproductive indexes

- it was observed that forage intake, on the intensive exploiting system, had been greater with 3.42% regarding the lolium hay and with 2.68% for the FM;
- on the intensive exploiting system differences of daily gain of 33 g/lamb are also significant ($p<0.02$), by comparison with the control group;
- the effect of RFNS on the intensive exploiting system the number of protozoa/ml grew with 134.6%, and there is a predominance of the Entodinium genera with a less influence share, but there is a growing tendency for Diplodinium and Dasytricha.

Ruminal microbiological indexes

- TGN/ml – the obtain results mean allow the estimation of tha fact that FSRN influences the number of ruminal bacteria that are by 37.6% higher in the intensive exploitation system, by comparison with TGN established at the control group;

- in the intensive exploitation system the number of protozoa/ml increased with 134.6%, under the influence of RFNS, and Entodinium protozoa prevailed by a share of less influenced, but the growing tendency of Diplodinium and Dasytricha genera is repreating.

Economical aspects

- the stimulation of multiplication of the ruminal simbionts with a specific preparation (RFNS), reduces the production prices per 1 kg weight gain with 8.5% on the intensive exploitation system.

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BIODIVERSITY IN FARM ANIMALS: SOURCES, USING, CONSERVATION
BIODIVERSITATEA ZOOTEHNICĂ: SURSE, UTILIZARE, CONSERVARE

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Key words: biodiversity; farm animals; breeding; genetic resources conservation
Cuvinte cheie: biodiversitate, animale de fermă, surse, utilizare, conservare.

SUMMARY

Sources of farm animal biodiversity, how to use biodiversity in animal production and how to save it for the future are discussed. Biodiversity of farm animals is of peculiar type being artificially created by humans through artificial selection and artificial insulation of breeds and strains. Ancient breeds, which currently are called local breeds, have been formed more or less from instinct. Understanding of artificial selection became much later in the 19th century when the first mouton breeds of sheep and beef breeds of cattle have been created in Great Britain. Artificial insulation of reproduction in farm animal populations started with the "stud book" of the English Thorough Blood Horse. There are now "stud books" for horses and donkeys, "herd books" for cattle and pigs, "flock books" for sheep and birds. Since within domestic genetic species of animals the natural mechanisms, molecular and behavioral, of reproductive insulation don't act, there is a permanent danger loosing the reproductive insulation of breeds or strains by "cross breeding". Genetic variability and biodiversity are different things. Variability is the genetic diversity inside closed population. In order to conserve biodiversity inside farm animal genetic species closed reproduction of breeds and strains has to be respected. Biodiversity of farm animal populations may be saved "*in situ*" conserving active breeds and "*ex situ*" preserving genetic material from in critical state populations in anabiosis. Legal regulations, adequate institutions and a clever management are the only ones guaranties for keeping on biodiversity in animal production.

/ INTRODUCTION

In terms of the "Triad mode of thought" (see Solomon Marcus: *"Modes of Thought"* - the "Collection for All" nr.281 Science - Scientific Publishing and Encyclopedic - Bucharest 1987), objective reality beyond our senses has 3 forms of existence: **Information, Energy** and **Substance.**

Information sets, qualitative and quantitative traits of existence. After Paraschhivescu M. (5) the constituent unit of **Information** is the ***"contrary".*** The primary contradiction of information is Perishability with *Reproduction.* Its measure unit is the "***bit***". The same author assume the existence of several evolutional types of information: **foundation information** existing without any support of energy or substance; **structural information,** with support of energy or lifeless substance, which exists and perish all at once with its support; **genetic information,** whose support is the living matter and is self controlling its reproduction; **cognitive information,** derived from genetic information to help its perennial existence and **rational information,** owned **by humans,** able to know and master itself and by consequence capable to art, to create (5).

Energy is the form of existence having as essential trait the movement. It is **support** of structural information. The constituent unit of energy is *quanta* and the measure unit the "***Joule".*** There are many types of energy as result of movement's characteristics. Movement could be in disorder or as linear waves becoming rays.

Movement could be also radial or spherical, in fields or in orbits. The types of energy can change one in another with *Entropy* (lost of movement). The Entropy magnitude is proportional to the degree of disorder (5).

Substance is the existence form having as essential trait the ***mass.*** Substance is support of information and energy. The constituent unit of substance is the *molecule.* The measure unit is the ***"gram"***. There are many types and kinds of substance. Substances may enter chemical combinations fixing (anabolism) or releasing (catabolism) energy but **preserving the total mass** of participant substances (Lavoisier’s Law). The main types of substance are *mineral* and *organic* substances. Mineral substances with molecules composed of a single type of atoms are the *chemical elements* (see Mendeleev’s Table). Mineral substances those molecules are made of more kinds of atoms, but never with at least two Carbon atoms connected between them are mineral *compounds.* Chemical elements deposit energy in the atoms only. *Organic substances* could be dead or alive. They have molecules which contain at least two Carbon atoms connected between them self. The number of connected Carbon atoms may be huge forming linear and simple or repeated cyclic chains of carbon atoms linked to each other by simple, double or triple valence. Organic compounds store energy intramoleculary (5).

Alive substance is the support of genetic information, the one able to control its reproduction by exchange of substances with the environment. It is highly organized. The organization unit of the substance alive is the **cell.** Cells are forming perishable **organisms.** Organisms format **biological species**. They are support of genetic information species able to control their reproduction by the three main functions of live organisms: *environment cognition, nutrition* and *reproduction* (5).

CHARACTERIZATION OF BIODIVERSITY GENETIC INFORMATION

Biological diversity is defined by the quality and the quantity of genetic information present in a given area. *Biodiversity* is result of the *genetic information quality,* consequence of the present kinds *(species)* of genetic information. Each *genetic species* has support a *biological species.* Biological species are real life existence. Biological species are composed of individuals who within the limits of the species common genetic information carry proper genetic information (the genotype). Genotypes differ with the sex and many other characters. Practically two identical individuals don’t exist. Even identical twins differ concerning spatial distribution of traits (e. g. Color genetic markers are symmetrical). In nature because of the closed reproduction quantitative traits of individuals are distributed like the statistical population numbers and thus biological species are biological populations. Defining quantitative characters of individuals of any species is *genetic variability*

In farm animals breeds and lines are populations because they reproduce in insulation. Farm animal species are genetic species but they are not populations because artificial selection for different targets modified the distribution of quantitative traits.

As an *index of biological diversity,* Shanon, head of "Program for Biodiversity" of the UN - 1973 - proposes: $I = \sum pi.\log_2 pi$

In this relation the value of biological diversity index *(I)* is given primarily by the term Σ, which is equal to the number of species of genetic information in a given area. The magnitude of this value is amplified by the number of individuals in each biological species *(pi)* corrected by multiplying it with the base 2 logarithm of the number of individuals of each species. It is estimated that the maximum amplification Σ *pi* is recorded when the distribution of individuals between biological species is equal (5). The *species of genetic information* are maintained by closed reproduction of *biological species.* Closed reproduction is provided by molecular and behavioral natural mechanisms of reproductive isolation (4;5)

In animal breeding, where acts *the rational information*, were created artificial population, *breeds or lines* (strains), using *artificial means to close reproduction.* Man used as such means: *incarceration* of animals in cages or *insulation* territory where animals of a kind could reproduce or *"breed books"* where animal allowed to give progeny where registered. There are now *"stud books"* for horses and donkeys, *"herd books"* for cattle and pigs, *"flock books"* for sheep or poultry. A *thorough breed* pretends to have its *"breed book"* and to register in it just individuals having both parents already registered in the same breed book. In farm animals biodiversity is given by the number of genetic species and the number of thorough breeds and lines inside them.

SOURCES OF BIODIVERSITY IN FARM ANIMAL LIVESTOCK

Natural biodiversity, the emergence of new species of genetic information, has been substantiated by Darwin in his famous work *"Origin of Species" (1869).* Updating and synthesizing Darwin's opinions one can says that nature is the creator of biodiversity. The *variability* inside genetic information species gives individuals different ability to *accommodate* with changes taking place in the biotope of biological species. Thus the ones which accommodate better will reproduce better and in time the biological species will *acclimatize* in new surroundings. By further reproduction members of the population as consequence of *natural selection (struggle for life)* will suffer changes to *adept* better and better to the environment. When adaptation process creates one of the natural mechanisms of reproductive isolation a new genetic species appears and biodiversity is enriched. Natural mechanism of reproductive isolation are: *zona* (pellucida*) reaction*, *vitellin block*, *karyotype structure* (number, form and size of chromosomes), *allele genes' complementarities, Major Histocompatibility Complex (MHC)* and *maternal recognition of pregnancy* as molecular mechanisms and *acquired sexual reflexes* concerning *pheromones, voice callings, nuptial dances and immobility syndrome in females,* as behavioral mechanisms (2,3,4).

In farm animals the role of nature is taken by the breeders. Let's say breeders imagine a *wanted type* of cattle. Further they discriminate reproduction selecting phenotypes of the wanted type allowed to reproduce progeny. Then they register parents and progeny in the herd book which acts as mechanisms of reproductive isolation. On the next step breeders decide how to format the genitor pairs in order to obtain as soon as possible the wanted type. Thus the reproductive discrimination, the nominalization of pairs and the registration of animals in the herd book will fast creating new desired populations of farm animals. Like in nature issue of biodiversity is found in the variability of genotypes. Variability is caused by *mutations* (random changes in the succession of codons in eukaryote genes), by *unequal division of repetitions* from eukaryote genes structure during the meiotic division in gameto-genesis, by *crossing-over*, by the *randomness of allele combination in polygenic pairs* of genes due to the fertilization by casual spermatozoa, by *epistasis* from neighbor genes or by *imprinting* induced from the sex of the organism formatting the genes (2;5). Genotypes variability can be amplified by *disjunction of traits* when couple of F_1 cross animals are bred (in accordance to the Mendel's second law). Thus in farm animals biodiversity *artificial selection* replaces *natural selection* and the *breed books* replace *the natural mechanisms* of closing reproduction. Since up to now no natural mechanism of reproductive isolation, genetically determined, has been yet created trough artificial selection any breed or a line can be maintained only working on in closed reproduction with the same selection program. Artificial selection *criteria* for reproduction discrimination and for couples' nominalization are individual traits which must have economic value, are measurable and possess acceptable *heritability* ($h^{2)}$. In artificial selection *adaptation* means to respect the wanted type. Selection for type aims to have body traits giving organism resistance to the efforts required by the high level of production performances. Regarding the body type breeders are interested in *stature, support, suspension and udder* (in females). In addition the duty of breeders and of producers, as well, is to provide animals' maximum comfort as measure of stress prevention and of avoiding economical losses (6).

The decisive measure in creating biodiversity in farm animals is to close reproduction. In this respect the breed books are perfect instruments. A new herd book has in farm animals the effect of speciation in nature.

USE OF BIODIVERSITY IN ANIMAL PRODUCTION

Now day's animal production is one of the most important economic activities in human societies. In farm animal breeding three levels of genetic information are used: *genetic species* level giving qualitative differences of products and better relations with the surroundings conditions, *artificial population* level which is ensuring the concordance of animal traits with the production needs of breeders and *genotype* level aiming economic efficiency increment of commercial units.

The first level of genetic information is an inherited treasure from the nature which selected the best genetic specie for different local environments. However humans changed the farm animals' needs, connections of animals with the natural environment still exist at least concerning climate and forage resources. At the same time production of animal species differs with the genetic species up to the constituent molecules of proteins and fat substances, what are real qualitative differences of products. Concerning meat for instance there are consumers who prefer pork, other who prefer beef or mutton and other who prefer chicken, turkey or goose. On the European Union market the offer of buffalo and sheep products is small. Since the human demographic explosion new genetic species are introduced in culture. Such examples are the partridge, the ostrich and other fowls, the snail, the oyster, many kinds of fish and even the roebuck.

The second level deals with the artificial biodiversity inside the genetic species. In old times artificial biodiversity of farm animals was poor. It enriched with the time and now became very important. Since breeders became producers of goods for market they want to have a better conversion of fodder into products. As there are two kinds of animal production, one *deposited* (body mass what means meat or wool) and another *excreted* (milk, eggs and progeny) which are in negative genetic correlation the way to maximum profitability is to specialize breeds for deposited or for excreted biological production.

There are *dairy cattle* and *beef cattle* (dual purpose breeds are out of mood). There are *maternal breeds* of swine, selected for fertility, and *paternal breeds* of swine selected for lean meat and few bones (pork is provided by maternal sows mated to paternal boars). There are many specialized horse breeds: race breeds for gallop or for trot, draught breeds for agriculture, riding breeds for sport or for services and ponies too. Most specialized breeds exist in sheep: breeds for thin wool, for tissue wool, for mutton, for milk, for fur, for pelt, for extensive rearing or dual purpose breeds. In poultry there are heavy and light breeds. Pigeons have also a great biodiversity. Biodiversity is increasing even inside specialization of breeds. Nearby the large Holstein-Frisian dairy cow requiring much concentrate feed is developing the small Jersey breed selected for milk dry matter content who requires forage. The best model about how to act with a breed is the USA H-F case. There are three categories of animals inside this breed. First, *pedigree animals* registered in the herd book and submitted selection. They have the *right to* generate *progeny of both sexes* providing the genetic progress in the breed. Second, *identified animals,* females only, registered in *progeny test* evidence (let say genealogic register) which have *right to* reproduce only *identified females* for bull progeny test. Third, *commercial animals* identified just for traceability of their products. Commercial cows *can reproduce* only *commercial cows* but they benefit of the genetic progress of the breed through the sires used in artificial insemination. No commercial or identified cow, doesn't matter how much performed, may be registered in the herd book. This model, based on *selection program,* must be followed in working with any animal artificial population.

The third level of genetic information, the genotypes, is used to obtain commercial animals. Three methods are in course: *Cross breeding, Hybridization* and *Biotechnology. Cross breeding* combines genetically uncorrelated traits of genotypes pertaining to different populations. It uses the law of the first generation uniformity, discovered by Mendell, using the dominance relations between genes. One typical example is using in flocks of dwarf (*recessive gene*) hen normal cocks (*dominant gene)* to obtain cheaper normal broilers by feeding lighter mother hens. Other spread model is crossing Landrace sows *(maternal breed)* with Pietrain boars *(paternal breed)* to obtain good commercial pork *(incomplete dominance of genes)* on lower prices from more fertile sows. There are many possible combination using two, three or even four breeds. The method is pretending an adequate *breeding program.* Look out! The last resulted genotype is a commercial one and mustn't give progeny. *Breeding programs don't increase biodiversity*; on contrary *uncontrolled cross breeding destroys biodiversity.* In

Romania because of uncontrolled cross breeding, biodiversity of farm animals is in great danger.*Hybridization* is a more sophisticated breeding method. In this case *lines* are selected directionally until genetic progress is no longer obtained *(the "growth factor law"* of quantitative biological processes). Then two separate lines selected in the same direction are cross bred to produce *heterosis* in *hybrids.* Number of individuals of lines is low, so hybridization was applied with population of highly fertile females. *Hybrids are not populations*. They must be treated as crowds. Because of *heterosis phenomenon* hybrids have superior performances than those of parental lines, but the plus of performance of hybrids isn't transmitted to progeny. *Hybrids have no genetic value, they are commercial genotypes*.

Biotechnology is another way to use genotypes in breeding. *Artificial insemination* increases the fertility of males permitting genetic pressure by males in selection programs or large dissemination of desired traits in breeding programs (1;3;6). *MOET,* the practical development of Embryo-transfer allows the direct transfer of animal farm populations (6). *In vitro fertilization (IVF)* provides access to *zygote at the time when* pronuclear chromosomes are uncoiled making possible the gene transfer and production of *genetically modified organisms (GMO). IVF* made possible *cloning mammals* from embryonic or adult somatic cells, as well.

CONSERVING BIODIVERSITY IN ANIMAL BREEDING

In animal production biodiversity is a convenient state for producers of goods in meeting the changeable market requirements. Conserving farm animal biodiversity is much more difficult than conserving biodiversity in nature because of the possible *uncontrolled cross breeding*.

Conservation *"in situ"* of biodiversity must have two targets: conservation of *active populations* which requires costs for *"breed books"* and *selection programs* and conservation of *in danger* or *vulnerable* populations' nuclei in which case it is necessary to dispose of land and houses and to avoid consanguinity

Conservation *"ex situ"*, better called *"preservation"* because genetic information stays unchanged has as target mostly anabiotic genomes, male gametes and embryos. DNA segments can be preserved as well. Long term anabiosis is obtained by freezing. There is no other way to preserve genomes. Dry DNA segments seem to be preservable.

Embryos are the best genomes to be preserved because getting out anabiosis complete genotypes are obtained. In order to use semen depots artificial insemination and absorption crossbred have to be applied. Using preserved DNA segments required advanced biotechnological procedures.

Biodiversity of farm animals being of national public interest it must be sustained by public authorities and financed by governments. In Romania there are funds allocated to the Ministry of Agriculture, Forestry and Rural Development on this purpose. The National Agency for Animal Breed Improvement and Reproduction is in charge to lead actions concerning *farm animal biodiversity conservation.* Romania has contact with FAO/UNO; a focal unit and a contact person are nominated. Nevertheless the activity in this field can be improved. Too much attention is paid to *"in situ"* preservation of population in danger and too little attention is paid to prevent farm animal populations to get this status. Research organizations have the target of reconsidering this approach.

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ADVANCED METHODS USED IN ECOLOGICAL AND ECO-ECONOMICAL SITE RESTORATION

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Key words: agrosilvic sites restoration, ecology, eco-economy
Cuvinte cheie: restaurare a amplasamentelor agrosilvice, ecologie, eco-economie

SUMMARY

The modern approach of ecology imposed the use of physics, mathematics and as well as economics methods in order to develop stable systems for safe food production. The complex assessment of the zones under the restoration of the agrisilvic sites is the basis of the sustainable development of the studied regions.

The site restoration includes development of technical documentation , safe actions in the area to mitigate the effect of the pollution and economical crisis impact on the population ,also in the next generations. The education and fair information of the public support the projects.

There is presented a project managed in Ilfov county – Romania, under Phare assistance (local initiative).

1. DEVELOPMENT OF THE STRATEGY FOR REHABILITATION

The rehabilitation of agrisilvic areas polluted by classical or /and radioactive substances is a difficult activity . The type of materials spreaded by industrial units (civil or military) or by bad practices used in agriculture is many times unknown . This means the characterization of the site is mandatory for the future development of the restoration project. The characterization of the site includes:

- accurate surveillance planning
- geophysical and geological evaluation of the damaged area
- the determination of the pollution map
- the development of the integrated project [1,2].

The program of the rehabilitation of agrisilvic sites has three major issues:

- the description and scheduling of the phases and tasks
- good practices for agrisilvic area regeneration
- the final reports to the competent authorities.

The costs of the rehabilitation are significantly in the development of strategy.[3,4] The application for funds must take into account the site restoration alternatives defined considering the physical and geological characteristics of the agrosilvic zone, techniques and technologies applicable in the project as well as the volumes of wastes which must be removed. [5,6]

The “spread sheet “method gives the costs based on the appraisal of the necessary funds for manpower, special equipments, utilities, taxes ,consultancy as well as management of the project.

The main steps of this eco-economical method are the followings:

- o the identification of main tasks
- o the determination of the steps in the specific task
- o the determination of manpower value
- o the determination of the costs for the waste removal ,including treatment and storage.

One of the important part of the project in the eco-economy is the scheduling of the tasks and the definition of the objectives of the activity. These are the justification and optimization of the restoration tasks in order to improve the status of the site .

In the Magurele area was developed the project no.8735/RO/International Atomic Energy Agency referring to the development of the advance methods for site restoration, focused on the radioactive contamination of the zone.[6,7] The methods and the monitoring instrumentation used for the radiological characterization of the area are presented in Table nos.1,2

Table 1

Smart radiation monitor SRM-200, detectors and accesories

TYPE	TYPE OF MEASUREMENT	CALIBRATION CONSTANTS
AC-3	Alpha Contamination	(1107±130) (cnt/min / Bq/cm^2)
HP-210	Beta-gamma Contamination, 2 inch window	(281±17) (cnt/min / Bq/cm^2)
HP-260	Beta-gamma Contamination	(260±16) (cnt/min / Bq/cm^2)
HP-270	Gamma Exposure or Exposure Rate	(7.12±0.32)x10^7 (cnt/min / mR/h)
HP-290	Gamma Exposure or Exposure Rate	(1.822±0.28)x10^6 (cnt/min / R/h)
LEG-1	Low Energy Gamma or X-Ray 20 to 70 keV	(2.092±0.18)x10^3 (cnt/min / μR/h)
SPA-3	High Sensitivity Gamma 40 keV to 1 MeV	(2.438±0.18)x10^6 (cnt/min / mR/h)
SPA-6	Medium Sensitivity Gamma 40 keV to 1 MeV	(7.577±0.42)x10^5 (cnt/min / mR/h)

Table 2

RO-7 High intensity exposure rate system

MODEL NO.	TYPE OF MEASUREMENT	RANGE
RO-7-LD	Exposure Rate	Background to 1.999 R/h
RO-7-BM	Exposure Rate	Background to 199.9 R/h

The high resolution gamma spectrometry [8.9] is the best tool for the accurate determination of the contaminants . In the Magurele Ilfov area there was used a spectrometer NOMAD type. The calibration of NOMAD spectrometer supplied the mimimum detectable activity value for each radioisotope identified in the field. The Table no.3 presents these data.

Table.3

Calibration of NOMAD: minimum detectable activity

Nuclid	E(keV)	Yield	MDA (s^{-1})	MDA (Bq)
^{241}Am	59.54	0.359	0.435	56.45
^{137}Cs	661.66	0.8521	0.151	8.25
^{60}Co	1173.24	0.999	0.184	8.56
	1332.5	0.999	0.212	9.88
^{152}Eu	121.78	0.284	0.14	23.07
	344.28	0.266	0.129	22.63
	778.9	0.1297	0.132	47.36
	1408.03	0.208	0.155	34.78

The associated errors of the calibration data are gathered in Table no.4. These data are used in the legal metrology qualification of the measuring systems. The last column of this table provides the deviation for each energy. There were performed calibrations for point sources as well as for volume samples.[10]

Table 4

Calibration of NOMAD: errors

Source	Nuclide	Source label	Activity (Bq)	Uncertainty (%)	Measured activity (Bq)	σ (%)	ε (%)
point	^{152}Eu	7-713	7026	±3.0	7038	±1.91	+0.2
	^{152}Eu	7-669	5188	±3.0	5162	±1.99	-0.5
	^{137}Cs	6-675	57759	±3.0	60597	±1.91	+4.9
	^{60}Co	7-510	2625	±1.5	2599	±1.91	-1.0
volume	^{152}Eu	7-660	6500	±3.0	6579	±2.00	+1.2
	^{152}Eu	7-644	3500	±5.0	3631	±2.00	+3.7
	^{137}Cs	8-309	2695	±5.0	2764	±2.00	+2.6
	^{60}Co	8-310	1910	±5.0	1952	±2.00	+2.2

An international intercomparison was performed for validation of the methods as well as the instrumentation selection . The common experimental program was made to VKTA Rossendorf Germany and to Institute of Atomic Physics Romania .The developed methods can ckeck the pollutants on the industrial filters .The spectrometer was calibrated for legal control of the waters and soils .[11]

2. SITE RESTORATION PROJECT IN ILFOV COUNTY – ROMANIA

The former radioactive waste storage Magurele Ilfov Romania was managed by Institute of Atomic Physics from sixties. The level of technological knowledge as well as the specific conditions of the Dictature generated a bad practice in the safe management of the periurban area of Bucharest. The evolution of the legislation in force in the country imposed the development of the site restoration project in this zone . PHARE project no.815/2001-Local initiative was the beginning of the rehabilitation of this agrosilvic area, contaminated by use of the old military building Baterry 14-15, Magurele for radwastes.[12]

Working with an instrumentation provided with an adequate capability of detection, it is possible to use an in situ system to estimate in depth radionuclide concentrations below surface, based on prior knowledge of the depth distribution of radionuclides of interest.

For the determination of gamma-spectrometer calibration factors to be used for in situ measurement a circular geometry (1 m radius, 24 equal sectors) was chosen. The reference sources used were the following:

^{152}Eu with an activity of 370.0 kBq
^{60}Co with an activity of 306.9 kBq
^{137}Cs with an activity of 255.7 kBq
^{241}Am with an activity of 338.1 kBq
all as of 1 July 1985.

A field calibration was performed by a combined method (experimental and theoretical) as recommended by Helfer and Miller [13]. The procedure can be summed up as follows:

The basic calibration equation for in situ spectrometry can be expressed in terms of the peak count rate N, the activity or inventory in the soil A, and the uncollided flux Φ as:

$$N_f/A = (N_f/N_0)(N_0/\Phi)(\Phi/A)$$

where the fundamental calibration parameters are expressed in ratios as follows:

N_f/A is the total-absorption peak count rate (cpm) in the spectrum at the energy of a particular nuclide γ transition per unit inventory ($Bq\cdot m^{-2}$) or concentration ($Bq\cdot g^{-1}$) of that nuclide in the soil,

N_f/N_0 is the angular correction factor of the detector at that energy for a given source distribution in the soil,

N_0/Φ is the peak count rate (cpm) per unit uncollided flux ($\gamma\cdot cm^{-2}\cdot s^{-1}$) for a parallel beam of γ rays of the same energy that is incident-normal to the detector face, and

Φ/A is the total uncollided flux ($\gamma\ cm^{-2}\cdot s^{-1}$) at that energy arriving at the detector per unit inventory or concentration of the nuclide in the soil.

In order to obtain the calibration factor (N_f/A) for a particular nuclide, the three quantities (N_f/N_0, N_0/Φ and Φ/A) are determined separately. The first two terms are detector dependent and can be determined experimentally, while the latter can be calculated on a purely theoretical basis.

The value of Φ/A at a particular energy is obtained by counting a γ-emitting point source of known strength, placed at a distance of at least 1m from the detector face to simulate a parallel beam of normally incident radiation.

The value of N_f/N_0 for a particular energy and source distribution is calculated from:

$$N_f / N_0 = \frac{\int R(\theta)\Phi(\theta)d\theta}{\int \Phi(\theta)d\theta},$$

where $R(\theta)$ is the peak count rate for γ-rays of energy E at angle θ, relative to the peak count rate at $\theta = 0^{\circ}$ (normal incidence) and $\Phi(\theta)$ is the γ-ray flux at energy E at angle θ.

The system of coordinates, references areas, area classification have been established based on the methodology recommended in MARSSIM manual [1]. For measurements was been chosen a square grid, with steps 2.83 m – for areas of Classes C1 and C2 as well as 5.65 m – for areas of Class C3. The numbers of measuring places are 42 – for C1, 32 – for C2 and 53 – for C3 Class. The measurements are made at the crystal – ground distance of 1 m. In Table no.4 are presented the measuring grids and places, as well as the small areas with elevated radioactivity ("hot spots").

The spreading of the results in different classes shows that the zone is not uniform contaminated, existing small areas with elevated activities in all site. The research results gave the total surface contamination distribution (^{137}Cs, ^{60}Co) in the site. It is clearly that the implementation of measuring results was performed using Helfer & Miller's method, based on the calibration made in lab as well as the distribution of the radioactivity in soil experimentally determined for the three classes C1, C2, C3 was a part of the integrated project.

Table 4

The radiological values of hot spots

Spot	Plan contact				1m crystal-ground distance			
	Dose rate (mSv/h)	Exposure (μR/h)	σ (μR/h)	σ r (%)	Dose rate (mSv/h)	Exposure (μR/h)	σ (μR/h)	σ r (%)
x=77m	0.01980	2257.31	9.55	0.42	0.00209	237.82	9.03	3.80
x=74m	0.01997	2276.80	12.02	0.53	0.00583	664.72	9.94	1.50
x=56m	0.01768	2015.59	5.51	0.27	0.00247	281.87	14.09	5.00
x=47m	0.02041	2327.49	4.77	0.21	0.00206	234.89	1.68	0.71
x=23m	0.00214	244.44	6.24	2.55	0.00048	55.30	0.97	1.75
x=15m	0.00680	775.83	2.76	0.36	0.00055	62.18	1.10	1.77
x=4m	0.01542	1758.28	7.29	0.41	0.00100	114.23	1.99	1.74

The use of gamma spectrometry in measurements on the vegetation show the main contaminants in the area as well their specific activities .These data are gathered in the Table no.5. The spreading of contaminants in the site is not uniform, existing zones with elevated radioactive contamination with ^{60}Co as well as others containing ^{137}Cs.

Table 5

Measurements on the vegetation samples

Sampling place	Surveillance class	Specific activity (Bq/kg)		
		Cs-137	**Co-60**	**K-40**
1	C21	133.80	304.71	1478.53
2	C31	104.31	12.87	1127.63
3	C31	88.46	79.32	1328.60
4	C31	23.49	-	1251.90
5	C31	221.50	9.82	1552.62
6	C11	122.27	48.85	1377.30
7	C11	61.56	128.33	1212.31
8	C11	46.41	-	1177.49
9	C11	56.37	54.56	1304.71
10	C32	41.35	-	1303.47
11	C32	10.86	-	1178.08
12	C33	17.88	49.75	978.09

CONCLUSIONS

The main purpose of the interdisciplinary projects for ecological restoration of the agrosilvic sites is the removal of the pollutants and creation of a zone which can be used without restrictions.

The biodiversity conservation [15,16] is the challenge of people for their healthy life.

The fair communication with the public referring the sites status is mandatory.[17].

The site restoration is an important part of European approach for sustainable development ,including in the . national strategy for environmental protection.

The independent laboratories must provide certification of the environmental issues.

A modern system of archive must transfer the environmental information for the next generations, based on the QA program.

The training of the researchers working in the field of sites regeneration is a permanent request for this type of projects.

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INCREASING THE UNDEGRADABLE PROTEIN FROM SYRIAN COTTONSEED MEAL BY DRY HEAT

CRESTEREA CANTITATII DE PROTEINA NEDEGRADABILA DIN SROTURILE DE BUMBAC SIRIAN PRIN TRATAMENT TERMIC

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Key words: undegradable protein; cottonseed; ruminants; degradation
Cuvinte cheie: proteina nedegradabila; seminte de bumbac; rumegatoare; degradare

SUMMARY

The rumen undegradable protein and the rumen degradable protein of cottonseed meal were measured by the in situ nylon bag method. Cottonseed meal were dry heated at 150°C for 0(t_0), 30(t_1) 60(t_2), 90(t_3) and 120 min (t_4) to increase the undegradable protein. Three non lactating dairy cows fistulated in the rumen were used for the in situ nylon bag studies. The samples of cottonseed meal were placed in 10×15 cm nylon bags, and were then incubated in the rumen for different periods of time (0, 2,4,8,16,24 and 48). Using 6% of rumen solid outflow rate, the effectives ruminal degradabilities of CP were: (t_0) 83.11%, (t_1) 78.09%, (t_2), 67.53% (t_3) 58.36% and (t_4) 55.28%. The heat treatment of cottonseed meal decreased the ruminal degradability of CP - 6.04%, - 18.75%, -29.78% and – 33.49% for t_1, t_2, t_3 and t_4 respectively and increased the rumen undegradable protein +29.72%, +92.24%, +146.54% and + 164.77% for t_1, t_2, t_3 and t_4 respectively. Cottonseed meal heated at 150°C for 90 min apparently gave the best increasing of undegradable protein.

Feeding high amounts of dietary CP (22 to 23% CP) can partially increase milk fat depression (Zimmerman, 1992). These high protein diets also resulted in increased milk yields (Jaquette, 1986. Jaquette, 1987. Jaquette, 1988. Zimmerman 1991). More moderate (18%) dietary CP was ineffective in alleviating milk fat depression, but it enhanced milk yield. The exact mechanism of partial alleviation of milk fat depression by high protein diets is unknown, but it appears to be due to an increased postruminal supply of AA,(Hopkins 1994). One possible method to decrease total dietary CP, while still maintaining total AA flow to the small intestine for enhanced milk production and milk fat percentage, is to increase the rumen undegradable protein of the diet. Increased rumen undegradable protein increased milk yield (Glen A, 1990, R. J. Forster, 1983, D. J. Schingoethe, 1988). Many studies have suggested the need to increase dietary CP, undegradable protein content, or both to support high production in early lactation (Jimmy H, 1980); however, observed responses have varied from none (R. J. Annexstad, 1987) to increased milk production, component yield, or both (Voss, 1988). Cottonseed byproducts are almost the only protein source in Syria for ruminant’s nutrition, due to the large quantities which are produce locally. Cottonseed meal has high content in protein

(36-47% crude protein), energy, and digestible fiber. The ruminal degradation of crude protein (CP) from cottonseed meal is relatively high (H. Tagari, 1986). The reduction of this ruminal degradation and increase of the undegradable protein is preferable since it reduces N losses through excessive NH3 urea production, and provides supplemental quantities of intestinally available protein which are required by diary cows in order to maintain high milk production. Heat treatment of feedstuffs can decrease degradation of dry matter and CP by blocking reactive sites for microbial proteolytic enzymes (Broderick and Craig. 1980) and increase the supply of dietary protein to the duodenum (Tagari,1986). Various treatments are available for increasing undegradable protein portion of cottonseed: oven-heating, roasting, extruding and autoclaving. Heat treatment has the advantage of being safe, inexpensive, and can be done with usual equipment. The objective of this study was to increase the undegradable protein portion from cottonseed meal by heat treatment.

1. MATERIALS AND METHODS

SOLVENT EXTRACTED COTTONSEED MEAL

Cottonseed meal from Syria was heat treated at 150°C for 0, 30, 60, 90 and 120 mints (t_0, t_1, t_2, t_3 and t_4 respectively). Heat treatment was applied in an oven in which cottonseed meal was spread on trays in 2 cm layers 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 of 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 cottonseed 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 (T0), whereas the bags for 16, 24 and 48 hours were inserted at T8, 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 repetition, corresponding to the three fistulated cows), and analyzed for N content by Kjeldahl method.

CALCULATIONS

Data were corrected for microorganism 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.

2. RESULTS AND DISCUSSIONS

The chemical composition of cottonseed meal is: dry matter 90.13%; crude protein 33.33%; fat 1.41%; cellulose 15.21%; ash 4.93%. These values are usual for a typical commercial cottonseed meal. The parameters of rumen degradation and effective degradability were presented in tables 1 and 2.

The rumen undegradable protein (RUP) and rumen degradable protein (RDP) determined by the in situ nylon bag technique are shown in Figure1. The parameters of rumen degradation and effective degradability were influenced by the heat treatment and the effective rumen degradations of cottonseed meal were reduced for all treatments. Thus, DM degradability was reduced by -8.76%, -12.97%, -19.87% and -23.25% for t_1, t_2, t_3 and t_4 respectively. CP degradability was also reduced with relatively higher extent: -6.04%, - 18.75%, -29.78% and – 33.49% for t_1, t_2, t_3 and t_4 respectively. The heat treatment of cottonseed meal increased the undegradable protein by +29.72%, +92.24%, +146.54% and + 164.77% for t_1, t_2, t_3 and t_4 respectively.

Heat treatment duration of cottonseed 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). When whole cottonseeds were heated at the same temperature, the reduction of rumen degradability was clearer for the dry matter than for crude protein (H. Alobeid, 2008). Heating whole cottonseeds at 150°C for 120 min has reduced the degradability of DM with -36 while -14 for CP. This observation suggested that heat treatment of whole cottonseed would be associated with a reduction in the ruminal degradation of carbohydrate and probably also of lipid and that this could be followed by a reduction in microbial synthesis in the rumen (H. Alobeid, 2008).

It is more beneficial to treat cottonseed meal than whole cottonseeds who have a higher level of fat and other carbohydrate approximately >18% fat. Heating cottonseed meal at 150°C for 120 min has reduced the degradability of DM with -23.25 while -33.49 for CP. Heat treatment of cottonseed meal at 150°C for 120 min increased the undegradable protein with +164.77%, but this high temperature may not just increase the undegradable protein but also the ADIN. When whole cottonseeds were heated at 150°C for 120 min, this increased the ADIN with 59.65%. This parte of protein consider unavailable CP (Thomas, 1982). In this study the content of ADIN in the cottonseeds meal treated and the N solubility in buffer were not studied so further more is needed to determine the ADIN, the N solubility and the total tract digest.

Table 1

Effect of the duration of heat treatment on the degradability of Dry Matter of cottonseed meal

Cottonseed meal treatment	Degradability Parameters[1]			Effective Dry Matter Degradability(Ed)	r^2
	a[1]	b[1]	c[1]		
Control(t_0)	50.69	35.85	5.40	**67.67**	0.959
heated at 150°C for 30 min(t_1)	39.25	29.71	18.70	**61.74**	0.814
heated at 150°C for 60 min(t_2)	41.02	77.05	1.81	**58.89**	0.973
heated at 150°C for 90 min(t_3)	37.06	89.79	1.24	**54.23**	0.935
heated at 150°C for 120 min(t_4)	39.56	92.19	0.84	**51.94**	0.969

[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

Effect of the duration of heat treatment on the degradability of Crude Protein of cottonseed meal

Cottonseed meal treatment	Degradability Parameters[1]			Effective Protein Degradability(Ed)	r^2
	a[1]	b[1]	c[1]		
Control(t_0)	56.02	41.63	11.19	**83.11**	0.926
heated at 150°C for 30 min(t_1)	36.34	50.71	27.95	**78.09**	0.851
heated at 150°C for 60 min(t_2)	44.66	79.53	2.42	**67.53**	0.938
heated at 150°C for 90 min(t_3)	35.89	97.22	1.74	**58.36**	0.893
heated at 150°C for 120 min(t_4)	38.91	99.78	1.17	**55.28**	0.917

[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.

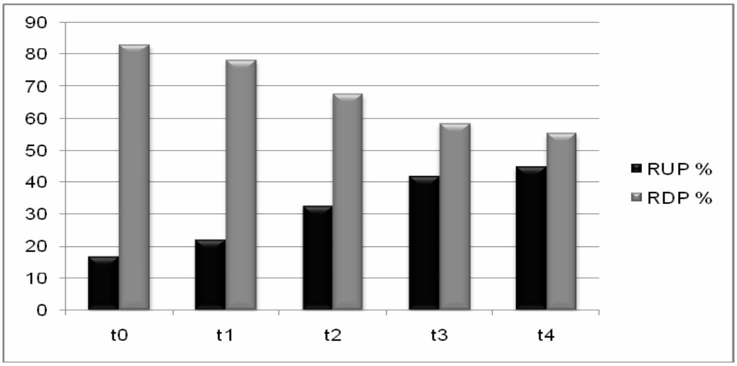

Figure 1. Rumen undegradable protein (RUP)
and rumen degradable protein (RDP) of cottonseed meal

3. CONCLUSIONS

Dry heating of cottonseed meal increased the rumen undegradable protein by +29.72%, +92.24%, +146.54% and + 164.77% for t_1, t_2, t_3 and t_4 respectively. This increase of the rumen undegradable protein has to be parallel with the increase of the digestibility in order to ensure the AA requirements for diary cows in the early lactation. The decrease of the protein`s degradability with the increase of the ADIN content of the protein bypass it is considerate to be protein waste. This study will be continued in order to establish the digestibility of rumen undegradable protein in the small intestine in order to compromise between the increase of undegradable protein and their digestibility. Another purpose of our future investigations will be the effect of rumen undegradable protein on milk production and milk quality of high production cows during the early lactation.

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A NEW METHOD FOR THE CALCULATION OF THE NUTRITIVE VALUE OF THE FEEDS FOR PIGS

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In calculating the nutritive value of the feeds for pigs we started from the gross dietary chemical composition in nutrients and from the digestibility coefficients. Based on these elements we could calculate the digestible dietary nutrients including starch (St), sugar (S) and the amount of digestible energy (DE) with the following formula:

DE, MJ/KgDM = 24.2 DCP + 39.4 DEE + 18.4 DCF + 17.0 DNFE
where DCP, DEE, DCF, DNFE g/Kg SU.

Knowing the dietary amounts of starch and sugar, considered to be fully digestible, we calculated the content of corrected metabolisable energy (ME_c) taking into consideration the corrections for the bacterial fermentescible matter (BFM), sugar content (S) and the consumption of energy during the process of deamination, according to the model of energy and protein metabolism simulation in fattening pigs (Burlacu et al. 1998).

The bacterial fermentescible matter represents the difference between the sum of the digestible crude fibre + the digestible nitrogen-free extractives and the sum of the starch + sugar, fully digested (in grams):

BFM = (DCP+ DNFE) – (St + S)

BFM correction is done only in the feeds with a content higher than 100 g BFM/kg DM, the loss of energy through fermentation being 6.8 KJ/ g BFM, that is 40% (17 KJ × 0.40 = 6.8 KJ).

The second correction for the dietary ME calculation is done when the feed has a content higher than 80 g sugar / kg feed DM. This correction is 1.4 KJ/g sugar, that is 8.24% (17 KJ × 0.824 = 1.4 KJ) and it represents the difference of gross energy content between 1 kg of starch and 1 kg of sugar.

The third correction corresponds to the process of the digestible protein deamination in excess of the maintenance requirement, the expenditure of energy being 4.9 MJ/kg deaminated protein (DP).

Thus, the corrected metabolisable energy (ME_c) of the feeds is calculated with the following formula:

ME_c, MJ Kg DM = DE – (UE + Edea+ 0.0068 BFM + 0.0014 S)

ehere DE, UE şi Edea reprezint the digetsible energy , the energy of urine and the deaminated, expressed in MJ, while BFM and S are expresse in grams.

The calculation of the corrected metabolisable energy (ME_c) and of the net energy (NE) of the feeds using this model took into consideration the standard capacity of feed utilisation by a 870 kg pig, at a maximal performance of protein retention (Pr) of 140 g/day, and for an average daily gain of 600 g, with the pigs housed under thermally neutral conditions (Q` and Q” = 0).

In this standard pig we evaluated, using the model, the requirement of metabolisable energy for maintenance (MEm) of 10.448 MJ/day and the requirement of protein, of 36.3 g, which can be supplied by a standard maintenance diet with 655 g DM, composed of 608 g corn and 47 g soybean meal, with 11.117 MJ DE and 70 g digestible crude protein (DCP); this diet is metabolized at maintenance level (energy and protein balance = 0) with an elimination of 0.504 MJ energy through urine and with 0.165 MJ deamination energy.

In simulating the administration of different supplements to the diet of the standard pig, provided they do not exceed the maintenance diet in terms of digestible energy, we used the mathematical model to calculate the efficiency of using them as corrected metabolisable energy and as net energy. When we used the model to simulate the effect of the supplementary feeds on the high protein diets, we took into consideration the highest level of protein retention (140 g/day) so that the supplementary feeds do not exceed the amount of available protein (AP) corresponding to this maximum retention level and that they provide for a maximal protein retention of 1/0.5 compared to the lipid retention. When we used the model to simulate the effect of the supplementary feeds on the bulk forages we took into calculation dietary supplements to the maintenance diet, indicated by the practice, which should not affect the ingestion capacity; in the case of the roughages we took care that the supplementary feeds do not exceed 10% CF in the total diet. Below are several such examples of calculation.

The nutritive value of the feeds was evaluated as crude protein (CP), digestible crude protein (DCP), corrected metabolisable energy (ME_c), net energy (NE) and oats feed units, knowing that one feed unit (FU) contains 8.067 MJ NE (or 1928 Kcal).

We gave up thus the feed unit of 3500 kcal, or 14.65 MJ, which was less received by the Romanian specialists in animal nutrition.
The feed unit of 8.076 MJ NE, or 1928 Kcal, is in a 1.22/1 ratio with the feed unit used for ruminants, which contains 6.78 MJ, NE for the milk and 6.59 MJ NE for the meat. The difference is justified by the higher efficiency of using the same feed (commonly used for both categories of animals) by the monogastric animals compared to the ruminant animals, the 8.067/6.68 ratio (average value of NE_{milk} and NE_{meat}) corresponding to percentage differences.

CONCLUSIONS

The calculation of the nutritive value of the feeds for pigs using the mathematical model for energy and protein metabolism simulation offers a higher accuracy in evaluating the productive potential of the feeds because, compared to the current systems used both in Romania and abroad, it supplies in addition:

- correction for the biological value of the protein, which shows amounts of urine energy and deamination energy which vary according to the protein content of essential amino acids;

- correction for the bacterial fermentescible matter and for the sugar, function of the dietary content of crude fibre and in mono- and disaccharides;
- calculation of the nutritive value for each feed under standard conditions, taking into account the requirement for the daily gain of energy and protein;
- dissociation of the net energy into protein energy and lipid energy which can be produced by the analysed feed.

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CALCULATION OF THE MAINTENANCE DIET

Elements f calculation

- Metabolisable energy for maintenance
(MEm) = $0.750^{0.62}$ = 0.750 x $70^{0.62}$ = 10.448 MJ

- Protein for maintenance
(Pm) = 1.5 W^{0i75} = 1.5 x $70^{0.75}$ = 36.3
- Dietary feeds: corn and soybean meal.
- Dietary content of ME, DCP and the biological value (BV) of these dietary ingredients protein (from tables in use).

	Corn	Soybean meal
ME/Kg DM (MJ)	15.929	15.630
DCP/Kg DM (g)	81	441
BV	0.37	0.88

a) Calculation of the dietary digestible crude protein (DCP) correlated with the maintenance protein (Pm) for a zero level of the retained protein (Pr = 0) (see the model)

Pr = (AP - Pm) 0.9 where AP = available protein

Pr = 0 $\Rightarrow$ (AP - Pm) 0.9 = 0; (AP – 36.3)0.9 = 0; AP = $\frac{32,67}{0,9}$ = 36.3 g.

DCP = AP/BV;   DCP = 36.3/BV

b) <u>Calculation of the dietary amounts of corn (x) and soybean meal (y):</u>

15.929x + 15.630y = 10.448
0.081x + 0.441y = 0.0363/BV

$$\frac{0{,}37\times 0{,}081x + 0{,}88\times 0{,}441y}{0{,}081x + 0{,}441y} = VB$$

By solving this system of equations with three unknown factors we calculated the amount of each dietary feed and the biological value of the diet.
x = 608 g corn; y = 47 g soybean meal and BV (diet) = 0.52

c) <u>Calculation of the digestible nutrients of the maintenance diet</u>

Feed	CP	EE	CF	NFE	St	S	MJ
Corn (608 g)							
Nutrients	64	27	15	491	420	12	11.528
%digestibility	78	76	43	94	100	100	89
Digestible matter	50	21	6	462	420	12	10.273
Soybean meal (47 g)							
Nutrients	23	1	4	16	3	5	0.938
%digestibility	89	45	80	100	100	100	90
Digestible matter	20	-	3	15	3	5	0.844
Total dietary digestible matter	70	21	9	477	423	17	11.117

<u>Calculation of the urine energy (UE) and of the deamination process energy (Edea)</u>

DCP = 36.3 / BV = 36.3 / 0.52 = 70 g or 0.070 Kg
Deaminated protein (DP) = DCP – Pr = 0.070 Kg
UE (MJ) = 7.2 x DP = 7.2 x 0.070 = 0.504 MJ
E dea (MJ) = 4.9 (DP - Pm) = 4.9(0.070 – 0.0363) = 0.165

d) <u>Calculation of the corrected metabolisable energy (EMc)</u>
MEc (MJ) = 11.117 – (0.504 x 0.165) = 10.448

Example 1. Calculation of the nutritive value of the oats

Nutrients (g; MJ)

	DM	CP	EE	CF	NFE	St	S	BFM	MJ	BV
Maintenance diet										
Nutrients	655	87	28	19	507	423	17	-	12.466	0.52
Digestible matter	-	70	21	9	477	423	17	46	11.117	-
Oats = 820 g										
Nutrients	820	105	44	93	550	367	14	-	15.872	0.53
% digestibility	-	77	86	30	77	100	100	-	70	-
Digestible matter	-	81	35	28	424	367	14	71	11.117	-
Total digestible matter	151	-	-	-	-	-	-	-	24.667	0.526

BFM and S corrections for oats = 0, because BFM = 34 + 517 – 447 –17 = 86

10% S = 17 < 8% of the supplement

Available protein (AP) = DCP x BV = 0.151 x 0.526 = 0.0794

Retained protein (Pr) = (AP - Pm)0.9 = (0.0794 – 0.0363)0.9 = 0.0388

Total protein at 70 Kg (Pt_{70}) = 11.43 Kg

Maximum total protein (Pt) = 300 x Pr = 300 x 0.140 Kg = 42 Kg

Synthesized protein (SP) = Pr / 0.23 (Pt – Pt_{70}) / Pt = 0.0388 / 0.23 (42 – 11.43) / 42 = 0.232 Kg

Energy for protein synthesis and retention:

(EPr) = 3.6 Ps + 24.2 Pr = 3.6 x 0.232 + 24.2 x 0.0388 = 1.773 MJ

Deaminated protein (DP) = DCP – Pr = 0.151 – 0.0388 = 0.112 Kg

Urine energy (UE) = 72 DP – UEm = 7.2 x 0.142 – 0.504 = 0,

where UEm = urine energy at maintenance

Deamination energy (E dea) = 4.9(DP-Pm) – E dea = 4.9(0.1120 – 0.0363) – 0.166 = 0.06 MJ

where E dea_m= deamination energy at maintenance

Corrected metabolisable energy (MEc) = DE – (UE E dea- 1.4 S – 0.0068)

(BFM - 100) = 11.117 – 0.304 – 0.206 – 0 – 0 = 10.607 MJ

MEc / Kg DM oats = $\frac{10,607}{0,820} = 12,923 MJ\,(3092 Kcal)$

Retained lipids (Pr) = (MEc - EPr)/52.5(10.607 – 1.773) / 52.5 = 0.168 Kg

where 52.5 = ME intake (MJ) for the synthesis of 1 Kg lipids

Net energy (NE) = 24.2 Pr + 39.4 Lr = 24.2 × 0.0388 + 39.4 × 0.168 = 7.565 MJ

NE / Kg DM oats = $\dfrac{7{,}569}{0{,}820} = 9{,}230MJ\,(2206Kcal)$

FU = NE (1 Kg oats with 0.874 DM) = 9.230 × 0.874 = 8.067 MJ (1928 Kcal)

Example 2. Calculation of the nutritive value of the corn

Nutrients (g; MJ)

	DM	CP	EE	CF	NFE	St	S	BFM	MJ	BV
Maintenance diet										
Nutrients	655	87	28	19	507	423	17	-	12,466	-
Digestible matter	-	70	21	9	477	423	17	46	11,117	0,52
Corn = 659g										
Nutrients	659	70	30	15	532	460	13	-	12,504	-
% digestibility	-	78	76	43	94	100	100	-	89	-
Digestible matter	-	55	22	7	501	460	13	35	11,117	0,37
Total digestible matter	125	-	-	-	-	-	-	-	27,981	0,453

BFM and S corrections for oats = 0, because BFM (11 + 760 – 698 - 19) 10% and S 8% of the supplement

Available protein (AP) = DCP x BV = 0,125 × 0,453 = 0,0566 Kg

Retained protein (Pr) = (AP - Pm)0.9 = (0.0566 – 0.0363) 0.9 = 0.0183 Kg

Total protein at 70 Kg (Pt_{70}) = 11.43 Kg

Maximum total protein (Pt) = 0.300 × 0.300 × 140 = 42 Kg

Synthesized protein (SP) (Kg) = Pr/0.23(Pt – Pt_{70})/Pt = 0.0183/0.23 (42 – 11.43)/42 = 0.078/0.1674 = 0.109 Kg

Energy for protein synthesis and retention

(E Pr) = 3.6 Ps + 24.2 Pr = 3.6 × 0.109 + 24.2 × 0.0183 = 0.836 Mj

Deaminated protein (DP) = DCP – Pr = 1.125 – 0.0183 = 0.1067 Kg

Urine energy (UE) = 72 DP – UEm = 0.1067 × 7.2 – 0.504 = 0.264 MJ

where UEm = urine energy at maintenance.

Corrected metabolisable energy (MEc) = DE – (UE E dea + 1.4S + 0.0068) (BFM - 100) = 11.117 + 0.264 – 0.180 – 0 – 0 = 10.673 MJ

MEc / Kg DM corn = $\dfrac{0{,}673}{0{,}659}$ = 16.195 Mj (3.871)

Retained lipids (Pr) = (MEc - EPr)/52.5 = (10.673 – 0.836)/52.5 = 0.187 Kg where 52.5 = ME intake (MJ) for the synthesis of 1 Kg lipids

Net energy (NE) = 24.2 Pr + 39.4 Lr = 24.2 × 0.0183 + 39.4 × 0.187 = 7.825 MJ

$$NE / Kg\ DM\ corn = \frac{7{,}825}{0{,}659} = 11.874\ MJ\ (2.838\ Kcal)$$

$$FU = \frac{11{,}874}{8{,}067} = 1.47\ FU/KgDM$$

where 8.067 Mj = 1 FU

Example 3. Calculation of the nutritive value of the soybean meal

Nutrients (g; MJ)

	DM	CP	EE	CF	NFE	St	S	BFM	MJ	BV
Maintenance diet										
Nutrients	655	87	28	19	507	423	17	-	12.466	-
Digestible matter	-	70	21	9	477	423	17	46	11.117	0.52
Soybean meal = 335g										
Nutrients	335	166	5	27	116	24	35	-	6.687	-
% digestibility	-	89	45	80	93	100	100	-	90	-
Digestible matter	-	148	2	21	108	24	35	69	6.018	0.88
Total digestible matter	218	-	-	-	-	-	-	-	17.135	0.764

BFM correction = - 0.0068 (SFB - 100) = - 0.0068 (207 - 1200) = - 0.728 MJ/Kg DM soybean meal

Sugar correction = - 0.0014 Z = - 0.0014 $\times$ 104 = - 0.146 MJ/Kg DM soybean meal

For 335 g the corrections are – 0.728 $\times$ 335/1000 =

= - 0.244 MJ BFM and – 0.146 $\times$ 335/1000 = 0.049 MJ Z

DCP = 70g + 148 = 128 = 0.218 Kg

DE = 11.117 + 6.018 = 17.135 MJ

BV = (70 $\times$ 0.52 + 148 $\times$ 0.88)/218 = 0.764

AP = 0.218 $\times$ 0.764 = 0.167 Kg; Pr = (0.167 – 0.0363) 0.9 = 0.117Kg

$$SP = \frac{0{,}117}{0{,}1674} = 0.698\ gEPr(MJ) = 3.6 \times 0.698 + 24.2 \times 0.117 = 5.347\ MJ$$

DP = 0.218 – 0.117 = 0.101 Kg

UE (MJ) = 0.101 $\times$ 7.2 – 0.504 = 0.223 MJ

E dea (MJ) = (0.101 – 0.0363) 4.9 – 0.165 = 0.152 MJ

MEc = 6.018 – (0.223 + 0.152 + 0.244 +0.049) = 5.35 MJ

MEc/1Kg soybean meal = $\frac{5,35}{0,335}$ = 15.970 MJ

Lr (Kg) (15.970 – 5.347 : 0.335)/52.2 = 0.0002 Kg

NE = 0.117 : 0.335 × 24.2 + 0.0002 × 39.4 = 8.460 MJ (2022 Kcal)

FU = $\frac{8,460}{8,067}$ = 1.05 FU/1Kg DM

Example 4. Calculation of the nutritive value of the beet

Nutrients (g; MJ)

	DM	CP	EE	CF	NFE	St	S	BFM	MJ	BV
Maintenance diet										
Nutrients	655	87	28	19	507	423	17	-	12.466	-
Digestible matter	-	70	21	9	477	423	17	46	11.117	0.52
Feedgrade beet=500g										
Nutrients	500	47	4	41	353	0	275	-	8.285	-
% digestibility	-	57	86	66	93	100	100	-	88	-
Digestible matter	-	27	3	27	329	0	275	81	7.291	0.44

BFM correction = - 0.0068 (161 - 100) = - 0.415 MJ / Kg DM beet

Sugar correction = - 0.0014 × 550 = - 0.770 Mj/ Kg DM beet

For 500 DMU the corrections are = - 0.208 MJ BFM and – 0.385 MJ S

Given the quite low dry matter content of the feedgrade beet (cca.12%) we calculated an amount of 500 g DM as dietary supplement, which produced the following values:

DCP= 70 + 27 = 97g = 0.097 Kg

DE = 11.117 + 7.291 = 18.390 MJ

BV = (70 × 0.52 + 27 × 0.44)/97 = 0.498

AP = 0.097 × 0.498 = 0.0483 Kg; Pr = (0.0483 – 0.0363) 0.9 = 0.011 Kg

DP = 0.097 – 0.011 = 0.088 Kg; PS = 0.011/0.1674 = 0.065 Kg

UE = 0.088 × 7.2 – 0.504 = 0.130 MJ; EPr = 3.6 × 0.065 + 24.2 × 0.011 = 0.500 MJ

E dea (0.088 – 0.0363)4.9 – 0.165 = 0.088 MJ

MEc = 7.291- (0.130 + 0.088 + 0.208 + 0.385) = 6.48 = MJ

MEc/1Kg feedgrade beet = $\frac{6,480}{0,5} = 12,960 MJ (3,098 Kcal)$

Lr (Kg) = (12.960 – 0.500 : 0.5)/52.2 = 0.242 Kg

NE = 0.011: 0.5 × 24.2 + 0.242 × 39.4 = 9.671 MJ (2.312 Kcal) by Kg DM

FU = $\frac{9,671}{8,067} = 1,20$ FU /1Kg DM feedgrade beet

Example 5. Calculation of the nutritive value of the fresh alfalfa cut, before budding

Nutrients (g; MJ)

	DM	CP	EE	CF	NFE	St	S	BFM	MJ	BV
Maintenance diet										
Nutrients	655	67	28	19	507	423	17	-	12.466	-
Digestible matter	-	70	21	9	477	423	17	46	11.117	0.52
Fresh alfalfa=500g										
Nutrients	400	103	13	87	151	23	4	-	7.392	-
% digestibility	-	75	46	48	77	100	100	-	66	-
Digestible matter	-	77	6	40	116	23	4	130	4.894	0.76

BFM correction = - 0.0068 (324 - 100) = - 1.523 MJ; for 400 g = - 1.523 $\times$ 0.4 = 0.609MJ

Sugar correction = 0. Because S < 8%

We calculated an amount of 400 g DM alfalfa as dietary supplement, which produced the following values

DE = 11.117 + 4.894 = 16.011 MJ

DCP = 70 + 77 = 147g = 0.147

BV = (70$\times$ 0.52 + 77 $\times$0.76)/147 = 0.646

AP = PBD $\times$ VB = 0.147 $\times$ 0.696 = 0.0949 Kg

Pr = (0.0949 – 0.0363) $\times$ 0.9 = 0.0527 Kg

DP = 0.147 – 0.0527 = 0.0943 Kg

$$SP = \frac{0,0527}{0,1674} = 0,315$$

EPr = 3.6 $\times$0.315 + 24.2 $\times$ 0.0527 = 2.409;J

UE = 0.0943 $\times$ 7.2 – 0.504 = 0.1750 MJ

E dea = 4.9 (0.0943 – 0.0363) – 0.165 = 0.1192 MJ

MEc = 4.894 – (0.175 + 0.1192 + 0.609) = 3.9908 MJ

MEc/Kg DM alfalfa = $\frac{3,9908}{0,4} = 9,977$ MJ (2.385 Kcal)

Lr (Kg)= (9.977 – 2.409 : 0.4)/52.2 = 0.075 Kg

NE = 0.0527 : 0.4 $\times$ 24.2 + 0.072 $\times$ 39.4 = 6.143 MJ (1468 Kcal) by Kg DM alfalfa

FU= $\frac{6,143}{8,067} = 0,76$ FU/Kg DM alfalfa

Comparison between the currently used nutritive values
and the values calculated with the model (by Kg DM)

	Currently used values				New values			
Feed	ME	%	NE	%	MEc	%	NE	%
Oats	3116	100	2277	100	3092	99.2	2206	96.9
Corn	3881	100	2818	100	3871	99.7	2838	100.7
Soybean meal	3890	100	2365	100	3374	86.7	2058	87.0
Beet	3148	100	2216	100	3098	98.4	2312	104.3
Fresh cut alfalfa	2158	100	1491	100	2385	110.5	1468	98.5

RESEARCHES REGARDING THE INFLUENCE OF SOME MICROELEMENTS ON THE GROWING AND FATTENING OF SWINE

CERCETĂRI PRIVIND INFLUENȚA UNOR MICROELEMENTE ASUPRA CREŞTERII ŞI ÎNGRĂŞĂRII SUINELOR

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Key words: microelements, vitamino-mineral premix, swine.

SUMMARY

For the increase the swine production it must to satisfy the requirements of microelements of this. The investigations have been in view the microelements influence (iron, copper, cobalt, manganese, zinc and iodine) upon pig growing and fattening.

From the experiments it was observed that the average daily gain, the feed efficiency and the results obtained of slaughtering were positively influenced by the introduction from different combination of microelements in the vitamino-mineral premix.

The necessity of obtaining big performances by swine put at fattening increased the attention which should be given to mineral substances, macro and microelements from their food [1].

In this paper, the influence of some microelements has been studied over the obtained results at the swines put at fattening.

Microelements arrive in the animal organism by feed which's content depend firstly on the chemical composition of soil [2]. But, usually, in the feed less quantities of microelements exist, the administration of mineral salts supply being necessary by vitamino-mineral premix [3].

1. MATERIALS AND METHODS

The researches have been made on the number of 160 pigs from the LS-345 Peris Synthetical Line, being divided in 8 batches uniformly by body weight and the ratio between sexes (table 1).

The fattening has been realised in two phases, first phase (from 25 to 50 kg) and the second phase (from 50 to 110 kg). The swine nutrition from all the 8 batches has been realised with the same compound feeds, with the recipe 0-3 in the first phase and 0-4 in the second phase (tabel 2), the differences being in the proportion of microelements from vitamino-mineral premix utilised [4]. The control batch didn't receive microelements, batch E received the complete mixture of 6 microelements and the rest 6 experimental batches received a mixture from which a microelement has been eliminated (E-Fe, E-Cu, E-Co, E-Mn, E-Zn, E-I).

Table 1

The experimental scheme

Specification	The batch							
	M	**E**	**E-Fe**	**E-Cu**	**E-Co**	**E-Mn**	**E-Zn**	**E-I**
Swine number (heads)	20	20	20	20	20	20	20	20
Experimental period (days)	120	120	120	120	120	120	120	120
Iron sulphate	-	1,53	-	1,53	1,53	1,53	1,53	1,53
Copper sulphate	-	0,25	0,25	-	0,25	0,25	0,25	0,25
Cobalt chlorure	-	0,08	0,08	0,08	-	0,08	0,08	0,08
Manganese sulphate	-	0,45	0,45	0,45	0,45	-	0,45	0,45
Zinc sulphate	-	0,76	0,76	0,76	0,76	0,76	-	0,76
Potassium iodate	-	0,10	0,10	0,10	0,10	0,10	0,10	-

Table 2

The structure and the parameters of the compound feeds used in experiment

Specification	Phase I	Phase II
Maize	67,00	68,50
Barley	8,30	8,30
Soya meal	11,00	6,50
Pea	7,00	11,50
Fish meal I	1,50	-
Yeast	2,40	2,40
L-lysine	0,15	0,18
DL-methionine	0,06	0,05
Choline premix	0,10	0,10
Calcium carbonate	0,69	0,30
Dicalcium phosphate	0,80	0,32
Salt	0,50	0,50
Vitamino-mineral premix	0,50	0,50
TOTAL	100,00	100,00
The recipes parameters		
ME (kcal/kg)	3155	3258
PB (%)	15,21	13,36
Lysine (%)	0,67	0,56
Methionine+cistine (%)	0,43	0,35
Methionine (%)	0,28	0,21
Tripthofan (%)	0,14	0,10
Treonine (%)	0,57	0,48
Calcium (%)	0,79	0,65
Phosphorus (%)	0,45	0,43
Brute cellulose (%)	3,09	3,08

The main observed targets in the experiment have been the evolution of body weight, the daily consumption and the specific consumption of compound feed, the obtained results at the slaughtering.

2. RESULTS AND DISCUSSIONS

The influence of the microelements levels administrated to the swine at fattening over the bioproductive performances unregistered by them during the whole experimental period is presented in the table 3.

Table 3

The bioproductive performances of swine registered in the experimental period

Phase	Batch	Average daily gain (g/head/day)	Average daily consumption (kg/head/day)	Specific consumption (kg compound feed/kg gain)
I	M	481	1,90	3,95
	E	553	1,86	3,36
	E-Fe	565	1,83	3,23
	E-Cu	588	1,92	3,26
	E-Co	552	1,80	3,26
	E-Mn	553	1,84	3,33
	E-Zn	598	1,90	3,18
	E-I	548	1,95	3,56
II	M	561	2,95	4,67
	E	650	2,75	4,23
	E-Fe	637	2,82	4,43
	E-Cu	632	2,86	4,52
	E-Co	584	2,68	4,58
	E-Mn	644	2,79	4,33
	E-Zn	593	2,70	4,55
	E-I	649	2,73	4,21
I+II	M	521	2,42	4,64
	E	601,5	2,34	3,89
	E-Fe	601	2,33	3,88
	E-Cu	610	2,39	3,92
	E-Co	568	2,24	3,94
	E-Mn	598,5	2,31	3,86
	E-Zn	595,5	2,30	3,87
	E-I	598,5	2,34	3,91

From the analyses of the obtained results it can be observed that the control batch has unregistered a smaller daily gain (521 g/head/day) during the whole experimental period, the experimental batches having an increase of daily gain (9,1-17,1%). It has been observed that the deficiency of cobalt from the premix has been much more felt, after which the deficiency the zinc, manganese, iodine are.

The daily consumption of the compound feed varied between 2,24-2,50 kg/head/day at the experimental batches, a small decrease been observed guarding the control batch (2,42 kg/head/day).

To show the evidence of the influence of different mixtures of microelements used in the experiment the specific consumption has been calculated, a decrease being observed in the case of the experimental batches (3,84-3,92 kg compound feed/kg gain) regarding the control batch (4,64 kg compound feed/gain). The smallest specific consumption has been realised by the swine from the batches which received cobalt, this microelement having the most important influence over the food utilisation.

The results obtained after slaughter are presented in table 4. The slaughter randament between 75,34% at the E-Mn batch and 76,67% at the E batch, which received the complete addition of microelements, the differences not being significant.

Table 4

The results obtained at the slaughter

Batch	Slaughtering randament (%)	Average thickness of fat (cm)	Meat in carcass (%)
M	75,93±0,56	2,56±0,23	48,6±0,55
E	76,67±0,64	1,98±0,19	56,2±0,32
E-Fe	76,27±0,75	2,35±0,34	52,6±0,39
E-Cu	75,45±0,53	2,25±0,41	53,6±0,42
E-Co	75,84±0,94	2,03±0,28	55,7±0,51
E-Mn	75,34±0,75	2,15±0,33	54,2±0,48
E-Zn	75,76±0,87	2,03±0,24	51,2±0,35
E-I	75,91±0,67	2,39±0,37	52,9±0,47

The meat proportion from the carcass has been bigger at the swine to each microelements have been administrated than to the ones from the control batch, so the supply administration of microelements, indifferent of the premix type, determined a smaller deposit of fat tissue. The swine from batch E received the complete mixture of microelements, presented the carcasses with the smallest proportion of fat. It is observed that also, the deficiency of cobalt determined carcasses with less fat.

The fat thickness was smaller at swine which received microelements in premix (1,98-2,39 cm) to the swine from the control batch (2,56 cm), being opposite ratio with the proportion of meat from the carcass.

3. CONCLUSIONS

1. The average daily gain obtained after the administration of different combinations of microelements was superior to all the experimental batches comparative to the control batch with 9,1-17,1%.

2. The food utilisation has been improved during the whole experimental period at swine from the batches which received microelements in premix. Similar to the weight gain, the supply of cobalt determined, generally, a better utilisation of food.

3. The obtained results at the slaughtering have been positively influenced by the supply of microelements, a significant effect having over the average fat thickness and the meat proportion from the carcass.

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RESEARCHES REGARDING THE INFLUENCE OF TWO DIFFERENT VEGETABLE OILS UPON THE FATTY ACID PROFILE OF PORKS

CERCETARI PRIVIND INFLUENTA A DOUA TIPURI DE ULEIURI VEGETALE ASUPRA PROFILULUI ACIZILOR GRASI LA PORCI

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Key words: rapeseed oil, linseed oil, pork, fatty acid profile
Cuvinte cheie: ulei de rapita, ulei de in, porc, profilul acizilor grasi

SUMMARY

Fats and oils included in animal feeds are composed of fatty acids bound to glycerol. Including fats and oils in livestock diets increases their energy content and the fatty acid composition of the pig"s diets can influence pork fat composition. In general, feedings diets with highs levels of fat or oil can result in fatter pigs. Feeding high levels of unsaturated fats can result in soft fat and hence problems with slicing bacon and sausage quality. Exceptions to generalities, however, can often create opportunities. It is generally accepted that the fatty acid composition of pork meat depends on the composition of dietary fat, the duration of the feeding treatment, the genetic type and the live weight at slaughter. In many cases, pig diets are supplemented with vegetable oils containing a high percentage of unsaturated fatty acids, favoring the production of healthy pork meat for consumer. In our coming experience we try to find which of two vegetable oils is more indicated to introduce in pig diets for obtaining a favourable fatty acid profile for human health.

1. MATHERIALS AND METHODS

In the our coming experiment, biological material was represented by a total of 20 gilts belonging to the Large White, which were kept in pens (10 animals/pen). The experiment was unroll in the last part of the finishing period of gilts, when the average weight was 94±1,2 kg. Each lot (10 animals) was fed throughout 4 weeks with a compound feed obtained by adding 2% rapeseed oil or linseed oil to the basic feed. Pigs were fed ad libitum. The gilts were weight bi-weekly and the fatty acid composition of Longissimus muscle was determined after slaughtering. Meat samples were extracted using chloroform:methanol (2:1). Fatty acid methyl esters from the triglyceride fraction were prepared by esterification using sodium methoxide in methanol. The fatty acids were identified by comparing retention times of peaks with those of methyl ester standards. The content of each fatty acid methyl esters was expressed as a percentage of total fatty acid methyl esters. All two diets were based on maize, barley, wheat and soybean meal. Diets were formulated for an equal energy and crude protein, respectively, 3150 kcal EM and 15%CP/kg.

2. RESULTS AND DISCUSSIONS

Type of dietary oil did not affect significantly ($P>0.05$) the final body weight (112.53 kg for the animal which consumed rapeseed oil in the basic compound feed and 113.9 kg for the animal which consumed linseed oil in the basic compound feed) and the mean average daily gain (0.662 and 0.710 kg/day for rapeseed oil and linseed oil, respectively) of the pigs. This demonstrates that the experimental diets did not differ for nutritional value. The oil x tissue interactions were not significant (*P*>0.05) for any variables, indicating that the oil added in the diet did not influence the fatty acid profile associated with different tissues. The mean saturated fatty acid profiles of backfat and *Longissimus* muscle fat of the two experimental groups are reported in Table 1.

Table 1

Saturated fatty acid composition of backfat and Longissimus muscle of finishing pigs fed diet added with 2% of rapeseed oil or linseed oil for the last 4 weeks

Fatty acid, g/100 g FAME	Oil		Tissue		SEM	P	
	Rapeseed oil	Linseed oil	Backfat	Muscle		Oil	Tissue
Saturated fatty acid							
C 14:0	1,08	1,15	1,11	1,13	0,025	**	ns
C 16:0	20,98	22,42	22,02	22,54	0,265	*	ns
C 18:0	13,13	13,16	13,58	12,79	0,262	ns	ns
TOTAL SFA	**35,19**	**36,73**	**36,71**	**36,46**	0,498	**ns**	**ns**

*ns=P>0.05; *=P<0.05; **=P<0.01.*

The mean unsaturated fatty acid profiles of backfat and *Longissimus* muscle fat of the two experimental groups are reported in Table 2.

Table 2

Saturated fatty acid composition of backfat and Longissimus muscle of finishing pigs fed diet added with 2% of rapeseed oil or linseed oil for the last 4 weeks

Fatty acid, g/100 g FAME	Oil		Tissue		SEM	P	
	Rapeseed oil	Linseed oil	Backfat	Muscle		Oil	Tissue
Unsaturated fatty acid							
C 16:1	1,98	2,30	1,82	2,40	0,096	*	**
C 18:1 cis 9	37,80	30,32	34,81	41,23	0,451	*	**
C 18:2 n-6	17,15	16,89	20,01	14,00	0,588	ns	**
C 18:3 n-3	1,15	2,32	1,34	0,79	0,443	**	**
CLA cis 9	0,11	0,12	0,15	0,10	0,010	ns	*
C 20:4 n-6	0,43	0,28	0,29	0,54	0,026	**	**
TOTAL MUFA	**39,78**	**32,62**	**36,63**	**43,63**	0,397	**	**
TOTAL PUFA	**18,84**	**19,61**	**21,79**	**15,43**	0,282	*	**

*ns=P>0.05; *=P<0.05; **=P<0.01.*

There was no difference for the total saturated fatty acid between the tissues of the two groups (table 1).

The results showed that the type of oil added to the diet significantly (*P*<0.05) affected the unsaturated fatty acid profile of the pig meat.

In particular, the tissues of linseed oil supplemented pigs have a higher percentage of C18:3n-3. This effect could be due to the relevant presence of C18:3n-3in linseed oil.

These results agree with data of another experiment in which finishing pigs were fed different dietary fat (Mitchaothai et al., 2007). The CLAc9 content was not affected by the dietary oil and the values observed in this trial were in agreement with those reported in other experiments in which the CLA was not added in the diet (Martin *et al.*, 2008).

The fatty acid compositions differed between the anatomical locations of adipose tissues analyzed, in particular for the MUFA and PUFA concentrations, whereas no differences were observed for the SFA. The content of MUFA was significantly higher in *Longissimus* muscle than in backfat, due to its higher concentration of C18:1cis9 and C16:1. This result did not agree with the data reported in an experiment carried out with pigs from seven different groups of genotype and sex (Monziols *et al.*,2007). The CLA cis9 concentration was significantly higher ($P<0.05$) in backfat than *Longissimus* muscle. The PUFA content was higher in backfat than in *Longissimus* muscle, in accordance with the results of Monziols *et al.* (2007).

In conclusion, the fatty acid profile of adipose finishing pig tissue was significantly affected by the fatty acid composition of the diets administered during the last four weeks before slaughtering.

The present experiment confirmed that the various adipose tissues of pig differ for their fatty composition. The backfat tissue had a higher concentration of PUFA and a lower content of MUFA than the intramuscular fat of *Longissimus* muscle. Our data demonstrate that it is possible to manipulate the fatty acid composition of diet in order to improve the health properties of the adipose tissues of pork meat.

Table 3

The unsaturated /saturated fatty acids report in oils and tissues

Fatty acid, g/100 g FAME	Oil		Tissue		SEM	P	
	Rapeseed oil	Linseed oil	Backfat	Muscle		Oil	Tissue
MUFA/SFA	1,13	0,88	0,99	1,19	0,037	*	**
PUFA/SFA	0,54	0,53	0,59	0,42	0,018	ns	**

*ns=P>0.05; *=P<0.05; **=P<0.01.*

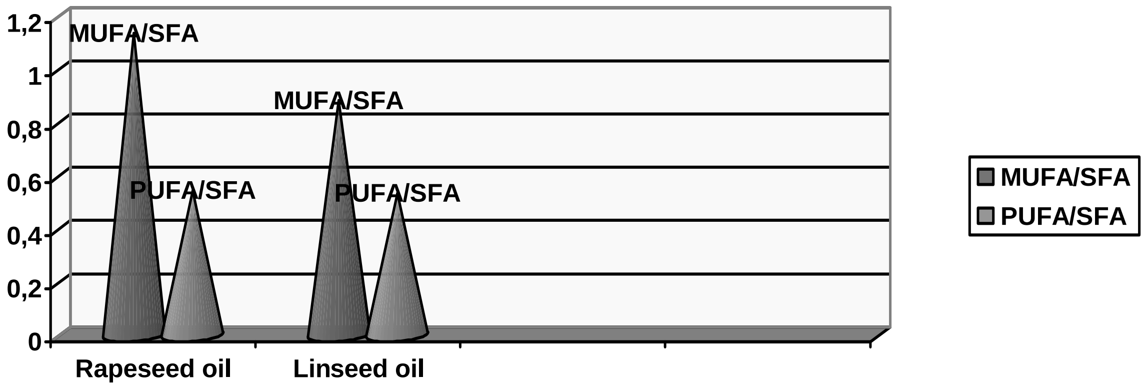

Fig. 1 The unsaturated /saturated fatty acids report in oils

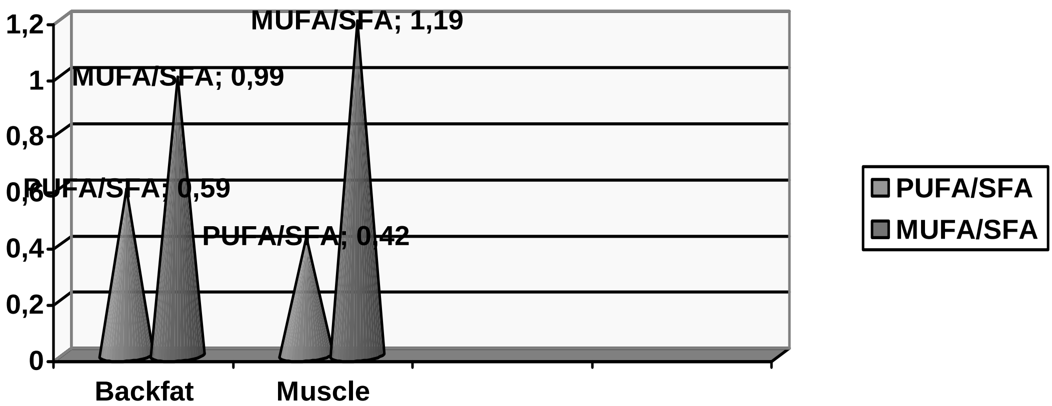

Fig. 2 The unsaturated /saturated fatty acids report in tissues

3. CONCLUSIONS

► the type of oil added to the diet significantly ($P<0.05$) affected the unsaturated fatty acid profile of the pig meat;

► the tissues of linseed oil supplemented pigs have a higher percentage of C18:3n-3;

► the CLA cis 9 content was not affected by the dietary oil;

► the fatty acid compositions differed between the anatomical locations of adipose tissues analyzed;

► the backfat tissue had a higher concentration of PUFA and a lower content of MUFA;

► the intramuscular fat of *Longissimus* muscle had a higher concentration of MUFA and a lower content of PUFA.

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STUDY RELATED TO THE EFFICIENCY OF USING PELLETED COMPOUND FEED IN THE EGG LAYING QUAILS DIET FROM THE MIXED POPULATION “BALOTESTI”

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Key words: quail, egg production, pelleted compound feed

SUMMARY

In an experiment organized at S.C. Ferma Nova S.R.L Bucharest on an initial lot of 1000 egg laying quails from the Balotesti population in the period of weeks 1- 25 of egg laying the efficiency of using the pelleted compound feed in the diet of the egg laying quails was observed. The quails have been split in two lots one which was fed with pelleted compound feed and the other one were fed with not pelleted compound feed.

Following the research, it was established that the average egg laying percentage was 5.4 % higher for the lot fed with pelleted compound feed, and the average consumption of compound feed per capita was by 10.58% smaller in the case of the lot of quails fed with pelleted compound feed an the lot of quails fed with not pelleted compound feed. The average consumption of metabolizable energy in the fodder was by 14.5% lower in the case of the egg laying quails fed with pelleted compound feed, while the average raw protein consumption was by 12.23% lower in the case of the quails fed with pelleted compound feed in comparison to the lot of quails fed with not pelleted compound feed.

1. MATERIALS AND METHODS

The initial flock on which the experiment was undertaken had 1000 egg laying quails from the mixed lot “Balotesti” (500 quails/ lot) and the duration of the experiment was 25 weeks of exploitation from the first egg laying (6 weeks of eclosion). The density used during the research was 50 capita per cage, 10 cages per lot. The first lot received pelleted compound feed, with a 2,5 granulation, from a factory of compound feed, and the second lot received not pelleted compound feed, made inside the farm. At the time of the experiment the price of pelleted compound feed was about 4% bigger than the not pelleted compound feed.

The environment conditions in which the experiment took place were in accordance with the current specialized literature in the field and they were the same for both analyzed lots.

The numerical egg production and the feed consumption have been recorded for each cage from the two lots of quails and they have been statistically analyzed; the following data have been achieved: the evolution of the average egg laying, the evolution of the average production per capita, the evolution of the average feed consumption and of the specific average consumption for the quails’ lots analyzed in the weeks 1 – 25 of egg laying, then in relation to the nourishing values of the combined feed formula and the average daily consumption of compound feed, the average consumption of metabolizable energy and nourishing substances for the period of weeks 1 – 25 of egg laying have been established. For testing the differences between the two lots the classic Student test has been used. The formula for the compound feed used in the experiment had the following structure and nourishing values:

Table 1

Structure and nourishing calculated values for the compound feed used in the two quails' lots experiment

Ingredient	Structure (%)
Corn	53.20
Groats soy	28.00
Groats sun flower	5.5
Oil	2.8
Lysine-HCl	0.20
DL- Methionine	0.20
Calcium carbonate	7.8
Dicalcic phosphate	1.5
Salt	0.30
Premix vitamin-mineral	0.50
Total	100.00

Nourishing values calculated for the compound feed formula used in the experiment	
Metabolizable energy (kcal EM/kg c.f.)	2777
Raw protein (%)	19.61
Lysine (%)	1.15
Methionine +cystine (%)	0.82
Calcium (%)	3.38
Phosphorus (%)	0.69
Raw cellulose (%)	3.82
Raw fat (%)	5.41
Vitamin A (UI/kg c.f.)	10752
Vitamin D3 (UI/kg c.f.)	2460
Vitamin E (mg/kg c.f.)	38,310
Vitamin B1 (mg/kg c.f.)	3,706
Vitamin B2 (mg/kg c.f.)	5,940
Vitamin B4 (mg/kg c.f.)	1796,780
Vitamin B6 (mg/kg c.f.)	2,000
Vitamin B12 (mg/kg c.f.)	2,010
Copper (mg/kg c.f.)	12,290
Manganese (mg/kg c.f.)	90,860
Selenium (mg/kg c.f.)	0,180
Zinc (mg/kg c.f.)	79,320
Energy protein ratio (kcal EM/PB %)	141
Lysine - methionine ratio	1,430
Calcium – phosphorus ratio	5,390

2. RESULTS AND DISCUSSIONS

THE EVOLUTION OF THE EGG LAYING PRODUCTION FOR THE QUAILS IN THE TWO LOTS IN THE PREIOD OF WEEKS 1 – 25 OF EGG LAYING

As it can be observed in table 2 and figure no. 1 the average egg laying percentage for the lot I rose from *5.32 % ± 0.34* in the first egg laying week to *87.78 % ± 1.93* in the 10th egg laying week (egg laying climax) after which a level of over 80% has been maintained until the 16th week of egg laying when the egg laying average percentage was of *80.34 % ± 2.3*. Afterwards the average egg laying percentage continued to decrease to reach a level of *64.03 % ± 2.22* in the 25th egg laying week. The average egg laying percentage for the lot II (table 2 and figure 1) has increased from *3.32 % ± 0.64* in the first egg laying week to *85.00 ± 2.25* in the 12th egg laying week (egg laying climax), and the average egg laying percentage has maintained a level of over 80% until the 14th egg laying week when an average egg laying percentage of *80.10 % ± 2.35*, and afterwards a level of 70% was maintained until the 20th egg laying week when an average egg laying percentage of *70.00 % ± 1.89* was recorded. The average egg laying percentage has continued to decrease to a level of *64.03 % ± 2.22* in the 25th egg laying week.

As it can be observed in table 2 and figure 1, **the average egg laying percentage** for the lot of quails fed with pelleted compound feed was 74.01 ± 2.34, by 5.4% higher than the lot of quails fed with pelleted compound feed where the percentage was 68.61 ± 2.12, the differences between the two lots being distinctively significant.

The average egg laying production per capita and per week for the lot of quails fed with pelleted compound feed was 5.18 ± 0.38, by 7.14% higher than the lot of quails fed with not pelleted compound feed, for which it was recorded an average production per capita and per week 4.81 ± 0.23 the differences between the two lots being not significant. **The average daily compound feed consumption** for the lot of quails fed with pelleted compound feed was 30.27 ± 0.43, by 30.27 ± 0.43 lower than the lot of quails fed with not pelleted compound feed, the differences between the two lots being distinctively significant. The specific consumption for the lot of quails fed with pelleted compound feed was 59.61 ± 1.94, by 23.76 % lower than the lot of quails fed with not pelleted compound feed for which the daily average feeding percentage was 78.19 ± 2.21, the differences between the two lots being very significant.

Table 2

The evolution of the egg production for the quails in the studied lots in the period weeks 1 – 25 of exploitation

Age (week of egg laying)	Average egg production for Lot I			Average egg production for Lot II		
	Average egg laying percentage	Average production of eggs per capita/ week	Cumu-lated egg produc-tion	Average egg laying percentage	Average production of eggs per capita/ week	Cumu-lated egg produc-tion
1	*5.32 ± 0.34*	*0.37 ± 0.07*	-	*3.32 ± 0.64*	*0.23 ± 0.10*	-
2	*35.21 ± 2.12*	*2.26 ± 0.25*	2.84	*32.31 ± 2.43*	*2.26 ± 0.22*	2.49
3	*62.12 ± 2.80*	*4.34 ± 0.25*	7.19	*58.32 ± 2.76*	*4.08 ± 0.26*	6.58
4	*77.12 ± 3.48*	*5.39 ± 0.42*	12.58	*65.00 ± 2.33*	*4.55 ± 0.38*	11.13
5	*83.87 ± 2.75*	*5.87 ± 0.32*	18.45	*68.00 ± 2.13*	*4.76 ± 0.37*	15.89
6	*84.12 ± 2.44*	*5.89 ± 0.30*	24.34	*73.00 ± 1.87*	*5.11 ± 0.31*	20.99
7	*85.12 ± 2.09*	*5.95 ± 0.19*	30.30	*77.50 ± 2.21*	*5.43 ± 0.15*	26.42
8	*85.12 ± 1.95*	*6.07 ± 0.22*	36.37	*80.56 ± 2.22*	*5.63 ± 0.18*	32.06
9	*87.33 ± 1.93*	*6.11 ± 0.25*	42.48	*82.05 ± 2.35*	*5.74 ± 0.25*	37.80
10	*87.78 ± 2.16*	*6.14 ± 0.26*	48.63	*83.10 ± 2.12*	*5.82 ± 0.33*	43.62
11	*87.22 ± 2.40*	*6.11 ± 0.30*	54.73	*84.56 ± 2.22*	*5.91 ± 0.23*	49.54
12	*86.1 ± 2.32*	*6.02 ± 0.29*	60.76	*85.00 ± 2.25*	*5.95 ± 0.38*	55.49
13	*85.00 ± 2.23*	*5.95 ± 0.27*	66.71	*82.00 ± 1.78*	*5.74 ± 0.39*	61.23
14	*83.45 ± 2.20*	*5.84 ± 0.29*	72.55	*80.10 ± 2.35*	*5.61 ± 0.22*	66.83
15	*83.23 ± 2.23*	*5.83 ± 0.33*	78.38	*78.10 ± 2.37*	*5.47 ± 0.24*	72.30
16	*80.34 ± 2.33*	*5.62 ± 0.32*	84.00	*77.11± 1.88*	*5.39 ± 0.44*	77.70
17	*79.34 ± 2.21*	*5.55 ± 0.34*	89.56	*75.00 ± 1.89*	*5.25 ± 0.43*	82.95
18	*77.29 ± 2.20*	*5.41 ± 0.35*	94.97	*74.00 ± 2.45*	*5.18 ± 0.34*	88.13
19	*76.43 ± 1.85*	*5.35 ± 0.38*	100.32	*72.00 ± 2.11*	*5.04 ± 0.33*	93.17
20	*74.22 ± 1.56*	*5.19 ± 0.33*	105.51	*70.00 ± 1.89*	*4.90 ± 0.23*	98.07
21	*71.29 ± 2.23*	*4.99 ± 0.36*	110.51	*68.00 ± 1.78*	*4.76 ± 0.32*	102.83
22	*70.34 ± 2.24*	*4.92 ± 0.33*	115.43	*65.12 ± 1.92*	*4.55 ± 0.23*	107.38
23	*69.02 ± 2.32*	*4.83 ± 0.36*	120.26	*63.13± 2.22*	*4.41 ± 0.44*	111.79
24	*68.22 ± 2.23*	*4.77 ± 0.38*	125.04	*60.11± 2.13*	*4.21 ± 0.34*	115.99
25	*64.03 ± 2.22*	*4.48 ± 0.41*	129.51	*58.00 ± 2.45*	*4.08 ± 0.45*	120.10
Average 1-25	***74.01 ± 2.34*****	***5.18 ± 0.38ns***	-	***68.61 ± 2.12*****	***4.81 ± 0.23ns***	-
Total 1-25	-	-	***129.51***	-	-	***120.10***

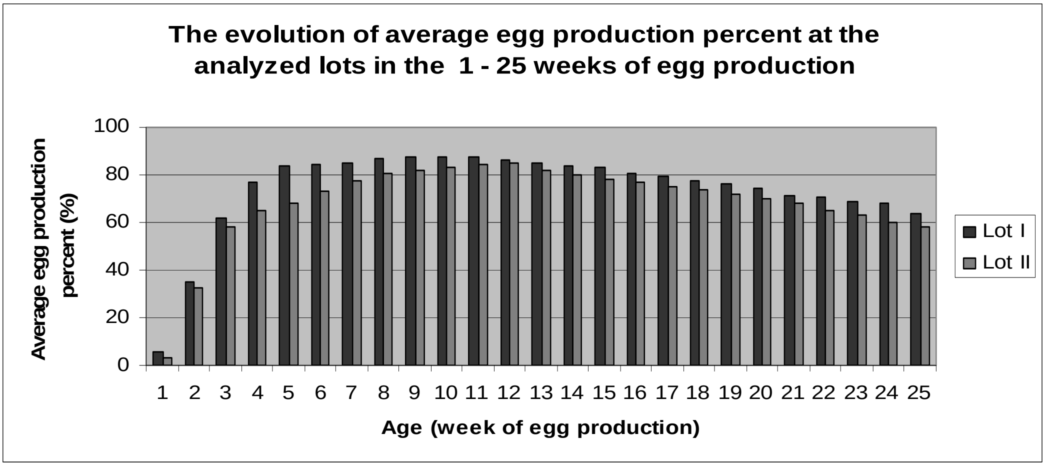

Figure 1: Graphic evolution of the average egg laying percentage for the two analyzed quails' lots in the period of weeks 1 – 25 of egg laying

ENERGY AND NOURISHING SUBSTANCES CONSUMPTION PER CAPITA/ PER DAY AND PER EGG FOR THE TWO ANALYZED LOTS OF QUAILS

Table 3

Energy and nourishing substances consumption per capita/ per day and per egg for the two analyzed lots of quails

Specification	Lot I		Lot II	
	Per capita/day	Per egg	Per capita/day	Per egg
Average consumption of metabolizable energy (kcal EM/capita/day)	84.07 ± 1.22	115.51 ± 5.39	90.13 ± 1.69	135.13 ± 6.12
Average protein consumption (g P.B./capita/day)	5.94 ± 0.009	8.17 ± 0.38	6.36 ± 0.12	9.54 ± 0.43
Average lysine consumption (g lysine/capita/day)	0.348 ± 0.005	0.479 ± 0.021	0.370 ± 0.005	0.559 ± 0.025
Average Methionine and cystine consumption (g met.+cys./capita/day)	0.2480 ± 0.0018	0.342 ± 0.015	0.266 ± 0.0018	0.399 ± 0.018
Average Tryptophan consumption (g tryptophan/capita/day)	0.0630 ± 0.0009	0.087 ± 0.004	0.068 ± 0.01	0.102 ± 0.004
Average calcium consumption (g calcium/capita/day)	1.023 ± 0.014	1.409 ± 0.005	1.09 ± 0.02	1.644 ± 0.074
Average phosphorus consumption (g phosphorus /capita/day)	0.209 ± 0.003	0.287 ± 0.013	0.223 ± 0.004	0.335 ± 0.015

As it can be observed in table 3, the energy consumption per capita and per day was by 6.72 % lower for lot I of quails than lot II of quails, while the energy consumption per egg was by 14.5% lower for lot I of quails in comparison to lot II of quails. **The consumption of raw protein per capita and per day** was by 6.60% lower for lot I in comparison to lot II of quails, while the specific raw protein consumption per egg was by 12.23% lower for lot I in comparison to lot II. **The average lysine consumption per capita and per day** was by 5.95% lower for lot I in comparison to lot II, while the specific lysine consumption per egg was by 14.31 % lower for lot I in comparison to lot II. **The average methionine and cystine consumption** per capita and per day was by 6.77% lower for lot I in comparison to lot II, while the specific methionine and cystine consumption per egg was by 14.28% lower for lot I of quails in comparison to lot II. **The average calcium consumption** per capita and per day was by 6.15 % lower for lot I of quails in comparison to lot II, while the specific calcium consumption per egg was by 14.29 % lower for lot I of quails in comparison to lot II. **The average phosphorous consumption** per capita and per day was by 6.27 % lower for lot I of quails in comparison to lot II, while the specific phosphorous consumption per egg was by 14.33 % lower for lot I of quails in comparison to lot II.

3. CONCLUSIONS

After the research the following conclusion can be highlighted:

The average egg laying percentage in the period of weeks 1 – 25 of egg laying has been by 5.4 % higher for the quails' lot fed with pelleted compound feed in comparison to the lot fed with not pelleted compound feed, the differences between the two lots being distinctively significant and **the production of eggs per capita** in the 25 analyzed weeks of egg laying was by 7.27 % higher for the lot to quails fed with pelleted compound feed in comparison to the lot of quails fed with not pelleted compound feed.

The average daily consumption of compound feed in the period of weeks 1 – 25 of egg laying for the lot of quails fed with pelleted compound feed was by 10.58 % lower than the lot of quails fed with not pelleted compound feed, the differences between the two lots being distinctively significant.

The specific consumption per egg in the period of weeks 1 – 25 of egg laying for the lot of quails fed with pelleted compound feed was by 23.76 % lower than the lot of quails fed with not pelleted compound feed, the differences between the two lots being very significant.

The average metabolizable energy per egg was by 14.5% lower for the lot of quails fed with pelleted compound feed, while the average raw protein consumption per egg was by 12.23% lower for the lot of quails fed with pelleted compound feed in comparison to the lot of quails fed with not granulated combined feed.

As a general conclusion it can be affirmed that although the pelleted compound feed was more expensive by aprox. 4 % in comparison to the not pelleted compound feed, using the pelleted compound feed in feeding the egg laying quails led to the increase by 7.27% of the production per capita, as well as a decrease of the average feed consumption by 10.58 %, aspects that led towards the idea that the pelleted compound feed can be used especially in the periods when there is a high quails' eggs demand at the farm level.

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CHEMICAL COMPOSITION AND NUTRITIVE VALUE OF SOME ECOLOGICAL AND CONVENTIONAL INGREDIENTS USED IN PIG NUTRITION

STUDII COMPARATIVE PRIVIND COMPOZITIA CHIMICĂ SI VALOAREA NUTRITIVĂ A UNOR INGREDIENTE OBTINUTE ECOLOGIC SI CONVENTIONAL, UTILIZATE ÎN ALIMENTATIA PORCINELOR

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Cuvinte cheie: porci, ingrediente, valoare nutritivă, ecologic, conventional
Key words: pigs, ingredients, nutritive value, ecologic, conventional

SUMMARY

The aim of the study presented in this paper was a comparative study of the nutritive value of several feed ingredients, produced under conventional or ecological conditions, used in pig feeding. Seven feed ingredients obtained or processed under conventional or ecological conditions were analysed by Weende determining their metabolisable energy, crude fiber, amino acids and fatty acids contents. The crude protein level in was lower in the ecological ingredients than in the conventional ones, while the crude fibre content was higher, except for the sunflower, which influenced the metabolisable energy content which also increased; the differences were not major and we must also take into consideration the fact that there are many other factors involved in plant growth. The fat level was highest in the ecological sunflower seeds. Camelina had the highest level of linolenic fatty acid.

INTRODUCTION

Food security is when all the people, at any time, have physical and economic access to enough food for an active and healthy life (FAO, 2003). The intensive animal production using chemicals often caused the resources and soil fertility to become exhausted and the agricultural production decreased in consequence. According to UNO statistics, if the current trend of soil degradation will continue, only 25% of the world population might be ultimately fed. The purpose of the ecological crops is to protect the environment and to obtain healthy ingredients. The consumers prefer to pay more for the organic food than for the conventional one (Burridge et Pierce, 1995), which fits consumer demands (Sundrum, 1998).

The ecological farms develop a link between the plants and the animals, which means that the farmer feeds his animals with own crops of forages which he fertilises with manure from his animals. There is a direct correlation between feed ingredient quality and animal products quality. In time, consumer trust has eroded by several crises which manifested in the animal feed and animal production industries such as the dioxin found in feed ingredients, the bovine encephalopathy, egg salmonella, the use of genetically modified crops in animal feeds. The European markets had large losses because the consumers were reluctant to buy animal foods, which prompted the governments to take measures and ensure animal feeds and animal products quality. The extensive production systems were in doubt whether the organic production can sustain a high quality of the carcass. There is little information on the impact of the organic ingredients on the growth, carcass quality and characteristics of pig meat (Sundrum et al, 2009). Within this context, the purpose of this paper is to present a comparative study on the nutritive value of several feed ingredients obtained under conventional and ecological conditions which were used in pig feeds. Recently there has been an increasing trend to use in feeds oleaginous seeds and their derivates such as meals, cakes and oils. The purpose of including these ingredients in animal diets is to improve animal products through the nutritional way, using dietary ingredients with a proper content of fatty acids which are beneficial to human health. If until recently oil extraction was done mainly by extraction with organic solvents, the current trend is to use cold pressing, which is 100% ecological because it uses no chemicals and maintains unaltered the polyunsaturated fatty acids. The animal trials with these feeds are in their early days worldwide, in most cases the trend being to replace the synthetic ingredients such as amino acids (Sundrum et al., 2000, Burridge et Pierce, 1995).

1. MATERIALS AND METHODS

The chemical analyses of the feed ingredients were done in the laboratory of chemistry and nutrition physiology of INCDBNA, laboratory accredited according to SR EN ISO 17025:2005 standard. The common analytical methods were performed according to clearly set working protocols as used worldwide. The following determinations were performed: dry matter (DM); crude protein (CP); amino acids; ether extractives (EE); fatty acids; crude fibre(CF); gross ash (Ash), expressed by 100 g DM. The crude protein was determined using a semiautomatic classical Kjeldahl method using a Kjeltek auto 1030 – Tecator. The fat was extracted using an improved version of the classical method by continuous extraction in solvent, followed by fat measurement with Soxhlet after solvent removal. The crude fibre was determined with a classical semiautomatic Fibertec-Tecator method and the ash by calcination at 550^0 until constant mass (Criste et al, 2003). The nitrogen-free extractives (NFE) were calculated from the formula: NFE = DM - (CP + EE + CF + Ash). The metabolisable energy (ME) was calculated with regression equations developed by the „Oskar Kellner" Institute of animal nutrition: $ME = 5.01 \times DP + 8.93\ EE + 3.44\ CF + 4.08\ DNFE$ (Stoica, 2001).

The detailed chemical composition in fatty acids was determined by gas chromatography. The principle of the method consists in transforming the sample fatty acids in methyl esters, followed by separation of the components in the chromatographic column, their identification by comparison with standard chromatograms and the quantitative determination of the fatty acids (expressed as % g fat). Sample collection and preservation was done in agreement with PSL – 18 procedure. The sample was kept under conditions which prevented any change of composition. The reference material (CRM) was a standard solution of methyl fatty acids SUPELCO 37 Component FAME Mix; 10 mg / ml, Soybean Oil and Sunflower Oil; SUPELCO. We used a Perkin Elmer-Clarus 500 chromatograph with capillary injection system (splitting ratio 1:100), with flame ion detection (FID) and programmed heated capillary oven; the separation capillary column had a high polarity stationary phase (TR-Fame, 60m × 0.25mm inner diameter, 0.25μm film); or high polarity cyanopril phase, which give a similar resolution for different geometrical isomers THERMO TR-Fame 120m × 0.25mm ID x 0.25μm film. Hydrogen was the carrier gas.

Cold pressing was used as ecologic method for oil extraction. The oils extracted with this method a better in terms of content and they preserve unaltered the nutritive quality of he seeds. The yield is 38-45% oil.

2. RESULTS AND DISCUSSIONS

Table 1 shows the chemical composition of some feed ingredients produced under conventional and ecological conditions. We determined the organic matter content (CP, EE, CF, NFE), the ME and the Ash. These nutrients were expressed in g/100 g DM because of the different DM content. ME was expressed by kg DM.

There is a lower content of crude protein and a higher fibre content in the ecologic feed ingredients. Only the sunflower seeds were exception from the higher crude fibre content, which influenced the metabolisable energy content which also increased, but the differences are minor. The fat content was the highest in the ecological sunflower seeds. We analysed a low number of ingredients, particularly ecologic ingredients, due to their high cost and to the limited crops. The producers presently wonder whether the organic procedures really are healthier, if the taste can be affected by the use of pesticides in the conventional crops and if there really are discernable nutritional differences. Very few studies have shown that the organic ingredients have a higher level of nutrients than the conventional ones (Spindler, 2007).

Table 2 shows the amino acids content, which was higher in the conventional ingredients since it depended on the protein level.

When we speak of human health, not all the fats or oils are equivalent, so that the interest for the specific fatty aids profile is quite an urgent topic for some while. Among the feed ingredients surveyed in this study, the Camelina had the highest content of linolenic acid, irrespective of the conditions of production (48.47 g/100 g fat, for the conventional Camelina 46.71 g/100 g fat for the, ecologic Camelina, Table 3). It is very important that traces of eicosanoids were detected in some conventional ingredients, knowing their favourable influence on human health. The values are close tom the data reported by Dubois, 2007.

Table 1

Chemical composition and nutritive value of the main feed ingredients produced under conventional and ecologic conditions and used in pig feeding (g/100g DM)

Ingredient	DM (%)		ME (Kcal/kg)		CP		EE		CF		Ash		NFE	
	C*	E**	C	E	C	E	C	E	C	E	C	E	C	E
Corn	87.30	87.70	3871	3802	10.49	8.06	4.50	3.14	2.60	3.64	1.60	1.21	80.80	83.93
Wheat	88.10	88.83	3636	3723	13.60	12.06	2.20	2.25	3.00	3.74	2.10	1.86	79.10	80.10
Barley	86.80	88.07	3241	3295	12.00	9.30	2.10	1.87	5.60	6.85	3.11	2.77	77.60	79.21
Peas	87.20	87.87	3626	3779	25.49	24.50	2.00	1.00	7.00	7.23	3.69	3.55	61.79	63.71
Sunflower seeds	90.90	96.56	3492	4140	17.00	15.07	29.49	38.85	28.69	23.61	3.39	2.48	21.40	19.99
Rapeseeds	92.20	92.90	4730	4432	27.90	26.03	36.10	27.86	6.29	15.09	6.40	4.14	23.30	26.88
Camelina	94.22	91.87	4737	4497	23.17	22.65	37.66	34.13	12.98	15.08	4.10	4.83	22.10	23.30

*C = conventional; values calculated according to Burlacu 2002.
** E = ecologic; samples from crops free of pesticides; samples obtained by cold pressing.

Table 2

Content of the main amino acids of some ecologic and conventional ingredients used in pig feeding

Ingredient	Lysine (g/100 g DM)		Metionine + Cystine (g/100 g DM)	
	C*	E**	C	E
Corn	0.33	0.24	0.45	0.35
Wheat	0.40	0.34	0.44	0.46
Barley	0.46	0.37	0.44	0.37
Peas	1.86	1.74	0.59	0.61
Dehulled sunflower seeds	0.71	0.66	0.70	0.65
Rapeseeds	1.62	1.58	1.55	1.25

*C = conventional; values calculated according to Burlacu 2002.
** E = ecologic; samples from crops free of pesticides; samples obtained by cold pressing.

Table 3

Chemical composition in fatty acids of some ecologic and conventional ingredients used in pig feeding (g/100 g fat)

Ingredient	Total saturated fatty acids	Total unsaturated fatty acids	Saturated fatty acids			Unsaturated fatty acids						
			Miristic C 14:0	Palmitic C 16:0	Stearic C 18:0	Palmi-toleic C 16:1	Oleic C 18:1	Linoleic C 18:2	Linolenic C 18:3	Eico-sanoic C 20:1	Eico-sadienoic C 20:2	Other
Conventional feed ingredients												
Soybeans*	15.10	84.90	0.10	10.30	3.80	0.20	22.80	51.00	6.80	0.20	-	4.80
Sunflower*	10.60	89.40	-	5.40	3.50	0.20	45.30	39.80	0.20	-	-	5.60
Rapeseds*	7.40	92.60	-	4.00	1.80	0.20	56.10	20.30	9.30	3.60	-	4.70
Corn*	13.30	86.70	-	10.90	1.80	-	24.20	59.00	0.70	-	-	3.40
Camelina**	10.43	89.57	0.19	7.76	2.48	0.21	16.57	20.22	48.47	0.47	1.55	2.08
Ecologic feed ingredients												
Soybeans **	11.82	88.18	0.07	10.02	1.73	-	16.68	65.20	6.30	-	-	-
Sunflower **	10.90	89.10	0.10	7.66	3.14	0.11	25.89	61.10	0.08	-	-	1.92
Rapeseds **	8.26	91.74	0.18	6.24	1.84	0.36	21.71	20.17	28.61	-	0.71	20.18
Corn **	14.32	85.68	0.12	12.66	1.54	0.16	25.05	59.37	1.10	-	-	-
Camelina**	4.45	95.55	-	4.45	-	-	16.13	24.51	46.71	-	-	8.20

*NRC 1998;
** INCDBNA-IBNA 2009 analyses

3. CONCLUSIONS

As expected, the nutritive value of the ecologic ingredients generally is close to that of the conventional ingredients. This study allows us to set a feeding strategy for testing on growing-fattening and finishing pigs which will allow us to observe the effects on the animal products, knowing that we can manipulate their quality through the diet.

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EFFECT OF DIFFERENT EXTENDERS ON VIABILITY PARAMETERS IN LIQUID STORAGE OF RAM SEMEN

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Key words: extender, ram, semen, storage, survive.

SUMMARY

Semen was collected via an artificial vagina from five rams. The ejaculates were pooled and diluted with five different extenders: Tris- (T), sodium citrate- (SC) and milk-based (M) and glucose phosphate (GP) extenders including egg-yolk, and AndroMed® (A) egg-yolk free diluent. The diluted semen was examined the effects of extenders on daily survive of ram sperm stored at 4 ºC up to day 14 after dilution. All sperm viability parameters were influenced by storage time and extenders ($P<0.01$). The different kinds of extenders had no effect on primary viability parameters of spermatozoa. While percentage of motile sperm and HOST value gradually decreased the live-dead and abnormal sperm rates gradually increased during the storage period. In conclusion, the spermatological features of ram semen diluted with T and SC and preserved at 4ºC for a short term was found to be better preserved in a longer period than that of diluted by M, A and GP.

1. MATERIALS AND METHODS

The study was conducted on 5 sexually mature Pirlak (Daglic x Kivircik) rams. Five extenders (T, SC, M, A and GP) were used in the present study. The extenders were prepared as follows:

Extender T: This Tris-based extender was a solution containing Tris (3.63 g), fructose (0.5 g); citric acid (1.99 g), 100 ml and mixed with 15 % (v/v) of egg yolk.

Extender SC: This sodium citrate-based extender was prepared from a 2.9 % aqueous solution of trisodium citrate and supplemented with 20 % (v/v) of egg yolk.

Extender M: This milk-based extender was prepared out of non-fatty milk powder (11 % (w/v)) and distilled water, heated to 95 ºC for 10 min., and then cooled to room temperature before the egg yolk was added (5 % (v/v)).

Extender A: This extender (egg-yolk free and concentrated medium) was a commercial AndroMed® diluent (Minitub, Tiefenbach, Germany).

Extender GP: This glucose phosphate extender was prepared from a 1.54 % Na_2HPO_4, 0.32 % KH_2PO_4, 0.62 % glucose and supplemented with 2 % (v/v) of egg yolk.

SEMEN COLLECTION AND PROCESSING

From each ram 5 ejaculates were collected every other day using an artificial vagina. Immediately after collection, the ejaculates were immersed in a warm water bath at 37ºC until their assessment in the laboratory. Each ejaculate was equally transferred to 5 tubes and diluted in the rates of 1:1 (v/v) with extenders. Prior to storage at 4ºC the first sperm viability parameters estimation was released and findings were saved as primary parameters. The daily percentage of motile, live-dead and abnormal spermatozoa and HOST values during storage at 4ºC in different extenders was estimated.

STORED SEMEN EVALUATION

Subjective motility estimations on the ram semen kept at 4ºC were repeated once every 24 h for 14 days. Percentage of motile sperm was subjectively estimated using a phase contrast microscope (Olympus CX31, Olympus Optical Co., Ltd., Japan) with warm stage at magnification 400 × according to the standard method [1]. The proportion of live-dead sperms was estimated via means of a stain mixture nigrosin-eosin [2]. The viability was assessed by counting 400 cells under phase-contrast microscope (400 × magnification).

The abnormal sperm rates were assessment according to liquid fixation method at least three drops of each sample added to Eppendorf tubes containing 1 ml of Hancock solution [3]. The percentage of total sperm abnormality (acrosomal abnormality, detached heads, abnormal mid-pieces and tail defects) was determined by counting a total of 400 spermatozoa under phase contrast microscope (magnification 1000 ×, oil immersion).

Osmotic resistance test was performed according to Buckett et al.[4] and Revell and Mrode[5], and it was evaluated according to Jeyendran et al.[6]. A total of 400 spermatozoa were counted with a phase contrast microscope (1000× magnification, oil immersion). The percentages of spermatozoa with swollen and coiled tails were assessment.

STATISTICAL ANALYSIS

Statistical analyses were performed using the Statistica® package, version 6.0 (Statsoft Inc., Tulsa, OK, USA). Means were examined by analysis of variance (ANOVA). Tukey's post hoc test was used to compare significant differences among the five extender groups for effects of days of storage on the sperm viability parameters.

2. RESULTS AND DISCUSSIONS

Prior to storage at 4ºC, the mean values of the spermatozoa motility, HOST values, dead and abnormal spermatozoa rates were found as 81.6±2.45%, 68.7±1.04%, 6.9±1.16% and 4.9±0.46% respectively, and weren't affected by the extenders ($P>0.05$). The average semen viability parameters of the first and the following days are presented in Tables.

The sperm viability is considered a valuable and reliable measure of semen quality. Normal spermatozoa lose fertilizing ability before they lose motility. While motility may assist in the transport of spermatozoa from the site of deposition to the site of fertilization, it is probably secondary to other transport mechanisms such as muscular contractility and ciliary motion of the female reproductive tract. Furthermore, abnormal spermatozoa may exhibit normal movement and yet be incapable of fertilizing an egg [1]. In addition, live-dead sperm proportions are highly correlated with visual estimates of progressively motile spermatozoa [2]. The integrity of caudal plasma membranes of spermatozoa exposed to hypoosmotic swelling, HOS test, assessed the resistance of the sperm to damage induced by the loss of permeability under the stress of swelling driven by the hypo osmotic treatment. It thus provided a form of a membrane stress-test, which is particularly useful in testing the membrane stabilizing action of the additives. The results of previous studies indicate that an intact sperm cell membrane will more closely reflect semen fertility than sperm motility [4,6].

The sperm plasma membrane is rich in polyunsatured fatty acids and is therefore susceptible to peroxidative damage with consequent loss of membrane integrity, decreased sperm motility, and eventually loss in fertility, resulting from reactive oxygen species during aerobic incubation [7,8,9]. The sperm motility of ram semen diluted with different extenders was gradually decreased during the storage period in this study (Table 1), and in accordance with the other references [10,11,12].

Table 1

Mean (± S.E.M.) values of daily subjective sperm motility of rams and statistical analysis during storage at 4 ºC in different extenders (n : 25)

Days	Percentage of motile spermatozoa				
	T	**SC**	**M**	**A**	**GP**
1	78.0±3.7^{Aa}	74.0±2.4^{Aa}	72.0±3.7^{ABa}	72.0±2.0^{ABa}	68.0±2.0^{Ba}
2	69.0±4.7^{Aa}	70.0±0.2^{Aab}	66.0±4.2^{ABab}	58.0±4.9^{Bb}	52.0±2.0^{Bb}
3	59.0±3.7^{Ab}	62.0±3.7^{Abc}	58.0±3.8^{Abc}	48.0±3.7^{Bc}	12.0±8.0^{Cc}
4	56.0±2.0^{Abc}	56.0±5.1^{Ac}	46.0±5.1^{Bcd}	38.0±2.0^{Bd}	0^{Cd}
5	47.0±2.4^{Acd}	42.0±3.7^{Ad}	28.0±3.6^{Bde}	28.0±2.0^{Be}	
6	42.0±2.0^{Ad}	26.0±5.1^{Be}	16.0±4.1^{Cef}	18.0±2.0^{BCf}	
7	38.0±2.0^{Ad}	14.0±5.1^{Bf}	8.0±4.4^{Bfg}	8.0±2.0^{Bg}	
8	34.0±2.0^{Ade}	6.0±4.0^{Bfg}	6.0±4.2^{Bg}	2.0±2.0^{Bg}	
9	26.0±2.4^{Aef}	4.0±2.4^{Bg}	2.0±2.0^{Bg}	0^{Ch}	
10	24.0±2.4^{Af}	2.0±2.0^{Bg}	0^{Ch}		
11	14.0±2.4^{Ag}	0^{Bh}			
12	12.5±2.5^{Ag}				
13	10.0±10.0^{Ag}				
14	0^{Ah}				

A-C: The different superscript uppercase letters in each row are statistically different among extenders ($P<0.05$).
a-h: The different superscript lowercase letters in each column are statistically different among days ($P<0.05$).

Liquid storage of ram semen at room temperature does not maintain the fertilizing ability of sperm for several days. However, Holt and North [13] observed that in ram semen maintained at 5 ºC there were changes in plasma membrane induced by cold. A decrease in hypoosmotic resistance of sperm has been observed after storage in this study (Table 2). Simpson and White [14] also reported that plasma membrane of ram sperm may suffer subtle but irreversible damage in slow cooling.

Table 2

Mean (± S.E.M.) values of HOST of ram sperm and statistical analysis during storage at 4 ºC in different extenders (n : 25).

Days	HOST percentages				
	T	**SC**	**M**	**A**	**GP**
1	68.8 ± 0.6^{Aa}	68.5 ± 8.4^{Aa}	62.4 ± 1.8^{ABa}	53.0 ± 3.9^{Ba}	66.1 ± 3.8^{Aa}
2	63.7 ± 0.8^{Aab}	65.1 ± 0.9^{Aab}	51.6 ± 3.1^{ABb}	43.8 ± 2.6^{Bab}	56.7 ± 7.2^{ABa}
3	61.1 ± 1.2^{Aab}	60.1 ± 2.5^{Aabc}	33.9 ± 3.6^{Bc}	34.0 ± 2.7^{Bbc}	13.8 ± 6.9^{Cb}
4	57.3 ± 1.6^{Ab}	58.3 ± 2.9^{Abc}	26.4 ± 2.9^{Bcd}	32.8 ± 2.3^{Bcd}	
5	54.2 ± 1.9^{Abc}	51.7 ± 2.7^{Acd}	22.6 ± 3.4^{Bd}	28.8 ± 1.2^{Bcd}	
6	46.9 ± 2.6^{Acd}	43.3 ± 6.5^{Ad}	17.8 ± 4.8^{Bd}	23.9 ± 2.9^{Bde}	
7	38.4 ± 1.2^{Ade}	30.2 ± 9.1^{Ae}	4.8 ± 4.8^{Ce}	16.9 ± 5.7^{Bef}	
8	34.1 ± 1.5^{Aef}	17.7 ± 7.2^{Bf}	4.2 ± 4.2^{Ce}	13.8 ± 3.8^{BCf}	
9	33.4 ± 2.2^{Aef}	7.4 ± 4.6^{Bg}	3.4 ± 3.4^{Be}		
10	26.4 ± 4.6^{Af}	2.6 ± 2.6^{Bg}			
11	26.1 ± 4.1^{Af}				
12	24.7 ± 2.2^{Af}				
13	13.6 ± 2.1^{Ag}				

A-C: The different superscript uppercase letters in each row are statistically different among extenders ($P<0.05$).
a-g: The different superscript lowercase letters in each column are statistically different among days ($P<0.05$).

Egg yolk was found to reduce the rate of peroxidation in ram sperm [15], although Jones and Martin [16] found that increase the percentage of egg yolk enhanced the toxicity of dead sperm in semen stored at room temperature. The study indicated that live-dead sperm rate was lower in diluted with T (including 15 % egg yolk) and SC (including 20 % egg yolk) than in diluted with M (including 5 % egg yolk), GP (including 2 % egg yolk) and A (egg yolk free) (Table 3). Furthermore, within an aerobic or even a partially aerobic medium, the production of reactive oxygen is inevitable [8]. During the present study, semen samples were stored in closed tubes, but the space between the upper part of the tube and semen surface might have contained enough oxygen to maintain the aerobic metabolism of the spermatozoa between assessments. Storage at 4 ºC does not completely arrest spermatozoa metabolism; therefore, the accumulation of the toxic products, including free radicals, might be involved in the damage suffered by spermatozoa. The effects of peroxidation on ram spermatozoa include irreversible loss of motility, inhibition of fructolysis and respiration, and structural damage to the plasma membrane [17].

Table 3

Mean (± S.E.M.) values of live-dead sperm proportion of rams and statistical analysis during storage at 4 ºC in different extenders (n : 25)

Days	Live-dead sperm proportion				
	T	**SC**	**M**	**A**	**GP**
1	7.7±0.3^{Bk}	7.7±1.0^{Bf}	7.3±0.4^{Bi}	9.6±0.8^{Ag}	9.3±1.4^{Ac}
2	8.4±0.4^{Cjk}	8.2±1.2^{Cf}	12.6±1.2^{Ah}	12.8±1.4^{Af}	11.1±1.5^{Bb}
3	9.3±0.5^{Cj}	9.4±1.5^{Ce}	14.8±1.4^{Ag}	13.9±1.4^{Be}	15.0±1.1^{Aa}
4	11.9±1.3^{Ci}	10.1±1.1^{De}	16.9±1.7^{Af}	14.9±1.0^{Bde}	
5	12.7±1.2^{Chi}	13.5±1.1^{Cd}	18.6±1.9^{Ae}	15.7±1.2^{Bd}	
6	13.7±0.9^{Cgh}	14.4±1.2^{Ccd}	21.8±2.2^{Ad}	17.0±1.1^{Bc}	
7	14.0±1.2^{Cfg}	14.8±1.6^{Cc}	24.3±4.6^{Ac}	18.9±1.1^{Bb}	
8	14.9±1.1^{Cef}	15.1±0.2^{Cc}	26.1±5.2^{Ab}	21.1±1.0^{Ba}	
9	15.5±1.1^{Ce}	17.4±0.6^{Bb}	32.4±6.3^{Aa}		
10	18.4±1.2^{Ad}	18.6±1.6^{Aa}			
11	23.2±1.9^{Ac}				
12	25.3±2.9^{Ab}				
13	36.0±0.0^{Aa}				

A-D: The different superscript uppercase letters in each row are statistically different among extenders (P<0.05).
a-k: The different superscript lowercase letters in each column are statistically different among days (P<0.05).

Cellular metabolism is not completely avoided during liquid storage. There is a gradual decrease in motility and morphological integrity, and a rapid decrease in fertility [18]. It was reported that organic peroxides are produced when ram semen is held at 5 ºC and that this accumulation is related to the sperm quality loss [19,20,21]. Maxwell and Stojanov [22] added some antioxidants to diluent Tris-glucose-egg yolk 20 % (v/v) for liquid storage, and these antioxidants improved both the survival and acrosome integrity of sperm during liquid storage at 5 ºC, although the beneficial effects of the antioxidants were not maintained throughout the 12 days of storage. The abnormal sperm rate in this work showed that gradually increased during the storage period (Table 4).

Comparison between extenders and daily values of sperm viability parameters were tested to estimate changes during the storage period. This revealed that there were significant changes from first day onwards. The differences between both storage period and extenders might be due to contents of diluters especially the glucose and egg yolk lypoproteins may have positive effects on the sperm. The energy source of sperm run off and the sperm viability decrease may originate from the metabolic activity under 4 ºC and the pH changed by the metabolic products, resulting in intoxication. Results in this study showed that the semen quality parameters dramatically declined during the days of storage. In the ram semen diluted with T and SC extenders and stored at 4ºC, spermatozoa motility could be maintained at greater rate than 50% for only 4 days. This interval decreased to 3 days in M and 2 days in A and GP. The same findings were reported in rams [10,19,20,23,24], in boars [25,26], in bulls [27].

Table 4

Mean (± S.E.M.) values of abnormal sperm rate of rams and statistical analysis during storage at 4 °C in different extenders (n : 25)

Days	Percentage of abnormal sperm				
	T	SC	M	A	GP
1	5.4 ± 0.5^{Ak}	5.7 ± 0.8^{Ae}	5.5 ± 0.8^{Ah}	5.3 ± 0.7^{Ae}	5.8 ± 0.5^{Aa}
2	5.9 ± 0.4^{Bjk}	5.9 ± 0.9^{Be}	7.9 ± 0.9^{Ag}	5.6 ± 0.8^{Be}	6.3 ± 0.8^{Ba}
3	6.1 ± 0.5^{Bjk}	6.2 ± 0.8^{Bde}	9.2 ± 0.8^{Af}	5.9 ± 0.9^{Bde}	6.7 ± 0.9^{Ba}
4	6.8 ± 0.4^{BCij}	7.2 ± 0.7^{Bcd}	11.6 ± 2.1^{Ae}	6.1 ± 0.8^{Cde}	
5	7.5 ± 0.4^{BChi}	8.3 ± 1.9^{Bbc}	12.1 ± 2.6^{Ae}	6.7 ± 1.1^{Ccd}	
6	8.1 ± 0.3^{Bgh}	8.5 ± 1.6^{Bb}	14.3 ± 1.9^{Ad}	7.7 ± 1.4^{Bc}	
7	8.7 ± 0.3^{Dg}	13.7 ± 3.2^{Ba}	15.6 ± 2.3^{Ac}	10.9 ± 2.4^{Cb}	
8	8.9 ± 0.4^{Dfg}	14.8 ± 5.2^{Ca}	16.7 ± 3.1^{Ab}	16.1 ± 4.6^{Ba}	
9	10.2 ± 0.6^{Ce}	15.1 ± 5.1^{Ba}	18.8 ± 3.6^{Aa}		
10	12.1 ± 0.8^{Bd}	15.6 ± 6.6^{Aa}			
11	14.3 ± 0.4^{Ac}				
12	17.1 ± 0.9^{Ab}				
13	18.5 ± 2.6^{Aa}				

A-D: The different superscript uppercase letters in each row are statistically different among extenders (P<0.05).
a-k: The different superscript lowercase letters in each column are statistically different among days (P<0.05).

3. CONCLUSIONS

It was concluded that tris-, sodium citrate- and milk–power extenders were more suitable as diluters than AndroMed® and glucose phosphate extenders for ram semen. Nevertheless, AndroMed® and glucose phosphate may be used alternatively as an extender alone in dilution for short periods in farm conditions, if necessary.

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EVALUATION OF PREGNANCY RATIO WITH RESPECT TO OESTRUS SYMPTOMS AND DOMINANT FOLLICLE LOCATION AT ARTIFICIAL INSEMINATION TIME IN COWS

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Key words: Cow, ferning, fertility, follicle, insemination, oestrus.

SUMMARY

The present study was conducted to evaluate the pregnancy rates together with ovulatory follicle location and to investigate which of the oestrus symptoms have positive effect on pregnancy success in two cow breeds under field conditions. The clinical findings of spontaneous oestrus signed cows were examined by clinical observation. Thereafter, all cows were inseminated by frozen-thawed semen. The overall mean values of pregnancy rate were recorded as 69.09 % and 65.12 % in Brown Swiss (BS) and Simmental (S) cows respectively, and no breed effect was found. The highest pregnancy rate (92.0 % for BS and 82.68 % for S) was achieved with inseminated range of 14.0-18.0 mm in ovulatory follicle sized cows, and no breed effect was determined, either. An additional, significantly ($P<0.01$) high fertility was observed to increase in rectal and vaginal temperature, vulvar oedema, vaginal hyperemia and cervical mucus ferning. The ovulatory follicle was located more often ($P<0.01$) on the right (67.27 % in BS and 60.47 % in S) than the left ovary (32.73 % in BS and 39.53 % in S), but there was no effect of location of the ovulatory follicle on the pregnancy rate. It was concluded that high pregnancy rates were obtained in spontaneously oestrus signed and inseminated cows which have maximum vulvar oedema, vaginal hyperemia and ferning of cervical mucus but have moderate ovulatory follicle size.

1. MATERIALS AND METHODS

This work was performed in Afyonkarahisar province, Turkey. Oestrus detection was carried out at the clinical unit of Faculty of Veterinary Medicine of Afyon Kocatepe University. A total of 110 multiparous Brown Swiss and Simmental cows were used in the research as material and the means of animal age were 5.38 ± 0.26 and 4.51 ± 2.12 years respectively. Each animal was in oestrus according to it owner were food conventionally. Body conditions of all animals were subjectively scored from 1 to 5 and all animals were 3-4.

The clinical examinations were assessed for rectal and vaginal temperature (was recorded directly via thermometer ºC), vaginal pH (was measured by pH test paper.) and hyperemia (was estimated 1 to 3), ferning of cervical mucus (score was calculated from 1 to 3 on mucus dried on a glass side with light microscope equipment) and vulvar oedema (was scored 1 to 3) (5,11,23). Ovarian follicular examination was monitored using the method of transrectal ultrasonography described by Pierson and Ginther (16). Ultrasonography was carried out using a real-time B mode ultrasound scanner fitted with a 6 mHz Linear array probe (Concept 2000, Falco, Esaote pie Medical). The dominant follicle sizes were measured. In addition, cows with undetected oestrus and variety of other reproductive abnormalities during the research period must be excluded from consideration.

Clinically oestrus and follicle sized cows that have clear uterine body were artificially inseminated with recto-vaginal method by frozen-thawed semen. Semen which it was produced by official organ The Agriculture Ministry of The Republic of Turkey, were prepared within classical procedure according to Jainudeen and Hafez (8) and also spermatozoa within straw had enough motility which it was subjectively estimated at 400 X magnification using a light microscope with a warm stage. The pregnancy were determined by questioned the owner of cows about returning, and then it was confirmed with rectal palpation and USG on 16-60th days after following AI.

All statistical analyses were carried out using SYSTAT for windows (Inc. 1800 Sherman Ave. Evanston, IL USA, 1992). The characteristics of follicle size, oestrus signs and return or non-return cows were compared by student *t*-test. The mean differences in the NRR for cows in oestrus signs were analyzed using chi-square test. The relationships between pregnancy and oestrus signs findings were studied by calculating Pearson coefficients. Differences were considered as statistically significant at the P<0.05 level. Results are presented as means ± standard error of the mean (30).

2. RESULTS AND DISCUSSIONS

Characteristics of the clinical examination of oestrus signs at insemination times in cows are summarized in Table 1. The parameters were ranged from 36.8ºC to 39.4ºC for rectal temperature, from 37.8ºC to 39.8ºC for vaginal temperature, from 1 to 3 for vulvar oedema, vaginal hyperemia and ferning of cervical mucus, from 6.0 to 8.0 for vaginal pH and from 7.0 mm to 25.0 mm for ovulatory follicle size in all cows and no breed effect was found. The pregnancy rate of vulvar oedema, vaginal hyperemia, ferning of cervical mucus and ovulatory follicle size was exhibited in Figure. The pregnancy rate and the ultrasonic findings of ovulatory follicle sizes and locations at insemination times in cows are presented in Table 2. The ovulatory follicle was located more often (P<0.01) on the right than the left ovary in all cows. There was no effect of breed and location of the ovulatory follicle on the pregnancy rate. And also, all animals were divided into subgroups consist of (1) <12 mm (2) 12.0-13.99 mm (3) 14-15.99 mm (4) 16.0-17.99 mm (5) 18.0-19.99 mm (6) 20.0-21.99 mm and (7) ≥22.0 mm considering to the ovulatory follicle sizes (Figure). But it was not observed the pregnancy in 1st and 7th groups. The pregnancy rates were significantly (P<0.01) high in 3rd and 4th groups (Figure). Correlations among the visual examination findings of oestrus signs at insemination time in cows were carried out. It was observed positively collective correlations among rectal and vaginal temperatures (r: 0.729, P<0.01), vaginal hyperemia both ferning of cervical mucus (r.0.561) and pregnancy rate (0.460) (P<0.01), and also ferning of cervical mucus and pregnancy rate (r: 0.603, P<0.01) in all animals.

The results of the present study indicated that pregnancy rates were noticeably high inseminated of the rectal and vaginal temperature, vulvar oedema, vaginal hyperemia and ferning of cervical mucus were high in cows (Table 1, 2 and Figure). The same trends were noted previously for cows as increase in body temperatures (29), vulvar oedema, vaginal hyperemia and ferning of cervical mucus but also decrease in vaginal pH (13,28). However, vaginal pH was no effect on pregnancy rate in this study. The difference may be resulted from evaluation time and technique.

In cows, delayed ovulation following estrus minimizes the chances of successful fertilization due to the short fertile lifespan of gametes (6, 17, 27). Contributing factors for decreased inseminated pregnancy rates in cows are subjected to premature estrus and/or ovulation, ovulation from smaller sized follicles resulting in low lifespan.

The contributing factors from bulls might be differences in post-thaw sperm viability, progression of spermatozoa in the female internal genital tract and the resultant sperm reservoir, capacitation, acrosome reaction and fertilizing capacity (15,26). This determines the presence of spermatozoa during different stages of capacitation and sperm viability before ovulation thus increasing the odds of fertilization (10). The lifespan of the oocyte is determining factor for successful fertilization, which means the oocyte is waiting for the arrival of eligible sperm. Inadequate oocyte development is another possible explanation for embryonic/fetal mortality when small follicles were induced to ovulate (1,12,14). Little is known about variation that exists in oocyte quality among bovine preovulatory follicles. In the present study, spontaneous oestrus and ovulation occurred and the highest pregnancy rate was achieved in cows which were inseminated the ovulatory follicle size range were about 14-18 mm (Table 2 and Figure 1). Consequently, when a follicle has matured and is capable of initiating the cascade of events leading to ovulation, a viable embryo can develop according to follicular size.

The follicular activity in cattle is known to be greater in the right than the left ovary (2,4,18,20). Indeed, it was observed that approximately 67.27 % for BS and 60.47 % for S of dominant follicles developed in the right ovary. This is consistent with the present results as well as those of Townson et al. (24), in that ovulations occurred more frequently in the right ovary. In contrast, other studies (7,21) found no such differences in location of the dominant follicles. These differing results cannot be attributed solely to reproductive status, as the study used cows, whereas the others used heifers. Of further interest is that in cows of the present study, there was a tendency for pregnancy to increase when ovulation occurred from the right ovary. The reasons for this observation are unclear at this time although it is not due to a higher incidence of fertile oocytes from the right ovary. In fact, the analysis showed that there was no interaction between location of the ovulatory follicle and pregnancy rate (Table 2).

It was evaluated the relationships between the pregnancy rate and the clinical examination findings of oestrus signs in cows. Especially, pregnancy rate was positively correlated with vulvar oedema, vaginal hyperemia and ferning of cervical mucus ($P<0.01$). It was showed that these findings support the hypothesis that visual estrous signs are indication of the ovulatory follicle size in cows undergoing spontaneous oestrous cycles and the findings were in accordance with the references findings that pregnancy rates were correlated with some oestrus signs (3,9,19,22,25).

Table 1

Overall mean values of oestrus signs at insemination time in cows (Means± S.E.M.)

Cows	*n*	*Rectal temperature (ºC)*	*Vaginal temperature (ºC)*	*Vulvar oedema (1-3)*	*Vaginal hyperemia (1-3)*	*Vaginal pH (5.5-9.0)*	*Mucus ferning (1-3)*	*Ovulatory follicle size (mm)*	*Pregnancy rate (%)*
Brown Swiss	55	38.39 ± 0.04	38.66 ± 0.04	2.66 ± 0.07	2.64 ± 0.08	7.21 ± 0.07	2.56 ± 0.09	16.29 ± 0.44	69.09
Simmental	55	38.55 ± 0.59	38.91 ± 0.41	2.64 ± 0.07	2.56 ± 0.08	7.21 ± 0.05	2.51 ± 0.08	16.99 ± 0.51	65.12

Table 2

Overall mean values regarding the dominant follicle at insemination time in cows

Cows	*n*	*Location of follicle (%)*		*Ovulatory follicle size (Means± S.E.M., mm)*		*Pregnancy rate (%)*	
		Right	Left	Right	Left	Right	Left
Brown Swiss	55	67.27^{a}	32.73^{b}	15.97 ± 0.59	16.96 ± 0.59	70.27	66.67
Simmental	55	60.47^{a}	39.53^{b}	16.80 ± 0.64	17.28 ± 0.87	65.39	64.71

a–b: The different superscript lowercase letters in each row are statistically different (P< 0.01).

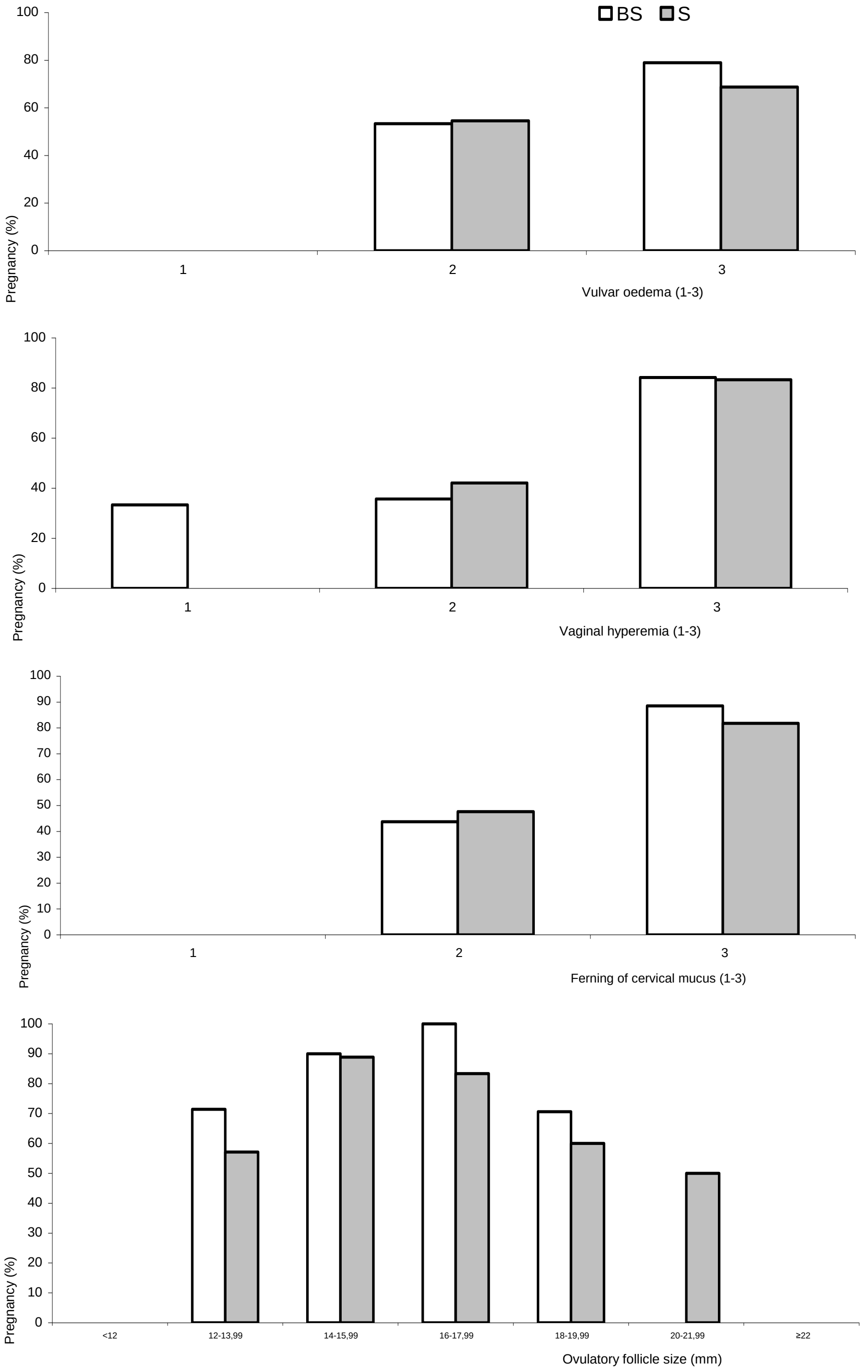

Figure 1. The pregnancy rates of vulvar oedema, vaginal hyperemia, ferning of cervical mucus and different dominant follicle size at insemination time in Brown Swiss (BS) and Simmental (S) cows.

3. CONCLUSIONS

In conclusion, pregnancy rates were high in cows undergoing spontaneous oestrus period inseminated that vulvar oedema, vaginal hyperemia and ferning of cervical mucus were very clear and high with moderate ovulatory follicle sized. Therefore, the exhibiting behavioral oestrus can be evaluated with ovulatory follicle size and ferning of cervical mucus, and management practices that optimize ovulatory follicle size may improve fertility. Particularly, it is developed and/or created a practical, minor and mobile device insist of microscope equipment to use in veterinary practice for determination of the cervical mucus ferning, it may be guide to arrange of the optimal insemination time and thus pregnancy may be boosted with using the tool.

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RELATIONS BETWEEN TEMPERATURE-HUMIDITY INDEX AND THYROID HORMONES (T3, T4) IN WHITE GOATS

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Key words: goat, T4, T3, temperature-humidity index.

SUMMARY

In this research, seasonal changes of T4 (Thyroxine) and T3 (Triiodothyronine) hormones in the white goat breed have been investigated. Furthermore, relations between the changes of temperature-humidity index values and the changes of T3 and T4 hormones during one year period have been compared. In the white goat breed, it has been determined that T3 and T4 values show decrease in summer depending on the increase in THI values.

In farm animals; the performances having economic importance (like breed, meat, milk, hair, and egg) are controlled basically by the cell physiology. The cell physiology has main elements of hormonal and biochemical processes and their genetic control mechanisms.

Hormones are effective in maintaining body's internal stability in harmony with outer conditions, growth, development, reproduction, and in producing, utilizing, and storing energy. Hormones have very important functions by themselves or together with the nervous system (Yılmaz 1999).

Changes in the functions of thyroid hormones in animals play an important role in balancing their metabolic stability against different environmental conditions and dietary changes. This situation shows much more importance in the traditional farming of small ruminant animals, where especially properties like feeding, reproduction and hair growth show dependence on the season (Todini 2007).

In goats, many number of researches incorporating the effects of different factors (breed, age, sex, physiological condition, climate, season, diet) have been conducted for determining the effects of T4, T3 and testosterone hormones in realization of the seasonal functions of reproduction, lactation, and hair growth (Colavita et al. 1983; Riis et al. 1985; Emre and Garmo 1985; Kloren et al. 1993 a,b; Puchala et al. 2001; Celi et al. 2003; Todini 2007). Again in recent years, many researches are under way regarding the analysis of interactions between the climate change due to global warming and the traditional and industrial goat production. In this declaration of two separate researches, seasonal changes of T4, T3, and testosterone hormones have been determined for the white goat breed in Turkey. In addition, some results have been presented regarding the interactions between temperature-humidity index (THI) and the changes of T4 and T3 hormones. In this respect, it has been intended to contribute to researches regarding analyses of physiologies of production processes in goats in Turkey and to researches oriented towards newly-developing global warming and animal reproduction issues.

1. MATERIALS AND METHODS

1.1 MATERIAL ANIMALS AND HORMONE ANALYSIS METHOD

As can be seen from Table 1, the materials of the research consist of white goats of different age and sex.

Table 1

Scientific researches regarding THI-dependent changes of thyroid hormones in white goats

	n	**Sex**	**Age**	**Analysis Period**	**Hormone**	**Analysis Method (*)**	**Laboratory (**)**	**Reference**
White Goat	5	Female	2	12 mos.	Total T4/T3	CMIA	AUTFEL	Koser Elicin 2008
	5	Female	3	12 mos.				
	5	Female	4	12 mos.				
	4	Female	2	12 mos.	Total T4/T3	EIA	AUZFZBEHL	Dellal et al. 2008
	5	Female	3	12 mos.				
	5	Female	4	12 mos.				
	3	Male	2	12 mos.	Total T4/T3			
	6	Male	4	12 mos.				

***: AUZFZBEHL:** Ankara University Agriculture Faculty Zootechni Department Endocrinology and Animal Reproduction Laboratory; **AUTFEL:** Ankara University Medicine Faculty Elisa Laboratory.
****: CMIA:** Chemiluminescent Microparticle Immunoassay; **EIA:** Enzymeimmunoassay.

1.2. TEMPERATURE-HUMIDITY INDEX

THI value is used to describe the human heat loading causing stress in thermal climate environments (Silanikove, 2000). THI, in a certain day, is generated from wet and dry thermometer temperatures and is defined with the formula below:

$$THI = 0.72 (W^0C + D^0C) + 40.6$$

THI = Temperature-Humidity Index value
W^0C = Wet bulb
D^0C = Dry bulb

In point of stress caused by temperature, a THI value 70 or below means comfort, a THI value between 75 and 78 means temperature oppression; and a THI value above 78 means that animal can not preserve its normal body temperature (Silanikove 2000).

2. RESULTS AND DISCUSSIONS

2.1. T4 AND T3 (KOSER ELICIN 2008)

For female white goats, the results for T4 and T3 hormones and THI value changes during one year period are given in Table.2 and Figure.1. As can be seen in Table.2, the general averages of T3 and T4 hormones in one year period from December to November, are 100.60±11.00, 56.00±6.59, 103.27±7.30, 95.87±5.4, 91.67±5.36, 64.00±3.75, 89.67±4.55, 88.80±6.42, 78.07±6.11, 96.07±4.96, 99.27±7.76, 96.40±7.77 ng/dl and 4.66±0.358, 3.11±0.359, 5.22±0.256, 5.14±0.370, 3.36±0.181, 2.89±0.132, 3.36±0.26, 3.49±0.191, 3.53±0.227, 4.03±0.114, 4.21±0.199, 4.04±0.305 µg/dl respectively. The differences between these values are in general important ($P<0.05$).

Table 2

Results for T4 and T3 changes in White Goats (Koser Elicin 2008)

MONTHS	THI	T3				T4			
		Age 2	Age 3	Age 4	General (n:15)	Age 2	Age 3	Age 4	General (n:15)
December	42.76	107.8	77.8	116.2	100.60	4.49	4.26	5.23	4.66
January	35.34	66.8	47.4	53.8	56.00	3.22	2.98	3.13	3.11
February	45.02	123.4	94.0	92.4	103.27	5.09	5.34	5.21	5.22
March	46.79	97.8	84.2	105.6	95.87	4.33	5.62	5.46	5.14
April	56.94	98.2	80.2	96.6	91.67	3.50	3.23	3.37	3.36
May	59.50	67.2	63.0	61.8	64.00	2.89	3.07	2.72	2.89
June	62.81	96.2	78.8	94.0	89.67	3.50	3.02	3.56	3.36
July	70.73	104.4	78.8	83.2	88.80	3.63	3.30	3.53	3.49
August	76.45	90.0	66.4	77.8	78.07	3.39	3.37	3.81	3.53
September	63.42	110.4	89.6	88.2	96.07	3.96	4.24	3.89	4.03
October	53.74	102.0	96.6	99.2	99.27	4.31	3.99	4.33	4.21
November	48.44	108.6	78.2	102.4	96.40	3.71	3.64	4.75	4.04
General (Y.M.)	-	**97.73**	**77.92**	**89.27**	**88.30**	**3.83**	**3.84**	**4.08**	**3.92**

***: Y.M.:** Year's Mean value.

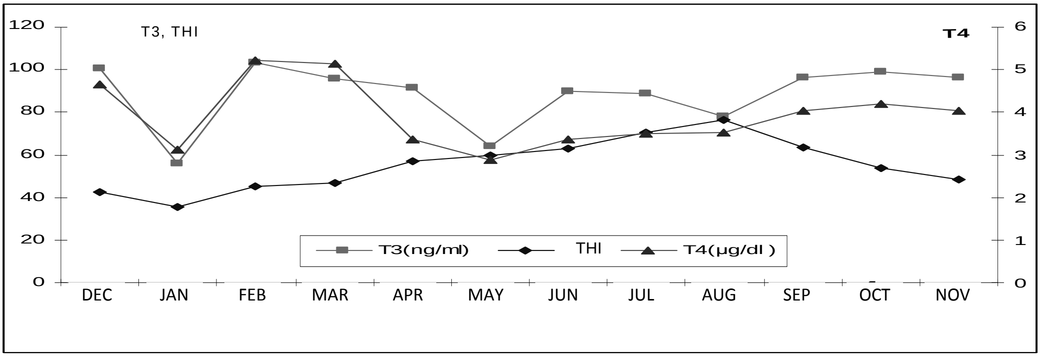

Figure 1. Graphical illustration for the changes of T4 (µg/dl) and T3 (ng/dl) hormones with regard to THI values.

2.2. T4, T3 AND TESTOSTERONE (DELLAL ET AL 2008)

For female and male white goats, the results for T4, T3 and testosterone hormone changes are given in Table.3 and Figure.2&3. The general averages of T3 and T4 hormones in one year period from January to December, are 106.07±5.28, 109.57±7.24, 105.14±5.96, 100.67±6.19, 99.02±5.66, 97.24±3.60, 90.80±2.88, 87.74±5.38, 103.34±5.76, 110.48±8.48, 125.23±7.24, 114.32±6.56 ng/dl and 4.54±0.20, 4.63±0.17, 4.44±0.28, 3.90±0.31, 3.46±0.20, 2.96±0.16, 2.64±0.17, 2.45±0.14, 4.75±0.27, 5.56±0.24, 6.45±0.35, 5.18±0.53 µg/dl respectively. The differences between thyroid hormone levels are unimportant for sex and age groups, but important between months ($p<0.05$).

Table 3

Results for the changes of T4 and T3 hormones in White Goats (Dellal et al 2008)

		MONTHS												General (Y.M.)
		1	2	3	4	5	6	7	8	9	10	11	12	
T3	Age 2	102.94	117.28	108.12	101.70	93.85	90.77	88.35	86.22	102.69	118.83	127.99	121.69	105.04
	Age 3	107.52	108.26	104.84	105.54	104.30	104.86	91.50	88.12	104.30	108.66	126.52	111.96	105.53
	Age 4	109.09	109.09	101.60	96.34	102.18	100.58	93.43	89.40	103.54	101.19	120.98	106.59	102.14
	Female	106.05	109.41	104.94	102.98	101.41	98.99	91.49	87.99	104.71	110.97	126.40	114.43	104.98
	Male	106.11	109.80	105.46	97.08	95.29	94.52	89.72	87.36	101.20	109.72	123.41	114.16	102.82
	General (M.M.)	106.07	109.57	105.14	100.67	99.02	97.24	90.80	87.74	103.33	110.48	125.23	114.32	104.14
T4	Age 2	4.14	4.50	5.04	3.32	3.51	3.16	2.48	2.36	4.58	5.85	6.14	5.54	4.22
	Age 3	4.43	4.56	4.28	3.82	3.29	2.88	2.52	2.28	4.61	5.42	6.34	5.19	4.14
	Age 4	5.10	4.83	3.79	4.69	3.51	2.81	2.92	2.69	5.07	5.28	6.89	4.74	4.36
	Female	4.46	4.56	4.33	3.85	3.31	2.86	2.51	2.34	4.73	5.55	6.44	5.16	4.18
	Male	4.66	4.73	4.60	3.98	3.69	3.15	2.85	2.62	4.79	5.57	6.45	5.22	4.36
	General (M.M.)	4.54	4.63	4.44	3.90	3.46	2.98	2.64	2.45	4.75	5.56	6.44	5.18	4.25
THI		35.34	45.02	46.79	56.94	59.50	62.81	70.73	76.45	63.42	53.74	48.44	42.76	-

***: M.M.:** Monthly Mean, **Y.M.;** Year's Mean value.

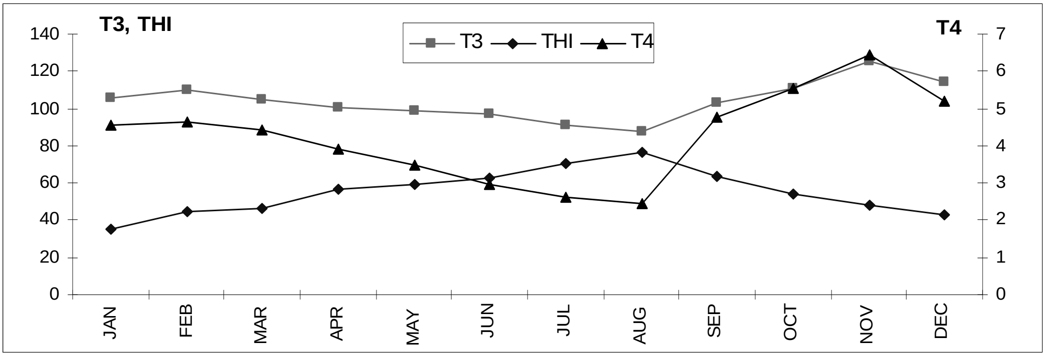

Figure 2. Yearly changes of T3 (ng/dl) and T4 (µg/dl) in white goats and THI values.

Again, from the same table, monthly general averages of testosterone hormone in male white goats are respectively 2.11±0.73, 2.22±0.52, 2.44±0.59, 2.10±0.41, 2.35±1.00, 3.42±1.48, 4.77±1.32, 5.61±1.40, 7.91±1.24, 10.84±1.59, 7.82±1.60, and 2.63±0.61 ng/dl. Regarding these values, the differences between age groups are statistically unimportant, whereas the differences between monthly averages are statistically important ($p<0.05$).

3. CONCLUSIONS

General averages of the T4 and T3 hormone levels (Koser Elicin, 3.92 µg/dl and 88.30 ng/dl; Dellal et al., 4.25 µg/dl and 104.14 ng/dl) determined in the white goat breed generally agrees with the levels declared for goats (T4:3.5-4.2, T3: 90-190 ng/dl, Yılmaz 1999).

In white goats, T4 and T3 hormone levels decrease in summer when environmental temperatures are high and increase in fall and winter when environmental temperatures are low (Koser Elicin 2008; Dellal et al. 2008). These results are in harmony with the results for other goat breeds (Colavita *et al*. 1983; Riis 1983; Emre 1987; Polat. 2003; Todini 2007). The decrease of T4 and T3 hormone levels in high environmental temperatures is declared mainly to be the result of a homeostasis of reduction in heat production for the purpose of balancing their body temperatures.

In white goat breed, the monthly changes of T4 and T3 hormone levels have been compared with the THI values incorporating the effects of the environmental temperatures along with relative humidity. In this regard, for white goats, there has been decrease in T4 and T3 hormone levels due to increasing THI values in summer months. These results also agree with the reference declarations (Silanikove 2000, Dhanda and Kundu 2001, Srikandakumar 2003). It can be stated as above that this situation is based on the imperative that animals slow down their metabolism via reducing the T4 and T3 levels for the purpose of fixing their body temperatures normal in high THI values.

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ABOUT SELECTION CRITERIA OF SOWS IN MATERNAL BREEDS

DESPRE CRITERIILE DE SELECTIE LA SCROAFELE DIN RASELE MATERNE

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Key words: pig industry; breed improvement; farm animal population; bio – statistics.
Cuvinte cheie: industria porcului; populatia la animalele domestice; ameliorea raselor; bio – statistica

SUMMARY

The pork market requires carcasses with rich musculature. But sows showing such traits are less prolific. Pork producers have passed over difficulty by crossing sows of high fertility (maternal breeds) to boars of thick musculature (paternal breeds). There is as alternative to produce commercial pigs by hybridization. Pig paternal breeds have been created successfully but maternal breeds are not good enough yet. That could be explained by low heritability of fertility and by the impossibility of estimating boars' prolificacy. However selection programs of maternal breeds can be improved. The present paper argues for "suckling capacity" of the first farrowing sows as the best selection criterion in increasing fertility in pig maternal breeds. It also demonstrates the good reason for using "one farrow sow" in selection of pig maternal breeds.

Now day's pork market requires lean carcasses with much meat and thin layer of fat. From the point of view of producers such carcasses are convenient to producing because lean meat needs less feed than fat meat. Specialized breed swine have been created for this purpose.

But this kind of breeds has a low fertility of sows, genetically determined, since meat is a deposited production while fertility is an excreted one. As low fertility increases the cost of weaned piglets the pork producers wants to have fertile sows to be crossed with rich muscle boars and produce many piglets having good commercial carcasses. There are two ways to get this kind of sows: to select maternal breeds to produce crosses or to select maternal strains (lines) of sows for hybridization. Paternal breeds have been successfully created, maternal breeds were not. Some trials to obtain high fertility breeds starting with hyper prolific sows were unsuccessful. Genetic progress is obtained working with population not with dispersed genotypes.

Based on the fact that between dual purposes breeds the Danish Landrace and the Large White expressed a better suckling capacity pork producers started to mate sows of this breeds with new created breeds possessing much musculature. The resulted progeny had good commercial value but a weak genetic value when it was reproduced. Out of there resulted the idea of using specialized breeds, paternal for boars and maternal for sows, in order to reduce the cost of commercial piglets. Concerning paternal breeds very good results were received. The Pietrain or the Belgium Large White breeds are already famous. In Romania the Perish 345 breed is competitive with the former mentioned breeds. It is not the same situation with the maternal breeds. In this respect the target to increase further the prolificacy of sows and their milk production potential in maternal breeds is not satisfying yet. The reasons of this situation are low heritability of fertility traits, the dual determination of fertility (the number of viable piglets and the milk production potential of sows) and the impossibility of estimating the milk production potential or better says “suckling capacity” in boars. In addition some other causes acted. The selection technique in not very clear. There is a general understanding that the best index for “maternal” value is the suckling capacity of sows measured as the total weight of the farrow (the lot of piglets) at 21 days of age. The first complication issues from the fact that the number of daughters in the farrow is high and is difficult to decide how many of them are reasonably to keep for reproduction. One decision is preserved from the selection technique used for dual purposes breeds paying attention to the daily gain and to the thickness of the under skin fat layer. But no one of these traits is related to the maternal traits. The answer to this question is the main objective of the present research.

Aiming the same target, to reduce the cost of weaned piglets, and based on nevertheless good prolificacy of swine, producing hybrids was developed. This time lines of grand parents specialized for the same maternal and respectively paternal traits are selected. The progeny resulted from crossing lines selected in the same direction are used as parents for the commercial hogs obtained by crossing maternal and paternal lines. Parents are expressing the heterosis phenomenon that increases the vitality of the progeny and par consequence their performance.

The present paper doesn’t compare the two ways of action each of them having advantages and disadvantages. It is dedicated to the selection of maternal breeds only and compares the genetic resources of the Landrace and Large White breeds in one former Experimental Station in Romania.

The aim of the research is to establish the best selection criterion to select good maternal sows. The suckling capacity of sows was normally adopted as selection criterion. But this index is a repeatable one and its value changes with the farrow range. It is less in gilts and increases with the sow’s age. The first question is if it is justified to discriminate gilt from reproduction based on her suckling capacity at the first farrow or it is necessary to dilate the decision to the second farrow. The second question refers to the selection intensity. If gilts are eliminated before having a farrow that, on one hand will decrease the selection intensity and on the other hand will give the possibility to eliminate the best of the gilts concerning the suckling capacity. The questions don’t stop here. When all the gilts are kept for the first farrow their participation to the all together fertility of the herd will determine reduction of the mean herd performance. Which is the cost of this depressed fertility? Can it be covered?

1. MATERIALS AND METHODS

To answer the above questions the objectives of the research became:

Estimate the correlations between the values of suckling capacity of sows in different farrow ranges;

Evaluate the selection intensity for the suckling capacity when all the gilts undertake the test of their self performance compared to selection intensity of the former program applied in the farm;

Appreciate the mean herd fertility depression when all gilts are retained for the self performance test compared to the current fertility level of the herd;

Calculate the cost effect of the fertility depression when one farrow breeding of gilts is practiced;

Find ways to increase the commercial values of piglets when all gilts are involved in the selection decisions.

The material used in the research referred to the reproduction indices registered in two selection farms of a Research Station that have been practiced the selection program for dual purpose breed. Selection of gilts has been applied at 6 month of age for body gain and fat layer. Further on selection of sows for the suckling capacity was practiced at every new farrow. For special needs data concerning farrows obtained from 298 Large White sows and 133 Landrace sows that had as much as 4 farrows between 2002 - 2004 years have been used. Sows were grouped in gilts (first farrowing females) and sows (females with 2 - 4 farrows) and their quotas were expressed in percentage.

2. RESULTS AND DISCUSSIONS

The data concerning the suckling capacity of sows and the number of wined piglets are presented in the table 1.

Table 1

Suckling capacity and the number of wined piglets in the experimental samples of sows

Indices	Large White breed (n = 298 heads)				Landrace breed (n = 133) heads			
	Farrow range				Farrow range			
	I	II	III	IV	I	II	III	IV
	$\bar{x} \pm m$	$\bar{x} \pm m$	$\bar{x} \pm m$	$\bar{x} \pm m$	$\bar{x} \pm m$	$\bar{x} \pm m$	$\bar{x} \pm m$	$\bar{x} \pm m$
Suckling capacity	41.1±0.30	46.2±0.40	48.8±0.48	50.5±0.50	41.0±0.39	47.2±0.62	48.3±0.62	51.4±0.76
Weaned piglets	7.6±0.06	8.3±0.06	8.8±0.06	8.9±0.13	7.6±0.07	8.6±0.10	8.8±0.10	9.1±0.11

The presented figures are similar to the data registered for all the sow livestock of the two breeds.

In table 2 the phenotypic, genotypic and environment correlations of the suckling capacity of gilts with the suckling capacity of sows at different farrow range are calculated.

Data in the table 2 show similar correlations between the suckling capacity of sows at the first farrow and the farrow capacity at the next farrows in both breeds. It means that from genetically point of view using suckling capacity of gilts as selection criterion for sows fertility is entirely justified. That creates the advantage of an early selection decision and of the highest selection intensity.

Table 2

Phenotypic, genotypic and environment correlations of suckling capacity at different farrow range in Large White and Landrace breeds

Correlated indices	$r_p \pm s_{rp}$		r_g		r_e	
	Large White	Landrace	Large White	Landrace	Large White	Landrace
First farrow x						
Second farrow	0.3215±0.055	0.4158±0.079	0.3462	0.3656	0.3151	0.4344
Third farrow	0.3368±0.054	0.3499±0.081	0.4267	0.3203	0.3117	0.3659
Fourth farrow	0.3409±0.54	0.4065±0.079	0.4255	0.3626	0.3127	0.4280
Second farrow x						
Third farrow	0.3185±0.055	0.2515±0.084	0.3995	0.3456	0.2955	0.2259
Fourth farrow	0.3281±0.054	0.2943±0.083	0.4469	0.3780	0.2937	0.2729
Third farrow x						
Fourth farrow	0.2883±0.055	0.3451±0.081	0.3365	0.3548	0.2700	0.3416

In order to estimate the importance of increasing selection intensity the data in table 3 have been completed.

Table 3

Distribution of the total number of sows in the farm and of number of weaned piglets in relation to the farrow range

Farrow range	I			II			III			IV		
Specification	Sows		Weaned piglets	Sows		Weaned piglets	Sows		Weaned piglets	Sows		Weaned piglets
Indices	No.	**%**	No.	No.	**%**	No.	No.	**%**	No.	No.	**%**	No.
Large white	539	34.1	7.6	386	24.4	8.3	358	22.6	8.8	298	18.9	8.9
Landrace	287	38.7	7.6	176	23.7	8.6	146	19.7	8.8	133	17.9	9.1

In accordance with the data in table 2, the total number of weaned piglets has to be 13102 heads in case of Large White breed and 6190 heads in case of Landrace. Accepting a 50% ratio of females and 5% losses in piglets the number of gilts in the series might be 6223 heads in Large White and 2940 heads in Landrace. Since the number of gilts at their first farrow has been 539 in Large White and 287 in Landrace it means that the pre selection ratio, for reasons not connected to fertility, was 91.33% and respectively 90.24%. These values being much over 50% in both cases a great number of gilts with their genetic fertility over the medium were eliminated.

Using suckling capacity at the first farrow as the single selection criterion, crediting the sows after the first farrow able to produce 4 gilts in a farrow and keeping the same number of sows, it will result that if all female piglets have to be tested for fertility will be necessary to have 20% mother sows and 80% daughter sows. For Large White breed that come to 316 mother sows and 1265 daughter gilts while for Landrace that comes to 148 mother sows and 594 daughter gilts. If the medium number of farrows in mother sows is 2 in means that the selection intensity for the suckling capacity in gilts is 12.5% (158 x 100:1265 = 12.49 or 74 x 100:594 = 12.46). According to the normal distribution of variability in closed populations the medium deviation of the selected items from the population mean (Δ) must be 1.6468 б. Such value gives hope for genetic progress concerning fertility in sows.

Increasing the gilt ratio in the sows' livestock up to 87.5% the total number of weaned piglets will depress. Using also the data presented in the table 3 it is estimated to obtain 12300 wined piglets in Large White and 5802 wined piglets in Landrace. Piglet yield will decrease with 802 heads in Large White and with 388 heads in Landrace. If the mean weight of a piglet is let say 10 kg and the price per kg of wined piglet is 20 lei the financial losses should be estimated as 160400 lei (38190 €) in Large White and as 77600 lei (18476 €) in Landrace. But the gilts are adding body weight during the first pregnancy and lactation. The gain in the body weight could be estimated as 40 kg and the price per kg of pork as 5 lei. For 1383 Large white gilts that means an output of 276600 lei (65857 €) and an output of 129800 lei (30905 €) for 649 gilts in Landrace. In both breeds the value of output resulting from the body weight gain of gilts is higher than the estimated value of the unborn piglets. The plus revenue is 116200lei (47667 €) in Large White and 52200 lei (12428 €) in Landrace.

Things don't stop here. Since the female progeny of the daughters are not implicated in selection, the gilts progeny can be obtained from boars of paternal breeds. Thus the cross piglets, able to growth faster and producing better carcasses must have more commercial value. The mean body weight of the weaned cross piglets is 11 kg and instead of 20 lei / kg they deserve to be paid on 22 lei / kg. That will add output to the herds. For the Large White farm the plus of output is 259862 lei (61872 €) the difference between 2880262 lei, the price of 10511 weaned cross piglets of 11 kg each plus the price of 1683 purebred piglets having 10 kg of body weight. For the Large White farm the plus of output is 259862 lei (61872 €) the difference between 2880262 lei, the price of 10511 weaned cross piglets of 11 kg each and a price of 22 lei/kg live weight plus the price of 1683 purebred piglets having 10 kg of body weight and a price of 20 lei/kg live weight. For the Landrace farm the plus of output is 117344 lei (27939 €) the difference between 1355344 lei, the price of 4932 weaned cross piglets of 11 kg each and a price of 22 lei/kg live weight plus the price of 909 purebred piglets having 10 kg of body weight and a price of 20 lei/kg live weight. Finally it results a plus total out put of 376062 lei (89539 €) for the Large White farm and 169544 lei (40368 €) for the Landrace farm if the selection for fertility uses all the contingency of gilts.

3. CONCLUSIONS

Concluding about the above content of the present paper, in order to select sows for fertility the next actions have to be provided:

Use as selection criterion discriminating reproduction the suckling capacity (live weight of the farrow at 21 days) in gilts (sows at the first farrow);

Work with two categories of sows: mothers (selected pure bred sows for the suckling capacity at the first farrow) and daughters (pure bred gilts at the first farrow which are under test for the suckling capacity);

Include in the test all daughters produced by mothers;

Feed the sows on diets permitting to maintain a constant body condition along the pregnancy and lactation;

Mate, or better inseminate artificially, all the daughters on boars of paternal breeds, to increase the commercial value of offspring;

Retain as mothers the best daughters in the necessary number to cover the eliminated mothers;

Sell the rest of the daughters, if possible, for reproduction in order to have better prices for them;

Don't retain, for any reason cross gilts for reproduction and don't sell any one for reproduction.

Keep in the farm at least 6 families to avoid inbreeding;

Select the boars for the body type. Do that for gilts, after the fertility is known, as well.

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THE HAEMATOLOGICAL PROFILE AT PREGNANT DOE IN CORRELATION WITH THEIR DESCENDANTS

PROFILUL HEMATOLOGIC OBȚINUT LA IEPUROAICELE GESTANTE ÎN CORELAȚIE CU DESCENDENȚII ACESTORA

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Cuvinte cheie: iepuri, hematologie, embrioni.
Key words: rabbits, haematology, embryos

SUMMARY

The knowledge of relationship between metabolic profile of the pregnant female and the product of conception is important with consequences that manifest in its further development.

The article is part of a wide range of researches regarding the correlations between the metabolic profile of does and the products of conception. The study was carried out on rabbits of different ages and physiological states.

The research results have been interpreted from the statistic point of view between genital populations and descendant generations.

The propagation and the perpetuation of the species are achieved at sexual maturity through the reflexes acts and specific sexual behavior, caused by the variation of the circulating gonad hormones (1). Sexual behavior is a complex of somatic – vegetative and behavior reactions related to the genital stimulation and copulation.

Essential for the process of life is the metabolic status of the mother. It is proved that the changes of this status are reflected on the development of the conception both in the uterus or postnatal period (2).

The knowledge of the relationship between the metabolic profile of the pregnant female and the product of conception is important through the consequences that are manifested in its further development (3).

The parent – fetus – new-born relationship influences the obtaining of healthy bodies, with an appropriate expression of the biological productive potential.

1. MATERIALS AND METHODS

Rabbits: as biological material were used half breeds of Giant Belgian. There were used females in three physiological stages (before mating, female at middle and end of pregnancy), youth and males.

The researches on the correlations between the mother's metabolic profile and intrauterine development of the conception products were made on does from three generations (G1, G2, and G3).

The females who represented the biological material for the research were maintained in batteries of 20 cages, suspended on three levels. Cage provided the access of animals to the food, which was given *ad libitum*.

Working procedure: blood was taken from the ear vein using needles of 21G 1½ ″ in vacuum system in vacutainers of 2 ml, using the K3EK3EDTA anticoagulant.

Blood tests: the haematological measurements were done to obtain the total number of erythrocytes, leukocytes and principal erythrocyte constants (RBC, HGB, HCT, MCV, MCH, MCHC, WBC); the parameters were obtained by using the automated analyzer ABX Micros ABC VET.

2. RESULTS AND DISCUSSIONS

Table 1

Significance of the changes at the studied blood constants

Studied parameter	Statistical estimators	Females				Males	ANOVA
		Youth	Before gestation	15 days of gestation	The end of gestation		
Population coding		**FT**	**F1**	**F2**	**F3**	**M**	
HCT (%)	n	10	16	9	9	5	FT x F1 = n.s. F1 X F2 = * $\hat{F}$(6.049)>Fα 0,05 (4.279) la 1;23 GL P=0.021848 F1 X F3 = n.s. F2 X F3 = n.s. F1 X M = n.s.
	Average ($\bar{X}$)	39,13	39,50	33,70	37,57	37,60	
	Variation (S^2)	3,79	41,24	14,76	22,73	37,49	
	Standard deviation (s)	1,95	6,42	3,84	4,77	6,12	
	Standard deviation of average ($\bar{x} \pm s_{\bar{x}}$)	0,62	1,61	1,28	1,59	2,74	
	Coefficient of variation (V%)	4,97	16,26	11,40	12,69	16,28	
HGB (g/dL)	n	10	16	9	9	5	FT x F1 = n.s. F1 X F2 = * $\hat{F}$(4.630)>Fα 0,05 (4.279) la 1;23 GL P=0.042137 F1 X F3 = n.s. F2 X F3 = n.s. F1 X M = n.s.
	Average ($\bar{X}$)	11,92	12,46	10,87	12,18	11,68	
	Variation (S^2)	0,97	3,63	2,31	2,31	2,65	
	Standard deviation (s)	0,99	1,90	1,52	1,52	1,63	
	Standard deviation of average ($\bar{x} \pm s_{\bar{x}}$)	0,31	0,48	0,51	0,51	0,73	
	Coefficient of variation (V%)	8,27	15,28	13,98	12,48	13,93	
MCH (pg)	n	10	16	9	9	5	FT x F1 = n.s. F1 X F2 = n.s. F1 X F3 = n.s. F2 X F3 = n.s. F1 X M =
	Average ($\bar{X}$)	20,74	20,49	21,70	21,13	20,18	
	Variation (S^2)	0,86	2,47	2,32	1,85	1,53	
	Standard deviation (s)	0,93	1,57	1,52	1,36	1,24	
	Standard deviation of average ($\bar{x} \pm s_{\bar{x}}$)	0,29	0,39	0,51	0,45	0,55	

	Coefficient of variation (V%)	4,47	7,67	7,02	6,44	6,13	n.s.
MCHC (g/dL)	n	10	16	9	9	5	FT x F1 = n.s. F1 X F2 = n.s. F1 X F3 = n.s. F2 X F3 = n.s. F1 X M = n.s.
	Average ($\overline{X}$)	30,92	31,63	31,72	32,23	31,34	
	Variation (S^2)	2,82	2,93	1,32	0,36	8,71	
	Standard deviation (s)	1,68	1,71	1,15	0,60	2,95	
	Standard deviation of average ($\overline{x} \pm s_{\overline{x}}$)	0,53	0,43	0,38	0,20	1,32	
	Coefficient of variation (V%)	5,43	5,42	3,62	1,86	9,42	
MCV (μm^3)	n	10	16	9	9	5	FT x F1 = n.s. F1 X F2 = n.s. F1 X F3 = n.s. F2 X F3 = n.s. F1 X M = n.s.
	Average ($\overline{X}$)	65,75	65,50	66,67	65,56	65,80	
	Variation (S^2)	12,85	12,13	14,75	10,28	24,20	
	Standard deviation (s)	3,58	3,48	3,84	3,21	4,92	
	Standard deviation of average ($\overline{x} \pm s_{\overline{x}}$)	1,13	0,87	1,28	1,07	2,20	
	Coefficient of variation (V%)	5,45	5,32	5,76	4,89	7,48	
PLT ($\times 10^3/mm^3$)	n	9	16	9	9	5	FT x F1 = n.s. F1 X F2 = n.s. F1 X F3 = n.s. F2 X F3 = n.s. F1 X M = n.s.
	Average ($\overline{X}$)	344,11	422,44	314,22	396,00	426,20	
	Variation (S^2)	14711,86	21688,40	6205,19	19060,50	20151,70	
	Standard deviation (s)	121,29	147,27	78,77	138,06	141,96	
	Standard deviation of average ($\overline{x} \pm s_{\overline{x}}$)	40,43	36,82	26,26	46,02	63,48	
	Coefficient of variation (V%)	35,25	34,86	25,07	34,86	33,31	
RBC ($\times 10^6/mm^3$)	n	10	16	9	9	5	FT x F1 = n.s. F1 X F2 = n.s. F1 X F3 = n.s. F2 X F3 = n.s. F1 X M = n.s.
	Average ($\overline{X}$)	5,87	6,09	5,42	5,48	5,80	
	Variation (S^2)	0,09	0,79	1,18	0,72	0,37	
	Standard deviation (s)	0,30	0,89	1,08	0,85	0,61	
	Standard deviation of average ($\overline{x} \pm s_{\overline{x}}$)	0,09	0,22	0,36	0,28	0,27	
	Coefficient of variation (V%)	5,08	14,57	20,03	15,51	10,47	

ANOVA = Significance of differences between the average of studied population (analysis of variance)
N.S. = Significant differences;
*** And S = significant difference (> Fα 0.05)**
**** Or d.s. = Significant distinct differences (> Fα 0.01)**
***** Or f.s. = Highly significant differences (> Fα 0.001)**
FT = encoding of the population represented by young cunicul
F1 = encoding representing the female population before breeding
F2 = encoding representing the female population at mid-gestation
F3 = encoding representing the female population at the end of pregnancy

The amount of haemoglobin had a main variation of 12.46 g/dL at the females studied before the period of reproduction, at 15 days of gestation it has been 10.87 g/dL compared with the end of pregnancy when the average has been 5.48 g/dL. Males experienced a mean value of haemoglobin of 11.68 g/dL, value that was very close to that obtained at youth 11.92 g/dL.

For the amount of haemoglobin the result analysis on the relative variability of the population compared with the average showed that the values for the youth were homogeneous, with the coefficient of variation of 8.27 g/dL.

The hematocrit had very close values, the minimum of 33.70% was observed at females from the middle period of gestation. The coefficient of variation was 11.40%, indicating a population with medium homogeneity.

At the end of gestation the mean value of hematocrit was 37.57%, very close to the one obtained in males, 37.60%. Maximum was recorded at females before breeding – 39.50%, at youth the hematocrit was 39.13%.

The average erythrocyte volume had very close values between the studied populations, which range between 65.50 μm^3 and 66.67 μm^3, the maximum being reported at 15 days of gestation. At adult females the average volume of red blood cells was 65.50 μm^3.

At the end of pregnancy the average volume of red blood cells was 65.59 μm^3, youth registering a value of 65.75 μm^3.

The mean quantity of erythrocyte haemoglobin was 20.49 pg at adult females, 21.7 pg at 15 days of gestation and 21.13 pg at the end of gestation. The average amount of haemoglobin at males was 20.18 pg, with a standard variation of the average of 1.29 pg and a coefficient of variation of 6.13 pg

Youth had a mean amount of erythrocyte haemoglobin of 20.74 pg, while the coefficient of variation was 4.47 pg.

The erythrocyte haemoglobin concentrations had the average value of 31.63 g/dL at females before the breeding period, value close to 31.72 g/dL, recorded at the middle of gestation and 31.34 g/dL registred at males. For youth it was determined an average of 30.92 g/dL.

In the context of comparison with the speciality literature we found that the variations are comparable for all the blood parameters studied large and small oscillations of some parts of the red series and in particular of the white series correspond to the scientific basis of the other researches.

Table 2

Significance of the changes at the studied blood constants descendants

Studied parameter	Statistical estimators	G1	G2	G3	ANOVA
Population coding		**G1**	**G2**	**G3**	
HCT (%)	n	3	8	4	G1 X G2 = n.s. G1 X G3 = * $\hat{F}$(7.506)>Fα 0,05 (6.607) la 1;5 GL P val=0.043588 G2 X G3 = n.s.
	Average ($\overline{X}$)	34,87	36,49	39,93	
	Variation (S^2)	2,84	18,64	8,25	
	Standard deviation (s)	1,69	4,32	2,87	
	Standard deviation of average ($\overline{x} \pm s_{\overline{x}}$)	0,97	1,53	1,44	
	Coefficient of variation (V%)	4,84	11,83	7,19	

HGB (g/dL)	n	3	8	4	G1 X G2 = n.s. G1 X G3 = n.s. G2 X G3 = n.s.
	Average ($\overline{X}$)	11,33	11,15	11,23	
	Variation (S^2)	2,09	1,31	1,17	
	Standard deviation (s)	1,45	1,14	1,08	
	Standard deviation of average ($\overline{x} \pm s_{\overline{x}}$)	0,84	0,40	0,54	
	Coefficient of variation (V%)	12,77	10,26	9,63	
MCH (pg)	n	3	8	4	G1 X G2 = n.s. G1 X G3 = n.s. G2 X G3 = n.s.
	Average ($\overline{X}$)	19,87	19,80	19,80	
	Variation (S^2)	2,46	1,95	0,27	
	Standard deviation (s)	1,57	1,40	0,52	
	Standard deviation of average ($\overline{x} \pm s_{\overline{x}}$)	0,91	0,49	0,26	
	Coefficient of variation (V%)	7,90	7,06	2,64	
MCHC (g/dL)	n	3	8	4	G1 X G2 = n.s. G1 X G3 = ** $\hat{F}$(19.454)>Fα 0,01 (16.258) la 1;5 GL P val=0.006952 G2 X G3 = n.s.
	Average ($\overline{X}$)	31,77	30,33	29,15	
	Variation (S^2)	1,34	5,93	0,11	
	Standard deviation (s)	1,16	2,44	0,33	
	Standard deviation of average ($\overline{x} \pm s_{\overline{x}}$)	0,67	0,86	0,17	
	Coefficient of variation (V%)	3,65	8,03	1,14	
MCV (µm^3)	n	3	8	4	G1 X G2 = n.s. G1 X G3 = * $\hat{F}$(7.506)>Fα 0,05 (6.607) la 1;5 GL P val=0.040802 G2 X G3 = n.s.
	Average ($\overline{X}$)	62,33	65,31	68,00	
	Variation (S^2)	14,33	43,92	2,67	
	Standard deviation (s)	3,79	6,63	1,63	
	Standard deviation of average ($\overline{x} \pm s_{\overline{x}}$)	2,19	2,34	0,82	
	Coefficient of variation (V%)	6,07	10,15	2,40	
PLT (×10^3/mm^3)	n	3	8	4	G1 X G2 = n.s. G1 X G3 = n.s. G2 X G3 = n.s.
	Average ($\overline{X}$)	421,33	406,50	257,00	
	Variation (S^2)	21285,33	28233,14	19548,67	
	Standard deviation (s)	145,89	168,03	139,82	
	Standard deviation of average ($\overline{x} \pm s_{\overline{x}}$)	84,23	59,41	69,91	
	Coefficient of variation (V%)	34,63	41,34	54,40	
RBC (×10^6/mm^3)	n	3	8	4	G1 X G2 = n.s. G1 X G3 = n.s. G2 X G3 = n.s.
	Average ($\overline{X}$)	8,92	8,36	5,88	
	Variation (S^2)	7,50	10,42	0,07	
	Standard deviation (s)	2,74	3,23	0,27	
	Standard deviation of average ($\overline{x} \pm s_{\overline{x}}$)	1,58	1,14	0,13	
	Coefficient of variation (V%)	30,70	38,61	4,54	

ANOVA = Significance of differences between the average population studied (analysis of variance)
N.S. = Significant differences;
*** And S = significant difference (> Fα 0.05)**
**** Or d.s. = Significant distinct differences (> Fα 0.01)**
***** Or f.s. = Highly significant differences (> Fα 0.001)**
G1 = the encoding of the population represented by the first generation of offspring
G2 = the encoding of the population represented by the second generation of offspring
G3 = the encoding of the population represented by the third generation of descendants

In Table 2 are given the haematological values obtained at the descendants of the studied females, being monitored 15 individuals during three generations. Variations were obtained between the first generation (G1) and third generation (G3) in the expression of hematocrit. The same change was recorded at the expression of the medium erythrocyte volume and main erythrocyte haemoglobin concentration, variations observed and compared between the two descendant series.

3. CONCLUSIONS

1. The number of erythrocytes, the average amount of haemoglobin, the number of platelets, are blood constants with significant variations between the populations of the studied animals.
2. The research results showed that at the females from the period before breeding and those at 15 days of gestation significant variations occured in the expression of hematocrit and haemoglobin.
3. During the three generations there have been obtained significant differences between G1 and G2 in the expression of hematocrit, mean concentration of haemoglobin and mean erythrocyte volume.

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HAEMATOLOGICAL CHARACTERIZATION OF REPRODUCTIVE STATUS IN LAYING HENS BY AGE

CARACTERIZAREA HEMATOLOGICĂ A STATUSULUI REPRODUCTIV LA GĂINILE OUĂTOARE ÎN FUNCȚIE DE VÂRSTĂ

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Cuvinte cheie: hematologie, status reproductiv, găini ouătoare
Key words: haematology, reproductive status, laying hens

SUMMARY

The physiological activity of the pineal gland with specific responses in the reproductive territory may be interpreted by monitoring the process parameters used in poultry practice in different age groups of laying hens. As biological material were used 105 laying hens, clinically healthy, belonging to ALBO SL-2000 hybrid, raised on ground, from which blood samples were taken at the age of 12 and 28 weeks. The haematological examinations were concerned to obtain the total number of erythrocytes and leukocytes and the main erythrocyte constant (RBC, PCV, MCV, MCH, MCHC and WBC). The results allow the interpretation of the reproductive status through the dynamics of the presented values.

The secretory function of pineal gland is reflecting in the explaining of some important physiological functionalities as part of the process of coordination and integration of the organism in the environment(1).

Numerous studies on the physiological implication of the pineal gland in the balance of body homeostasis demonstrated that it is an endocrine organ with multiple and varied implications especially in the coordination of circadian and seasonal rhythms(2,5).

Pineal in birds has been shown to occur in regulation of the reproductive status. Reproduction in birds is being characterized by the fact that the development of the ovulatory cycle is limited to several hours. Unlike mammals, only the ovary and the left oviduct are functional. The production of müllerien inhibitory substance by the ovary determines the regression of the right duct, provided with a smaller number of specific receptors for estrogen hormones than the left duct. Suppressing the negative action of the müllerien inhibitory substance, the estrogen promotes the predominant development of the ovary and left oviduct. It differs morphologically from that of mammals because the 4 ÷ 6 preovulatory follicles are arranged in a distinct hierarchy and attached to the ovarian surface through follicle rods(3,4).

The physiological activity of the pineal gland with specific responses in reproductive territory may be interpreted by monitoring the process parameters used in poultry practice in different age groups of laying hens(6).

The measurement of haematological values made on lots of laying hens of different ages were taken to reflect the health status and body homeostasis during the laying cycle, knowing the fact that erythrocytes are involved in the characterization of estrogen hormone level caused by the hypothalamic – pituitary – epiphysis – gonads complex of laying birds.

The assessment of haematological status enables the interpretation of the influence of the maintenance conditions through the variations that they provide in poultry practice (food, parameters of microclimate and light regime).

1. MATERIALS AND METHODS

Birds: 105 laying hens were taken in study, clinically healthy, belonging to ALBO SL-2000 hybrid, raised on ground, from which blood samples were taken at the age of 12 and 28 weeks. Birds were grouped into 7 groups of 15 individuals in each group, identified by attaching different colored rings, being maintained in similar conditions, the food administration was done *ad libitum*.

The microclimate parameters were insured according to the growth guide specific for the used hybrid.

Working procedure: the blood samples were collected from brachial vein using 21G 1½ ″ needles in vacuum system in 2 ml vacutainer using the K3EK3EDTA anticoagulant.

Blood tests: the blood determinations were concerned to obtain the total number of erythrocytes and leukocytes and the main erythrocyte constant (RBC, PCV, MCV, MCH, MCHC, WBC), with automatic analyzer ABX Micros ABC VET.

2. RESULTS AND DISCUSSIONS

The obtained values for the analyzed parameters are presented as the average of groups formed by the experimental protocol.

Table 1

Haematological values obtained at 12 weeks

Lot number	RBC (10^6/mm^3)	PCV (%)	MCV (µm^3)	MCH (pg)	MCHC (g/100mL)	WBC (10^3/mm^3)
1	2,19	28,6	120,4	39,9	23,4	20,4
2	2,14	28,28	132,3	57,1	43,2	20,0
3	2,04	27,43	132,2	58,1	42,3	20,6
4	2,21	28,20	144,2	61,5	25,7	20,5
5	2,29	29,5	118,0	35,9	44,8	21,8
6	2,73	28,75	125,6	56,32	42,6	20,3
7	2,26	27,58	132,0	56,57	42,3	21,9

RBC – Erythrocyte number x 10^6/mm^3
PCV – Hematocrit;
MCV – Erythrocyte mean volume;
MCH – Mean quantity of erythrocyte hemoglobin;
MCHC – Mean concentration of erythrocyte hemoglobin;
WBC – Total number of white cells;

The number of erythrocytes is influenced by sex, hormones, hypoxia and other factors. Erythrocytes have a short life (28 ÷ 35 days) compared with human erythrocytes (50 ÷ 60 days), due to high body temperature and metabolic rate.

At the first three lots the erythrocytes showed a declining path, starting from an average value, of 2,19 $10^6/mm^3$ and ending with the lower limit of the obtained values, respective 2,04 $10^6/mm^3$. The maximum value determined (2,73 $10^6/mm^3$) has been recorded at the six lot, being a 0,69 $10^6/mm^3$ difference between the two extreme values, while the average value of all results was 2,26 $10^6/mm^3$, value which coincided with the values obtained at the 7 lot.

The hematocrit values were within the area bounded by the value of the lower limit of 28,28 %, registered at the lot 2 and the one of the upper limit, 29,5 % to lot 5. It has been pointed out that the limit values, both lower and upper have been recorded in lot 2 and 5.

Erythrocyte mean volume showed a notable difference between the minimum (120,4 μm^3) and maximum (144,2 μm^3) of the determined values, 23,8 μm^3, while for the lots 2 and 3 these values were relatively constant, 132,3 μm^3 respectively 132,2 μm^3.

The values determined for the mean quantity of erythrocyte hemoglobin were within the minimum of 39,9 pg in lot 5 and a maximum of 61,5 pg in lot 4, the area outlined by these extreme values is characterized by an average of MCH of 52,19 pg.

Regarding the values for the mean concentration of erythrocyte hemoglobin, there was a variation in parameter values between the minimum of 23,4 g/100mL for lot 1 and a maximum of 44,8 g/100mL in the lot 5. The values between the 6 and 7 lot were similar, the difference was 0,3 g/100mL for the first, also being observed the superiority of the difference between consecutive values of lot 5 and 6 (2,2 g/100mL) than lot 2 and 3 (0,9 g/100mL).

Leukocytes showed a mean value of 20,78 $10^3/mm^3$, at the experimental lots being recorded both the minimum of 20,0 $10^3/mm^3$ to the lot 2 and maximum of 21,9 $10^3/mm^3$ at the 6 lot.

Table 2

Haematological values obtained at 28 weeks

Lot number	RBC ($10^6/mm^3$)	PCV (%)	MCV (μm^3)	MCH (pg)	MCHC (g/100mL)	WBC ($10^3/mm^3$)
1	2,9	32,4	115,6	50,4	43,0	23,8
2	2,9	37,7	127,2	50,7	46,2	23,7
3	2,9	35,7	113,8	51,5	43,9	23,6
4	3,1	35,4	111,8	49,3	44,2	30,1
5	3,0	32,7	113,7	43,7	43,4	29,7
6	3,0	31,2	117,9	53,1	47,2	28,8
7	2,4	30,3	127,4	53,5	44,7	27,8

RBC – Erythrocyte number x $10^6/mm^3$
PCV – Hematocrit;
MCV – Erythrocyte mean volume;
MCH – Mean quantity of erythrocyte hemoglobin;
MCHC – Mean concentration of erythrocyte hemoglobin;
WBC – Total number of white cells;

The number of erythrocytes ranged from a minimum of 2,4 10^6/mm^3 in lot 7 and a maximum of 3,1 10^6/mm^3 for lot 4. The intermediate values of 2,9 10^6/mm^3 and 3,0 10^6/mm^3, had a constant evolution between the top 3 lots and the 5 and 6. There was a slight increase in the difference between these two limits of the total number of erythrocytes from 0,69 10^6/mm^3 at 12 weeks to 0,70 10^6/mm^3 at 28 weeks.

Comparing the mean hematocrit values at 12 respectively 28 weeks, its superiority was observed for adult birds, being 33,6 % over 28,33 %, result recorded at 12 weeks. The maximum value of 37,7 % recorded for this parameter in lot 2 is followed by a continuous and steady decrease of all values at every experimental lots up to the limit of 30,3 %, corresponding to lot 6, value that represents the lower limit of the determined values.

Overall, the results determined for the mean erythrocytes volume are smaller at 28 weeks compared to the same parameter values determined at 12 weeks. They have ranged between a minimum of 111,8 μm^3 for the lot 1 and a maximum of 127,4 μm^3 at the lot 6, the average of all values being 118,2 μm^3, the gravitational pole is represented by the value corresponding to the 6 lot.

The lower limit for the values of the mean amount of erythrocyte hemoglobin was 43,7 pg, higher result than the adequate extreme, but determined at 12 weeks. At 28 weeks we can say that the employment field of the values for this parameter is less extensive than the area framed by the values measured at 12 weeks. The maximum (53,5 pg) for MCH occurred at the 7 lot, followed by a close value, 53,1 pg, corresponding to lot 8.

Regarding the mean concentration of erythrocyte hemoglobin, these have ranged between a minimum of 43 g/100mL at lot 1 and a maximum of 47,2 g/100mL corresponding to the 6 lot, showing an mean value of all the results, 44,65 g/100mL.

The extensibility of the area defined by the obtained values for the leucocytes at 28 weeks is higher than that of area defined by values of the same parameter, but determined at 12 weeks. The limits of the leukocytes evolve from a lower value of 23,6 10^3/mm^3, corresponding to lot 3 to a maximum of 30,1 10^3/mm^3 for lot 4, in overall observing a growth of these values at 28 weeks to those obtained at 12 weeks.

3. CONCLUSIONS

The study leads to a characterization from the haematological point of view of hybrid SL-2000 widespread in poultry farms and highlights the differences between categories of age and lets the possibility for reproductive status interpretation by the dynamic of the presented values.

The inclusion of these values in the domain described in the avian physiology of, justifies the conditions of maintenance and will be the basis for determining the correlation between the hormone levels that characterize a high productive potential and the variation of some microclimate parameters directly involved in the physiological modulation of this bird class.

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RESEARCH REGARDING THE ONSET, FREQUENCY AND TREATMENT OF CATARAL ENDOMETRITIS IN HIGH-PERFORMANCE COWS

CERCETĂRI PRIVIND APARIȚIA, FRECVENȚA ŞI TRATAREA ENDOMETRITEI CATARALE LA VACILE DE MARE PERFORMANȚĂ

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Cuvinte cheie: vaca, endometrită, reproductie, tratament
Key words: cow, endometritis, reproduction, treatment

SUMMARY

The parametres characteristic for the state of health of milk cows are emphasized by their normal behaviour patterns. Any change in the feeding and environmental conditions triger changes in behaviour.

*The incidence of reproductive disorders.*These disorders have a variable incidence (5,8-35,5% in the farms with milk cows, depending especially on the country, due to the exploitation, management and organization of reproduction, preventive measures and therapy that are used). Thus, in England, the highest incidence of the reproductive disorders is recorded -5,8% (the retention of the placenta 3,8% and miscarriages 2%); in Canada-19,9% (the retention of the placenta 10,5%, endometritis 5,1% and sterility 4,3%); high incidence in Holland –28,75 (endometritis 9,5%, the retention of the placenta 7,1%, anestrus 6,6% nimfomania 3,5%, miscarriage 2%) and very high in our country –35,5% (ovarian disorders 9,6%, endometritis 18,2%, miscarriage 1,2% şi 6,5% other reproductive disorders.

Causes of the reproductive disorders. The causes concerning feeding and maintenance rank first among the many types of causes that trigger reproductive disorders. Georgescu, Gh, (1989) shows that feeding deficiences determine over 50% of the reproductive disorders in taurine. Undernourishment delays the resuming of the activity after calving, also causing delays in the uterine involution, which means they exhibit repetated unovulatory heats, anestrus, deats of the embrios, miscarriages, dops in the conception rate, etc; overfeeding, especially during mamary rest, causes dystocias, the retention of the placenta, abnormal uterine involution, endometritis; the metabolic disorders (acetonaemia) favour the onset of endometrites. These disorders are worsened by inadequate maintenance (stalling, lodging and hygiene discomfort, lack of movement), as well as by the other technical and organizational causes.

1. MATERIALS AND METHODS

The research was carried on Holstein cows, raised on three farms in the south of Romania, the Pantelimon and Afumați farms in Ilfov county and the Răteşti farm, Argeş county, respectively.

From the production point of view, the cows produce over 7000 kg milk: 7174.72 kg/ normal lactation in the ones raised in Afumați, 7400 kg in the cows raised in Răteşti and 9145.74 kg in the ones in Pantelimon.

The cows are kept in free stalling, they are fed differently, according to season and the milking is performed in specially designed halls.

The work method was to check the gynecologic data recorded and the treatment logs. The cows under treatment were also observed in order to see how these highly productive animals respond to treatment.

2. THE RESULTS AND DISCUSSIONS

The onset of these diseases is favoured by several factors, such as: the retention of the fetus covers, difficult parturition, dystocias, uterine hypotonia, the insufficient self-cleansening of the uterus by reduced leucocitosis, reduced local ressitance, insufficienta stimulation of the macrofages and of the lymphoplasmocitar infiltration leading to an increase in the pathogenity of the pathogen microbial agents. The blood clots, the fragments of covers present at the level of the uterus create an environment favourable to the development of pathogenic germs. The uterus becomes infected through several paths: iatrogenic infection (during obstetrical maneuvres), during delivery or to the retention of the covers and from the outer environment, in the case of prolapse of uterus. (1)

Simptomatology: The cows normally exhibit only local changes, so the general state remains the same 10-14 days after parturiție some sero-mucous secretions can be noticed; their colour is reddish-grey, with a bitter smell, sometimes with detritusuri celulare and 5-6.5 pH. These secretions are eliminated in a larger quantity in the morning. Normally, the elimination of the blood clots should stop at that moment.

On transrectal examination, the uterus is enlarged, has a lower tone and thinned walls. The changes in the general state that may occur are: moderate hyperthermia, decreased appetite and milk lactation.

In most cases, in cows, the cataral puerperal endometritis has a tendecy to heel. After 8-10 days the genital secretions decrease in quantity and become clear, the uterus involution, and the healing may occur spontaneously,within 3-4 weeks: more often than not, this disorder can become chronic. If the disease is not found in time, it can evolve into puerperal endometritis or suppurative metritis, and the germs become more pathogenic.(1,2).

Table 1

The frequvency of occurence of the cases of cataral endometritis

No.	Location	Cataral puerperal endometritis				Treatment				Animal culling	
		2006	2007	2008	Total	Healed		Not healed		Total	%
						Total	%	Total	%		
1.	Pantelimon Farm	8	7	5	20	19	95	1	5	0	
2.	Rătești Farm	10	11	7	28	23	82,14	5	17,86	2	7,14
3.	Afumați Farm	17	14	9	40	37	92,5	3	7,5	2	5
	Total	35	32	21	88	79	89,77	9	10,23	4	4,54

Treatament. Three objectives can be taken into account, as follows: the emptying of the uterus from the infected, the stimulation of contractions and the acceleration of the uterine involution and the treatment of infection.

The emptying of the uterus can be performed by massaging the uterus or by uterine lavage with probes that have dublu curent. The lavage should be performed only in the uterus there are large quantities of secretions. For the lavage physiological serum or antiseptic solutions (Rivanol 1‰, potasium permanganate 1/2000-1/4000, Cloramină 4‰) are introduced in the uterus, which are then completely removed with the help of the probe. For the emptying of the uterus and the stimulation of uterine involution can be administered: *ocitocine* in usual doses, repeated after 12-24 hours or reduced doses every 3 hours, inducing uterine contractions, which lead to the cleansing of the uterus; this treatment can be aplied only within the first 48 hours after delivery and *metilergometrin maleat 1‰*, adminsitred intramuscular in doses of 5-10 ml, *parasimpaticomimetice* (pilocarpine), administred subcutanat in a dose of 0.1 g active substance per animal.

Different local and general treatments have been used thoughout time in the therapy of cataral endometritis, as follows:

- Jimenez M., Viamontes, L.D., (1993), citated by **Constantin V.T**. (2005) conducted an experiment concerning the treatment of puerperal endometrites on a group of 142 cows for which a solution of5 - l0% propolis in etanol 70% (50 ml) was used for uterine infusion and that were examined 72 hours later. The cows recovered after the first treatment, except for those suffering from cataral suppurative metritis or from biometritis, that were treated with 1-2 extra infusions (40 ml each) every 72 hours. After the third cure, 81.7% of the cows were completely healthy. It is belived that a concentration of 5-10% of the solution does not influence the outcome, but influences the number of births. The animals that had several births aree more difficult to heal.

- Diaconescu A., Voicescu, Crezante, Kubaszki Raluca (1998) used to treat this disorder a product called produsul Placentcol I, made up of collagen from skin 90%, collagen from the placenta 90%, potassium iodine 14,2 g, metallic iodine 7,1 g. The metallic iodine and the potassium in a solution have a local action, creating a sterile inflammatory process that activates the immune and cicatrizante processes, influencing the reproductive function by activating the sexual cycle. The collagen has analgetic cicatrizante properties, improves immunity and helps form a shield;

- Grigore C. (1998) used to treat endometrites in cows the following pattern of treatment: day 0-Hexestrol diacetat 8 mg intramuscular (Sintofolin 2 ml); day 4 or 5 PGF 2α natural 20 mg/animal or sintetic 450-500 μg/animal; day 15-16 PGF 2α is repeated; day 18 sau 19 (72-96 hours from the second administration of PGF 2α) double blind artificial insemination is performed;

- for aseptic purposes, **Bîrțoiu A.** and **col**.(2006) recommend the treatment with wide spectrum antibiotics, according to the antibiogram (Oxitetracicline, Neomicine, Polimixine, Aureocicline, Teramicine) sulfamides and chimioterapic drugs, administred as solutions and watery, oily or with hydro-vitamin-minerals (vitamina A, D_2, E), suspensions, hemopansament sulfamidat; Local administration of vitamine A, estrogenes is recommended for the recovery of the enometrium. As a general treatment, tissular extracts, vitamin complexes (AD_3 ,E), beta-caroten, (Carofertin) and Camfor serum (1 g Camfor, 15 g glucoză, 60 ml alcool etilic, 1500 ml distiled water) are administered intravenously in a dose of 400 ml for the improvement of the general state and the stimulation of the processes of uterine healing;

- Ghencioiu C., Vlăşceanu Laura (2004**)**, on the **Pantelimon farm**, during the perioad under research (2006-2008) identified 20 cases of chronic cataral endometrites, following the retention of the placenta. As treatment they used the ***American method***, which consists of three administrations as follows: administration 1- 24 hours from birth 500 ml physiological serum, 30 ml medicinal alcohol , 4-5 g oxitetracicline; the entire mixture is inserted in a perfusion bag and is administered straight into the uterus with some insemination paiete; a dose of PG F2α is also added; administration 2- 48 hours after the first administration, made up of 500 ml physiological serum, 30 ml medicinal alcohol and 4-5 g oxitetracicline; administration 3- 7 days after the second one; the mixture contains 250 ml physiological serum and 1 000 000 U.I. peniciline and 1 mg estradiol. At the same time with the 3rd treatment, the uterine contractions should be stimulated by administering ocitocice. The uterine infection is faught against by introducing into the uterus antibiotics with a wide spectrum, a sulfamides (Nitrofuran), dry (pulvis or bujiuri spumante), which, being effervescent, reach among all faldurile. The uterine involution is stimulated by transrectal massage or ocitocine 30-50 U.I. epidural or 50-80 U.I. intramuscular, PG F2α, ergometine maleat 5-10 ml solution 1‰.

- at present PGF 2α is more and more widely used, which causes uterine contractions, the emptying of its content, asrwell as the destruction of the yellow corpului, which is frequently found in uterine infections.

To avoid the occurance of puerperal disorders generally and of endometritis catarale especially, a set of technical, organizations and hygienic-veterinary measures has to be implemented,as follows:

- the gestant cows should be transferred in the maternitay 2 weeks before birth, so as to benefit from good lodging and microclimate, associated to daily exercise in the open;
- the delivery and the puerperal period should be surveilled;
- the elimination of the covers of the fetus should be watched for and their retention should be adequately treated;
- the use of vaginal lavage with astringent and antiseptic solutions to prevent genital infections on an ascending path;
- in order to increase the resistance of the body (**Ruginosu, Elena-** 1999) recommends the use of drugs like Polidin (8 ml) up to 48 hours from birth and 14 days postpartum to activate fagocitosis and the antibodies synthesis.

3. CONCLUSIONS

1. To avoid the occurance of catarale endometritis, certains organizational measures should be observed: the suveillance of animals prior to and after birth, the stimulation of increased bodily immunity, the use of vaginal lavages vaginale with astringente and antiseptic solutions to prevent genital infections on an ascending path.

2. Of all the methods used to treat this disorder, the „American method” is the most recent and has the best results, as it can be seen after its use in the Pantelimon farm. The uterine infections are fought against by introducing into the uterus antibiotics with a wide spectrum, a sulfamides (Nitrofuran), dry, which, being effervescent, reach among all. The uterine involution is stimulated by transrectal massage or ocitocine 30-50 U.I. epidural sau 50-80 U.I. intramuscular, PG F2α, maleat de ergometină 5-10 ml soluție 1‰.

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RESEARCHES REGARDING THE QUALITY OF BOVINE EMBRYOS SAMPLED IN S.C. ILYA AGRO SRL

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Key words: embryo transfer, superovulation, progesterone intravaginal device.

SUMMARY

The present paper emphasizes the benefit of using the superovulation in cows breeding and to underline the important of embryotransfer in nowadays situations. The researches were carried out during six weeeks in a farm located in the south part of Romania, on a livestock of two Romanian breeds: Romanian Spotted Cow and Romanian Black Spotted Cow. There were used different treatments to induce the superovulation, there were made artificial inseminations with high value sperm, and there was assessed the quality of all the sampled embryos.

INTRODUCTION

The animal breeding, as an important branch of the agriculture has a more and more importance to the whole production and income in the agriculture field. If the animal breeding is the one which modify the animal genetic potential in a positive way along generations, reproduction comes with an essential aid, being the material and the working support for the animal breeding. Thus, the applying of artificial insemination, of embryotransfer, superovulation inducing and obtaining of some patogenous germ free organisms represent more efficaciousness methods spreaded in bovine raising.

1. MATERIALS AND METHODS

To study and asses the result of the embryotransfer the researches of the present study were carried out upon 6 weeks. This term included the choosing of the donor and receptor females, the inducing of the superovulation and heats syncronization, embryos sampling and assessment. The biologic material researched in the present paper was represented by health animals with non infectious diseases, with a good status from the zootechnical point of view, raised in S.C. ILYAAGRO SRL. The animals owed to two Romanian breeds: Romanian Spotted Cow and Romanian Black Spotted Cow. There were made four groups: one with Romanian Spotted Cows of 16-18 months year old, one with Romanian Spotted Cows of 3 years old, one with Romanian BlackSpotted Cows of 16-18 months year old and the last one with Romanian Black Spotted Cows of 3 years old.

For the first group, a progesterone intravaginal device was introduced for 7 days. The FSH was administered in decreasing doses twice a day, starting with the fourth day after the progesterone intravaginal device introducing.

For the second group it was chosen a treatment with PMSG and it was administered 2500 u.i. Folligon, in the morning of the tenth day of the estral cycle, and in the 12 th day of this 0,500 mg Prosolvin was introduced.

In the third group it was chosen a treatment with PMSG and it was administered 2500 u.i. Folligon, in the morning of the tenth day of the estral cycle, and in the 12 th day of this 0,500 mg Prosolvin was introduced.

In the fourth group , a progesterone intravaginal device was introduced for 7 days. The FSH was administered in decreasing doses twice a day, starting with the fourth day after the progesterone intravaginal device introducing.

After this the heats were monitored and there were made artificial inseminations with the sperm of Dutch By, delivered by World Wide Sires,Ltd. There were sampled the embryos by the non surgical method and they were assess and after these preserved by frozen into liquid nitrogen.

2. RESULTS AND DISCUSSIONS

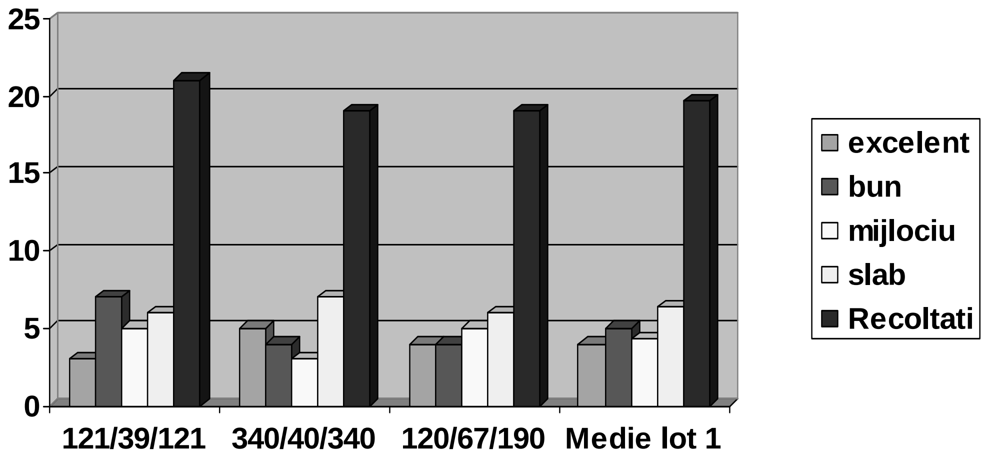
There were analyzed the embryos from the animals in the four groups.

The results may be noticed in four charts.

Totally, in the first group there were obtained 59 embryos which of 12 excellent, 15 good, 13 medium and 19 of a very low quality. The proportion of embryos obtaining, calculated as an average number of embryos per animal under superovulation was 19,6.

Chart 1

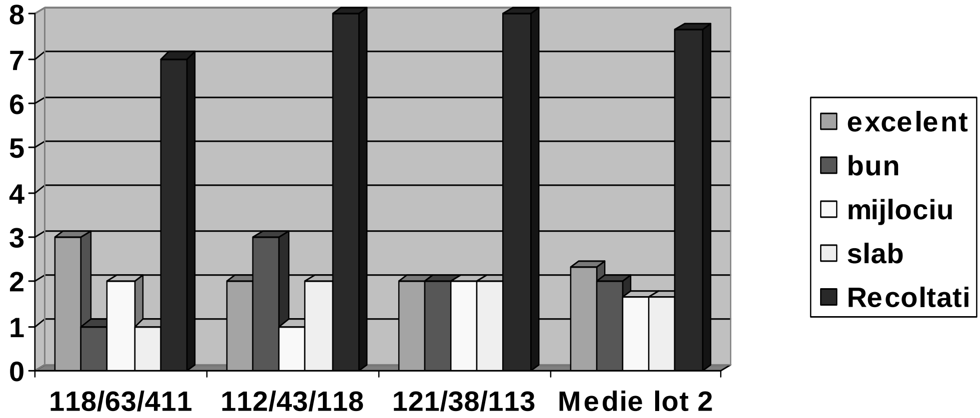
Quality of embryos sampled from the first group



In the second group, there were obtained totally 23 embryos which of 7 excellent, 6 good, 5 medium and 5 of a very low quality. The proportion of embryos obtaining, calculated as an average number of embryos per animal under superovulation was 7,75.

Chart 2

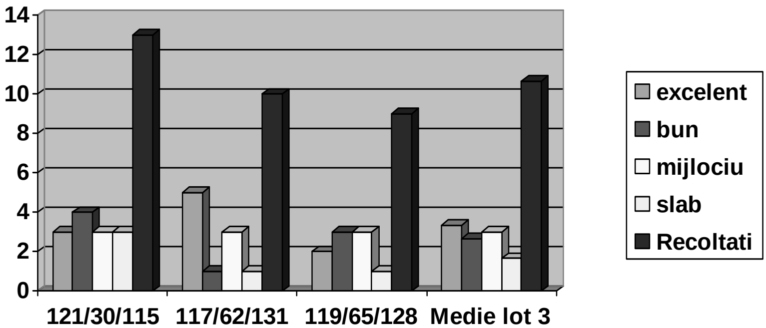
Quality of embryos sampled from the second group



Totally, in the third group there were obtained 32 embryos which of 10 excellent, 8 good, 9 medium and 5 of a very low quality. The proportion of embryos obtaining, calculated as an average number of embryos per animal under superovulation was 10,6.

Chart 3

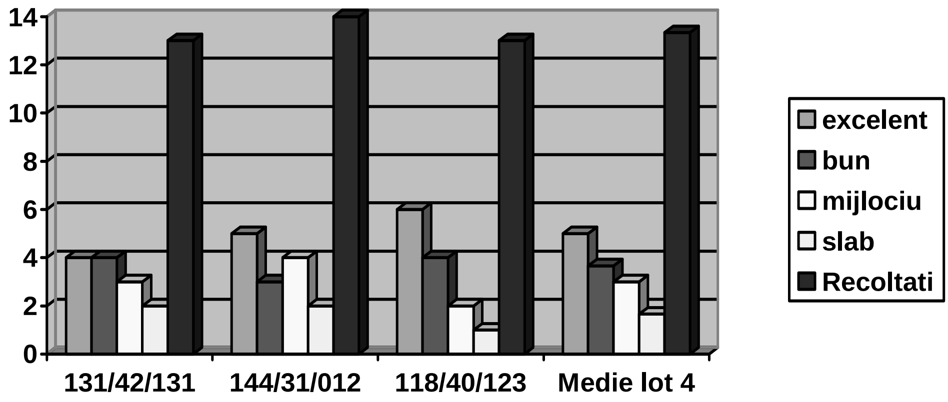
Quality of embryos sampled from the third group



In the fourth group, there were obtained totally 40 embryos which of 15 excellent, 11 good, 9 medium and 4 of a very low quality. The proportion of embryos obtaining, calculated as an average number of embryos per animal under superovulation was 13,3.

Chart 4

Quality of embryos sampled from the first group



3. CONCLUSIONS

After the researches during all our studies it may conclude the following:

1. Using the treatment with the progesterone intravaginal device in 1 and 4 groups, on the donor and acceptor females, it was obtained an average number of 21 embryios and 30 transferable embr and 30 transferable embryios.

2. The best answer at the treatment was obtained by a cow in number 1 group, a Spotted Romanian cow of 16-18 months, with a number of 21 sampled embryios and 15 transferable, using the progesterone intravaginal device.

3. The worst result was obtained in a cow in number three group, a Black Spotted Romanian cow, from 16-18 months category with only 4 sampled embryios, but all of them transferable, using the Folligon superovulation.

4. It is also a breed influence in reaction with the superovulation treatment, noticing that the highest intensity in Romanian Spotted Cows than in Romanian Black Spotted cows.

5. That is why it is reccomend a very well maintening of the donor cows and the treatment for inducing the superovulation with the progesterone intravaginal device.

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4. TECHNOLOGIES OF ANIMAL HUSBANDRY, MARKETING

MEAT PRODUCTIVITY OF THE NEW TYPE BLACK AND WHITE CATTLE
PRODUCȚIA DE CARNE A TIPULUI NOU DE BOVINE BĂLȚATĂ CU NEGRU

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Key words: meat productivity, black and white cattle.

SUMMARY

Within last three decades in Republic Moldova new zonal type of bovines of Black and White breed has been created. Animals of new type are characterized by high genetic potential of dairy production (7 - 9 thousand in kg of milk for lactation). On 53 best farms it is received on 5 - 7 thousand in kg of milk from each cow for a year. The young growth has good parameters of meat production. At intensive cultivation the daily average gain of alive weight has made 900 - 1100 grammas. At slaughter an output of carcass has made more 59%.

Earlier divorced in Republic Moldova breeds of the large horned live-stock - Red Steppe and Simmental had a low potential milk and meat productivity, insufficient available with machine milking, did not meet the requirements industrial organization of cattle breeding. At period since 1960 on 1974 was conducted work on crossbreeding the specified breeds with Jersey breed. Contents of fat in milt increased on 0.2 – 0.3 %, but dairy productivity remained low - 3000 - 3500 kilo on cow per year. Hereinafter, the work was organized on creating the new type Black and White live-stock. Local populations of the live-stock crossbreed with employment the Black and White and Holstein live-stock. With 1971 on 1976 in republic they were imported from Estonia, Ukraine's, Moscow, Leningrad and Kaliningrad areas 22.5 thousands goal Black and White live-stock, inclusive 95 bulls. On genealogical composition 27.5% black and White pertained to lines of the line Annas Adema 30587. The most high milk productivity full-grown (6539-6135 kg) were characterized by the producers a line Hiltes Adema 37910, Niko 31652 and Lindberg N-2363. The oxen's-producers many known line Holstein live-stock they were imported In Republic Moldova from Germany, Denmark, Great Britain, Bulgaria, Rumanian, Estonia, Lithuanians, Russia, and the other countries. To account of the use oxen black and White and Holstein live-stock in our republic is created high genetic potential milk and meat productivity.

1. MATERIALS AND METHODS

The study to meat productivity of the saplings was conducted on base intensive growing of the young bulls of new type in comparison with saplings to local source populations of the live-stock. Studied the growing and development, velocity of the growing and change the alive mass, conversion stern, factors at slaughter of the live-stock and quality of meat. The studied factors to meat productivity and fitness to intensive growing young bulls of the new type in comparison with saplings Simmental and Red Steppe breeds.

2. RESULTS AND DISCUSSIONS

The studies of the mongrels with share miscellaneous gene perfecting sorts have shown that increasing of the share gene Holstein race with 50% before 75% and with 75% before 87.5% weakening existed beside some with high half bred of the mongrels to constitutions. This has allowed to draw a conclusion about that to lead increasing the bloodies to race over 75-87.5% share gene beside animal of the new type inadvisable.

Optimum for "north" zonal subtype is a variant of the crossbreeding with use cross-breed that will allow to get the animal with share gene Holstein of the race at a rate of 75-81..2% with the following breeding "in itself". For "south" zonal subtype advisable to use the scheme of the crossbreeding, as a result which share gene Holstein of the race beside animal will form 62.5-75.0%.

As a result called on studies is created new inside the breed type Black and White race for breeding in Republic Moldova. The dairy productivity cortex on the first lactation forms from 4420 ± 37.8 kg before 5077 ± 20.0 kg milk with contents of fat 3.58 – 3.72 %. Cows of the new type have milk productivity on 820-1277 kg above standard of the race. The cows of the south subtype exceed the standard of fat in milk on 0.12%, cows of the south subtype had a contents of fat on 0.02% below standard. The velocity of the milking has at the average formed 1.80 l at minute. In new type there are 5 genealogical lines oxen. It is determined genetic feature to new population animal type.

The results of the first experience on intensive growing Black and White and Simmental young bulls were provided in table 1.

Table 1

Indicator to meat productivity ("north" zonal subtype)

Productivity indicator	Simmental bulls	Black and White bulls	Black and White in comparison with Simmental bulls, ±
Amount animal	18	18	-
Weight calf at birth	43.6	42.4	- 1.2
Weight bulls at age 16 months	474.0±8.1	452.3±11.4	+ 21.7
Velocity of the growing, g	1023	952	+ 71.0
Consumption stern on 1 kg increase, stern units	5.87	6.64	- 0.77
Weight of the carcass, kg	267.5	253.1	+ 14.4
Output of the carcass, %	60.7	59.3	+ 1.4

Results of the first experience have shown that at birth calf from Black and White and Simmental breed had a cognate alive weight, but Black and White bulls grew more intensive and at age 16 months had more alive weight than their peers with Simmental breed.

Meat productivity Black and White and Red of Steep bulls studied In the other experience. Results were provided in follow table 2.

Table 2

Indicator to meat productivity ("south" zonal subtype)

Productivity indicator	Red of Steep bulls	Black and White bulls	Black and White in comparison with Red of Steep bulls, ±
Amount animal	20	20	-
Weight calf at birth	37.6	40.4	+ 2.8
Weight bulls at age 16 months	403.7±9.2	453.3±8.9	+ 49.6
Velocity of the growing, g	787±21,2	894±21,7	+ 107.0
Consumption stern on 1 kg increase, stern units	7.39	6,.75	- 0.64
Weight of the carcass, kg	236.4±4.7	261.9±5.2	+ 25.5
Output of the carcass, %	59.2	60.9	+ 1.7

And in the second experience Black and White bulls of the new type had a more high factors than Red Steep bulls on alive mass from birth before termination fatten, on velocities of the growing, on weight and quality flourish, as well as the best payment stern by increase of the alive mass.

PARTIAL RESULTS REGARDING THE IMPROVEMENT OF MILK PRODUCTION AT THE LOCAL POPULATIONS OF GOATS BY CROSSBREEDING WITH SPECIALIZED BREEDS

REZULTATE PARȚIALE PRIVIND AMELIORAREA PRODUCȚIEI DE LAPTE LA POPULAȚIILE AUTOHTONE DE CAPRINE PRIN ÎNCRUCIȘARE CU RASE SPECIALIZATE

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Key words: hybrids, weight increasing rate, average daily increasing rate.

SUMMARY

For the improvement of the milk production at the local populations of goats belonging to Carpathian breed the crossbreeding with Saanen breed was made, aiming to create the first links of a new goat population, with superior productive performances. It was noted a great variability of the milk production at the population of Carpathian breed, the coefficient of variability being between 33,16-60,49%. The total milk production was of 180,47 ± 3,80 liters (the quantity of milk sucked by the kids was of 68,65 ± 2,41 liters, the quantity of milked milk 111,82 ± 3,67 liters) and the duration of lactation of 191,46 ± 3,82 days. At dropping at F1 Saanen x Carpathian kids it was noted a smaller average weight comparatively to the kids of Carpathian breed, during the growing period it was noted a similar body weight of F1kids comparatively to the witness lot. At the goats which were mounted with Saanen he-goats the fecundity and prolificacy have sensibly higher values comparatively to the witness lot. The average age at which the kids manifested estrus was of 266,63 ± 2,65 days at F1 hybrids and 270 ± 4,16 days at the witness lot. The achieved percent of fecundity was clearly in the favor of the hybrid kids that of 63,2% besides only 25,8% at the Carpathian breed.

1. MATERIALS AND METHODS

The works were begun in 2007 and they were effectuated on a number of 120 animals, matrix goats from the local goat population from ICDCOC Palas-Constanța, goats of Carpathian breed and 2 experimental lots were created: lot I – was used at crossbreeding with he-goats of Saanen breed, and lot II – used as witness lot. The studied effective of matrix goats was tested to establish the productive potential (milk production under quantitative and qualitative aspect). It was made the evaluation of results of droppings to obtain the first series of F1 hybrids (Carpathian x Saanen) and the main achieved reproduction indicators were established. The production of merchandise milk was determined through monthly controls, summing up the quantity of milk at the 2 milking sessions in the day of control. Establishing the total milk production resulted from summing up the quantity of milk sucked by kids on the basis of the increasing rate made during milking period, considering that in the first 2 months the kids have specific consumption of 7,5- 8,0 liters/kg increasing rate.

2. RESULTS AND DISCUSSIONS

The milk production under quantitative aspect was the main parameter taken into study to characterize the local goat population which was the mother breed, the Carpathian breed, in crossbreeding with improving he-goats of Saanen breed.

In table 1 there are presented the average monthly quantities of milk calculated on the basis of the 5 individual controls, during the whole milking period. It was noted a great variability of the milk production at the analyzed population, the coefficient of variability having values between 33,16-60,49%. This aspect shows that Carpathian breed –local population from ICDCOC Palas-Constanța, was not subject to a program of selection in the way of milk.

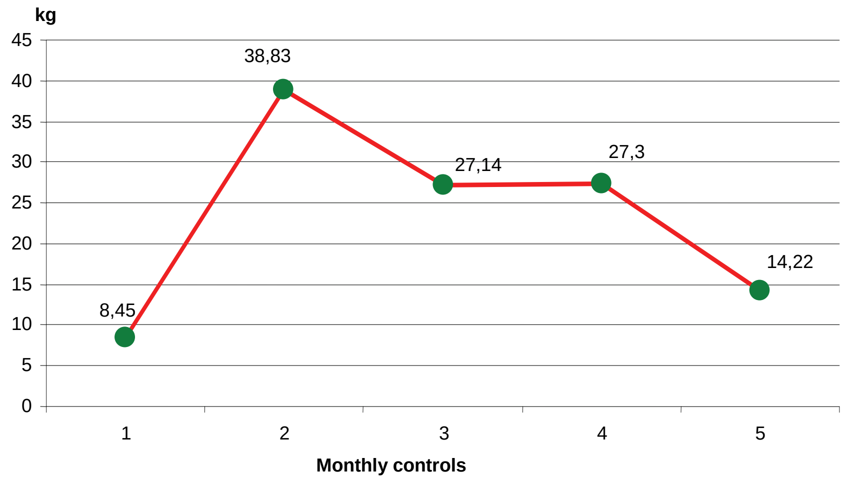
Table 1

Quantity of milked milk (liters) established by the monthly controls at the goat population from ICDCOC Palas-Constanța

Month	n	X ± sx	V%
May (control I)	86	8,45 ± 0,32	36,14
June (control II)	107	38,83 ± 1,27	33,92
July (control III)	107	27,14 ± 0,8	33,16
August (control IV)	103	27,29 ± 1,16	43,37
September (control V)	96	14,22 ± 0,87	60,49

On the basis of the obtained data it was graphically presented the lactation curve (graph 1) revealing the fact that it has a normal evolution and specific to the Carpathian breed.

Fig. 1 THE EVOLUTION OF THE AVERAGE MILK PRODUCTION PER CONTROLS



It is noted a decrease of the production of milked milk 30,10% in the 3rd month besides the 2nd month of milking when it is reached the peak of the lactation curve. After the 3rd month it is observed a maintenance in plateau until the 4th month, and then a decrease of the milk production with 63,40% in the 5th month.

Establishing the total milk production was made by summing up the quantity of milk sucked by kids during milking and the quantity of milked milk (table 2). After analyzing the obtained data it was calculated the quantity of milk sucked by kids as being of 68,65 ± 2,41 liters, and the quantity of milked milk of 111,82 ± 3,67 liters. The total milk production of the goats was of 180,47 ± 3,80 liters, the total duration of lactation being of 191,46 ± 3,82 days. All in all, the analyzed population made an average daily milk production, during the whole lactation period of 0,942 liters/animal.

Table 2

Total milk production at the goats of Carpathian breed at ICDCOC Palas-Constanța

Specification	n	$\bar{X} \pm s\bar{x}$	V%
Quantity of sucked milk (liters)	107	68,65 ± 2,41	36,16
Duration of milking (days)	107	63,65 ± 1,71	27,62
Quantity of milked milk (liters)	107	111,82 ± 3,67	33,95
Period of milking (days)	107	127,81 ± 1,46	11,88
Total milk production (liters)	107	180,47 ± 3,80	21,78
Total duration of lactation (days)	107	191,46 ± 3,82	20,63

Following the monthly controls made at ICDCOC Palas-Constanța milk samples were gathered and analyzed in the laboratory under the aspect of the content of dry substance, fat and protein (table 3).

The chemical composition of the milk is conditioned by breed, individuality, area and age, but also by the level and the nature of alimentation, lactation stage, frequency and duration of milking. To obtain certain features that are characteristic to the species at the milk must be taken into account also the fodders that the animals consume.

Table 3

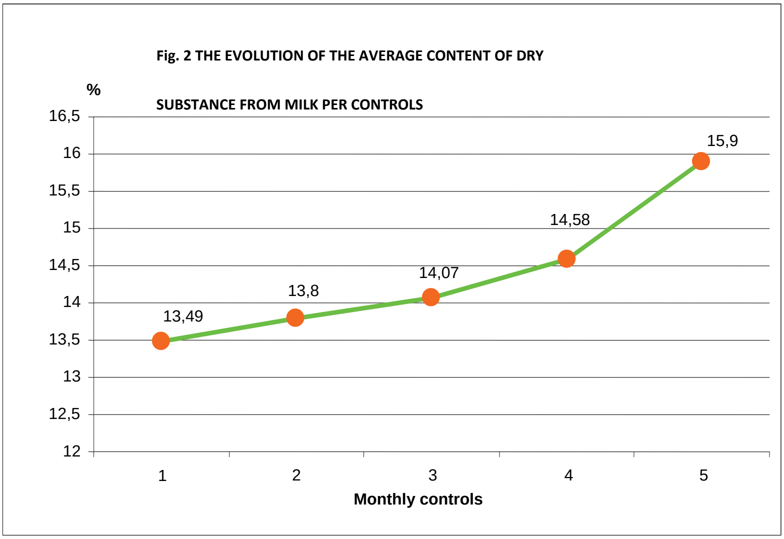
The quality indicators at the goat milk established on the basis of controls made at ICDCOC Palas-Constanța

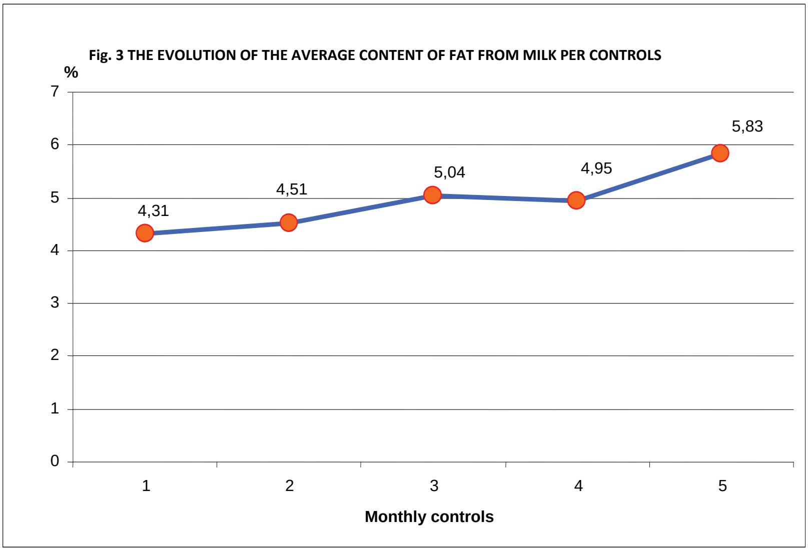
Control	Dry substance %		Fat %		Protein %	
	$\bar{X} \pm s\bar{x}$	V%	$\bar{X} \pm s\bar{x}$	V%	$\bar{X} \pm s\bar{x}$	V%
Control I	13,49 ± 0,092	3,74	4,31 ± 0,069	8,86	3,35 ± 0,021	3,46
Control II	13,80 ± 0,106	4,24	4,51 ± 0,101	12,18	3,35 ± 0,014	2,42
Control III	14,07 ± 0,140	5,47	5,04 ± 0,130	14,21	3,27 ± 0,018	3,18
Control IV	14,58 ± 0,195	7,34	4,95 ± 0,196	21,77	3,55 ± 0,022	3,39
Control V	15,90 ± 0,242	6,81	5,83 ± 0,211	16,22	3,70 ± 0,025	3,03

From the obtained data it was noticed the fact that regarding the content of dry substance of the goat milk it is emphasized, during lactation a progressive increase of its value. (Graph 2).

So, the content of dry substance of the milk at the 1st control was of 13,49 ± 0,092%, at control II of 13,80 ± 0,106%, at control III of 14,07 ± 0,140%, at control IV of 14,58 ± 0,195% and at control V of 15,90 ± 0,242%.

The same increasing trend was registered also concerning the average percent of fat from milk; at control I the average percent of fat was of 4,31 ± 0,069%, at control II of 4,51 ± 0,101%, at control 3 of 5,04 ± 0,130%, at control IV of 4,95 ± 0,196% and at control V of 5,83 ± 0,211% (graph 3).

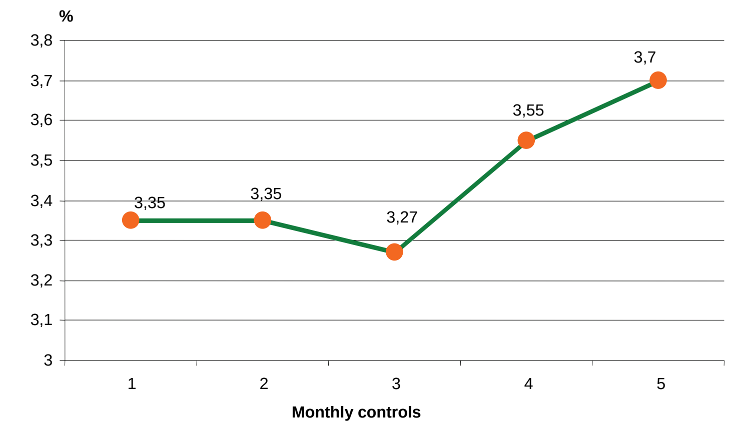




Regarding the content of protein of the goat milk, at the 5 controls made during the milking period, it was of 3,35 ± 0,021% at the first and the second control, it decreased at 3,27 ± 0,018% at the third control, it came back near the value of the first two controls, of 3,55 ± 0,022 at the forth control, being to increase at the last control to the value of 3,70 ± 0,025%.

It can be concluded that the protein from milk during the whole lactation had relatively constant values (graph 4).

Fig. 4 THE EVOLUTION OF THE AVERAGE CONTENT OF PROTEIN FROM MILK PER CONTROLS



After establishing the productive performances of the goat population which initially was at ICDCOC Palas-Constanța, the works continued by watching the dynamics of the body development at the F1 Saanen x Carpathian crossbred female youth comparatively to those from Carpathian breed (ecotype of Dobrogea), the data being presented in table 4.

Table 4

The dynamics of body development of the Saanen x Carpathian F1 crossbreds comparatively to Carpathian breed at ICDCOC Palas-Constanța

Specification	n	Saanen x Carpathian F1 crossbreds		Carpathian	
		$\bar{X} \pm s_{\bar{x}}$	V%	$\bar{X} \pm s_{\bar{x}}$	V%
Weight at dropping (kg)	25	2,44±0,0	19,48	2,62±0,099	19,00
Weight at 28 days (kg)	25	8,31±0,29	17,59	8,33±0,34	20,59
Weight at weaning (kg)	25	13,83±0,54	19,56	14,15±0,52	18,06
Weight at 5 months (kg)	25	19,04±0,87	22,88	18,12±0,95	26,26
Weight at 6 months (kg)	25	21,30±0,85	20,1	21,69±0,63	14,56

At the Saanen x Carpathian F1 kids at dropping it was noticed a lower average weight comparatively to the kids of Carpathian breed. Then it was noted, during growing period, a body development which is similar at Saanen x Carpathian F1 kids comparatively to the witness lot.

Following the evaluation of results of droppings at the studied goat population, there were obtained the reproduction indicators which are presented in table 5.
It was noted the fact that at the goats which were mounted with Saanen he-goats, the fecundity and prolificacy have sensibly higher values comparatively to the witness lot (Carpathian x Carpathian). Then it was proceeded to stimulatory feeding of two lots of kids (lot I Carpathian x Saanen and lot II Carpathian x Carpathian) which were precociously mounted (9 months).The average age at which the kids estrus was of 266,63 ± 2,65 days at the F1 hybrids and 270 ± 4,16 days at the witness lot. The percent of fecundity was clearly in favor of hybrid kids, that of 63,2% besides only 25,8% at the Carpathian breed.

Table 5

Main reproduction indicators
made by the goat lots from ICDCOC Palas-Constanța

Specification	Mounted goats	Dropping goats	Dropped kids	Fecundity (%)	Prolificacy (%)
Carpathian x Carpathian	46	43	68	93,48	147,8
Carpathian x Saanen	72	69	112	95,83	155,5

3. CONCLUSIONS

It was noted a great variability of the milk production at the analyzed population, the coefficient of variability having values between 33,16-60,49%.

The total average milk production of the goats of Carpathian breed was of 180,47 ± 3,80 liters (milk sucked by kids 68,65 ± 2,41 liters, milked milk 111,82 ± 3,67 liters), duration of lactation being of 191,46 ± 3,82 days.

The content of dry substance of the milk increased from control I to the fifth control, at the first control was 13,49 ± 0,092%, at control II 13,80 ± 0,106%, at control III 14,07 ± 0,140%, at control IV 14,58 ± 0,195%, at control V 15,90 ± 0,242%.

The percent of fat from milk registered an increasing trend; at control I the percent of fat was 4,31 ± 0,069%, at control II 4,51 ± 0,101%, at control III 5,04 ± 0,130%, at control IV 4,95 ± 0,196% and at control V of 5,83 ± 0,211%.

The content in protein was of 3,35 ± 0,021% at control I and II, decreased of 3,27 ± 0,018% at control III, it came back to the value of the first 2 controls of 3,55 ± 0,022 at control IV, then increasing at the last control to the value of 3,70 ± 0,025%.

At the goats which were mounted with Saanen he-goats the fecundity and the prolificacy have sensibly higher values comparatively to the witness lot (Carpathian x Carpathian).

At Saanen x Carpathian F1 kids at dropping the average weight was smaller comparatively to the Carpathian kids, during growing period it was noted a similar body development at the F1 kids and those of Carpathian breed.

The average age at which the kids manifested estrus was of 266,63 ± 2,65 days at the F1 hybrids and 270 ± 4,16 days at the witness lot. The percent of fecundity was clearly in the favor of the hybrid kids that of 63,2% besides only 25,8% at the Carpathian breed.

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THE TECHNOLOGY OF EXPLOITING THE YOUNG GOATS FOR MEAT PRODUCTION

TEHNOLOGIA DE EXPLOATARE A TINERETULUI CAPRIN PENTRU PRODUCȚIA DE CARNE

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Key words: kids fattening, carcasses, mutton’s leg, slaughtering output.

SUMMARY

It was made the fattening of kids from Carpathian breed and of Boer X Carpathian half-breeds, fattened in system semi-intensive system, noticing: similar average body weights in the beginning of the experiment at the two lots, and in the end of fattening it is emphasized a bigger difference of the body weight with 13% at the lot of Boer x Carpathian half-breeds beside the lot of Carpathian breed, 15,25±0,75 kg at Boer x Carpathian half-breeds and 11,97±0,56 kg at the kids of Carpathian breed. At the fattening of the kids of Carpathian breed and of the Boer X Carpathian half-breeds which were intensively fattened, there were noticed the following: the average weight in the end of the fattening period, at the kids of Carpathian breed was of 26,23 ± 0,81 kg , the average total increase of weight was of 13,51 ± 0,67 kg , and the average daily increase was of 135,1 ± 4,89 g/day; at the kids of Boer x Carpathian half-breeds he average weight in the end of the fattening period was of 28,51 ± 0,76 kg , the total weight increase was of 14,66 ± 0,52 kg, and the daily average increase of 146,6 ± 5,1 g/day; the average specific consumption at the kids of Boer x Carpathian half-breeds was of 8,91 UNC, 1087 g PDIN and of 869 g PDIE; the average specific consumption at the kids of Carpathian breed was of 9,67 UNC, 1180 g PDIN and 943 g PDIE at ICDCOC Palas. By the intensive fattening of the kids, there were obtained bigger dimensions of the carcass at the kids of Boer x Carpathian half-breeds. There were obtained bigger values of the slaughtering output at the kids of Boer x Carpathian half-breeds, of 45,66±1,02%, besides 43,42±0,95% at the kids of Carpathian breed, due to the bigger weight of the carcasses, also the commercial output, 50,57±1,13% besides 48,76±0,98%. The meat/ bones rate was of 3,22/1 at the kids of Carpathian breed and of 4,02/1 at the kids of Boer x Carpathian half-breed.

In the actual international context the kid meat is appreciated by the consumers for its organ lepta qualities and for the low content of fat. The production of goat meat has developed a lot lately, in many countries of the world, both in the countries from the Middle East and in those of West Europe. The increase of the interest in goat meat determined the increase of the interest of breeders to exploit the goats for meat.

The use of industrial crossbreeding is a rapid way of increasing and improving the meat production, allowing the improvement of the performances of the obtained products, associating the qualities of two breeds and thus having benefits from the effect of complementarities and heterocyst. The method is frequently used in many countries, which oriented the goat breeding to the meat production, this meaning the crossbreeding of the local breeds with Boer breed.

1. MATERIALS AND METHODS

The works were made on an effective of goats in the frame of the **Institute of Research – Development for Sheep and Goat Breeding Palas-Constanța –** goats of Carpathian breed. The animas have been individually observed under the report of own performances, registering the data regarding: control of productions; reproduction indicators; the weight of kids at birth and the evolution of the body weight on the whole growing period until weaning and calculus of the weight increase rate; control of fodder consumption; body measurements.

The maintenance of goats is made in stable for 150-160 days and 205-215 days on pasture. For the goats, there were assured fodder ratios depending on the physiological estate of the animals. The control of fodder consumption was made during the stable period through weighing the fodders, per lots, in the moment of administering them and the rests remained unconsumed, at an interval of 24 hours, and for the grazing period, the consumed quantity of green mass, it was established using the method of control points. The feeding of youth was made beginning with the age of 8-10 days, when it was assured hay of very good quality and concentrated foddersd fodders, the administering being done at discretion, until the kids' weaning, then being made the intensive fattening for a period of 100 days, structured in 3 stages: ***stage I - "accommodation"*** (15 days), the animals were fed with fodders as unique mixture which was given „ad libitum", in 3 daily meals, the content of the daily ration in the nutritive principals being of 0,97 UNC, 92 g PDIN and 89 g PDIE; ***stage II "properly fattening"*** (60 days), unique mixture was administrated, the content in nutritive principals of the daily ratio being of 1,29 UNC, 159 g PDIN and 125 g PDIE; the fodders were administered in two daily ratios; ***stage III - "finishing"*** (25 days), the content of the daily ration in the nutritive principals being of 1,55 UNC, 201 PDIN and 156 g PDIE; or semi-intensive fattening, according to the following scheme:

Scheme of growing and fattening of the goat youth in semi-intensive system

System of maintenance	Stage of fattening	Duration (days)	Quantity of fodders per period
In stable	Accommodation	15	Hay (6,0 kg); Warehouse corn (10,5 kg); Concentrated fodders (o,6 kg).
	Growing and fattening	35	Hay (14,0 kg); Warehouse corn (43,0 kg); Concentrated fodders (1,4 kg).
Grazing	Accommodation	15	Hay (3,0 kg); Warehouse corn (3,0 kg); Concentrated fodders (0,3 kg); Green mass (45 kg).
	Growing and fattening	90	Green mass (678 kg).
In stable	Accommodation	10	Hay (5,0 kg); Gross fodders (5,0 kg); Warehouse corn (16,0 kg); Concentrated fodders (0,5 kg).

	Finishing	35	Hay (7,0 kg); Gross fodders (18,0 kg); Warehouse corn (94,0 kg); Concentrated fodders (4,0 kg).
Total period of fattening	-	200	Hay (35,0 kg); Gross fodders (23,0 kg); Warehouse corn (165,5 kg); Concentrated fodders (6,8 kg) Green mass (723 kg)

During the grazing period, the fattening of the goat youth it was made with green mass from a cultivated pasture, with the fodder mixture: 70-75% grain plants (Dactylis glomerata, Festuca pratensis, Lolium perene) and 25% perennial vegetable plants (Medicago sativa, Trifolium repens). During the in-stable period the goat youth received the ratio from table 1.

Table 1

Fodder ratio given to the goat youth during the period of in-stable fattening

Specification	**kg**	**S.U.**	**UNC**	**PDIN g**	**PDIEg**
Lucerne Hay	0,30	0,26	0,17	28	14
Corn	0,25	0,22	0,26	24	29
Barley	0,25	0,22	0,29	19	17
Wheat Bran	0,20	0,18	0,12	18	12
Chalk	0,005	-	-	-	-
Salt	0,005	-	-	-	-
Total	1,00	**0,88**	**0,84**	**89**	**72**

In the end of the fattening period there were made appreciations on the living animal, through the biometric method, which consists in establishing the values of the many body areas which have a high coefficient of heritability. Determination of measurements regarding the conformation on the living animal or on the carcass was made through measurements with the fillet, the ruler, the compasses and the caliper.

The control slaughtering was effectuated by an adequate work methodology, regarding slaughtering, bleeding, peeling. It was made the appreciation of the rate of the consisting parts of the body, weighing the carcass at warm and at cold. The calculus of the output at slaughtering was made as follows: slaughtering output - as rapport between the weight of the carcass after 24 hours since slaughtering and the weight of the living animal; the commercial output – where also the internal organs were included.

It was made the statistic processing of the data.

2. RESULTS AND DISCUSSIONS

After the weaning of kids there were composed the lots of kids and it was made the semi-intensive and intensive fattening. The evolution of the body weight of the goat youth which were fattened in semi-intensive system, on pasture and in stable can be watched in table no. 2.

At the fattening of kids from Carpathian breed and of Boer X Carpathian half-breeds, which were fattened in semi-intensive system there were obtained the following weights and average daily increasing rates: the initial weight was of 11,36 ± 0,32 kg at the Boer x Carpathian half-breeds and of 11,18±0,27 kg at the kids of Carpathian breed, similar average body weights in the beginning of the experiment at the two lots at the two lots of male young goats; from table no. 2 it is noticed, in the end of fattening a difference of the body weight which is bigger with 13% at the lot of Boer x Carpathian half-breed kids beside the kids of Carpathian breed, 15,25 ± 0,75 kg at the Boer x Carpathian half-breeds and 11,97 ± 0,56 kg at the kids of Carpathian breed; the average daily increasing rate being of 101,66±5,48 g at the Boer x Carpathian half-breed kids and of 79,80±3,71 g at the Carpathian breed kids.

Table 2

Evolution of the body weight at the young goats which were semi-intensively fattened on pasture and in stable

Specification	**n**	**Half-breeds of Boer x Carpathian**		**n**	**Carpathian**	
		$\bar{X} \pm \bar{sx}$	**V%**		$\bar{X} \pm \bar{sx}$	**V%**
Initial average body weight (kg)	12	11,36 ± 0,32	9,75	12	11,18±0,27	8,36
Final average body weight (kg)	12	26,61±0,67	8,84	12	23,15±0,89	13,30
Weight increase (kg)	12	15,25± 0,75	18,88	12	11,97± 0,56	16,19
Average daily increasing rate (g)	12	101,66±5,48	18,65	12	79,80±3,71	16,09

At the fattening of the kids of Carpathian breed and of the Boer X Carpathian half-breeds which were fattened in intensive system there were obtained the weights and increasing rates from table no. 3.

Table 3

The evolution of the body weight of the kids fattened in intensive system (100 days)

Lot	Weight in the beginning of fattening (kg)		Weight in the end of fattening (kg)		Total weight increasing rate (kg)		Daily weight increasing rate (g)	
	$\bar{X} \pm \bar{sx}$	V%	$\bar{X} \pm \bar{sx}$	V%	$\bar{X} \pm \bar{sx}$	V%	$\bar{X} \pm \bar{sx}$	V%
Carpathian Breed (n=25)	12,72±0,32	12,57	26,23±0,81	15,44	13,51±0,67	24,79	135,1±4,89	18,09
Boer x Carpathian Half-breeds (n=25)	13,85±0,37	13,35	28,51±0,76	13,32	14,66±0,52	17,73	146,6±5,1	17,39

The kids of Carpathian breed had, in the beginning of fattening, the average weight of 12,72 ± 0,32 kg, and the Boer x Carpathian half-breeds had, in the beginning of fattening, the average weight of 13,85 ± 0,37 kg. The average weight in the end of the fattening period at the kids of Carpathian breed was of 26,23 ± 0,81 kg, the total average weight increasing rate was of 13,51 ± 0,67 kg, and the average daily increasing rate was of 135,1 ± 4,89 g/day.

La at the half-breeds of Boer x Carpathian the average weight in the end of the fattening period was of 28,51 ± 0,76 kg, the total weight increasing rate was of 14,66 ± 0,52 kg, and the average daily increasing rate of 146,6 ± 5,1 g/day . The average specific consumption of the kids of Boer x Carpathian half-breeds was of 8,91 UNC, 1087 g PDIN and of 869 g PDIE as it is shown in table no. 4. The average specific consumption at the kids of Carpathian breed was of 9,67 UNC, 1180 g PDIN and 943 g PDIE.

Table 4

The average consumption of UNC, PDIN and PDIE/kg of increasing rate at the fattening of kids in intensive system

Breed/ population	Total increasing rate (kg)	Total of UNC consumption	Average consumption of UNC/kg increasing rate	Total consumption of PDIN	Consumption of PDIN/kg of increasing rate	Total consumption of PDIE	Consumption of PDIE/kg of increasing rate
Boer x Carpathian Kids	14,66	130,7	8,91	15945	1087	12735	869
Carpathian Kids	13,51	130,7	9,67	15945	1180	12735	943

Following the experimental slaughtering at the lots of kids intensively fattened there were made appreciations of the carcasses, noticing the bigger dimensions of the carcass at the kids of Boer x Carpathian half-breeds especially the bigger dimensions of the leg, the length and the width of the leg, comparatively to those from the carcasses of the kids of Carpathian breed. In table no.5 there are presented the results of the experimental slaughtering.

Table 5

The results of the experimental slaughtering at ICDCOC-Palas

Specification	UM	Kids of Carpathian breed (n=9)		Kids of Boer x Carpathian half-breeds (n=9)	
		$\bar{X} \pm s\bar{x}$	V%	$\bar{X} \pm s\bar{x}$	V%
Living weight	kg	26,23±0,81	15,44	28,51±0,76	13,32
Weight of carcass	kg	11,39±1,02	26,86	13,02±1,12	25,80
Slaughtering output	%	43,42±0,95	6,56	45,66±1,02	6,71
Commercial output	%	48,76±0,98	6,02	50,57±1,13	6,70
Meat / bones rapport		3,22/1		4,02/1	

From the data of table no. 5 there can be noticed the bigger values of the slaughtering output at the kids of Boer x Carpathian half-breeds, 45,66±1,02%, besides 43,42±0,95% at the kids of Carpathian breed, due to the bigger weight of the carcasses (13,02±1,12 kg at the Boer x Carpathian half-breeds and 11,39±1,02 kg at the kids of Carpathian breed), and also the commercial output, 50,57±1,13% besides 48,76±0,98%.

The meat/bones rapport was of 3,22/1 at the kids from Carpathian breed and of 4,02/1 at the kids of Boer x Carpathian half-breeds.

3. CONCLUSIONS

➢At the fattening of the kids from the Carpathian breed and of the Boer X Carpathian half-breeds, fattened in semi-intensive system it was noticed:

Similar average body weights in the beginning of the experiment at the two lots;

- In the end of the fattening it is noticed a difference of the body weight, bigger with 13% at the lot of Boer x Carpathian half-breed kids besides the lot of the kids of Carpathian breed, 15,25 ± 0,75 kg at the Boer x Carpathian half-breed and 11,97 ± 0,56 kg la kidsi de breed Carpathian.

➢At the fattening of the kids from the Carpathian breed and of the Boer X Carpathian half-breeds, fattened in intensive system the following were observed:

- The average weight in the end of the fattening period, at the kids of Carpathian breed was of 26,23 ± 0,81 kg, the total average weight increasing rate was of 13,51 ± 0,67 kg , and the average daily increasing rate was of 135,1 ± 4,89 g/day and of 138,0 ± 5,48 g/day;
- At the half-breed kids of Boer x Carpathian the average weight in the end of the fattening period was of 28,51 ± 0,76 kg, the total average weight increasing rate was of 14,66 ± 0,52 kg, and the average daily increasing rate of 146,6 ± 5,1 g/day;
- The specific average consumption at the kids of Boer x Carpathian half-breeds was of 8,91 UNC, 1087 g PDIN and of 869 g PDIE;
- The specific average consumption at the kids of Carpathian breed was of 9,67 UNC, 1180 g PDIN and 943 g PDIE.

➢By the intensive fattening of the kids there were obtained bigger dimensions of the carcass at the Boer x Carpathian half-breed kids, especially the bige dimension of the leg.

➢ There were obtained bigger values of the slaughtering output at the Boer x Carpathian half-breed kids, of 45,66±1,02%, besides 43,42±0,95% at the kids of Carpathian breed, due to a bigger weight of the carcasses, and also the commercial output, 50,57±1,13% besides 48,76±0,98%.

➢The meat/ bones rapport was of 3,22/1 at the kids of Carpathian breed and of 4,02/1 at Boer x Carpathian half-breed kids.

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RECONDITIONING OF THE RESHAPED RAMS IN PERMANENT IN-STABLE

RECONDIȚIONAREA BERBECILOR REFORMAȚI ÎN STABULAȚIE PERMANENTĂ

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Key words: reconditioning of rams, permanent in-stable, experimental slaughtering, output

SUMMARY

We have observed the reconditioning of the reshaped rams, to know the productive capacity in the way of meat production, and the quality of the carcasses obtained through slaughtering these animals. At reconditioning of rams in system of permanent in-stable it was noticed a total weight increasing rate between 7,91 ± 0,95 kg and 16,94 ± 2,57 kg, different depending on breed or population they were included. At the experimental slaughtering of the reconditioned rams in system of permanent in-stable it was noticed an output which varied between 43,4 ± 2,7 and 49,7 ± 1,6%; a big quantity of meat of 1st quality from the carcass, which varied between 51,15% and 55,62%, 2nd quality between 26,09% and 28,05%, 3rd quality between 16,33% and 21,93%.

1. MATERIALS AND METHODS

The works were done on an effective of sheep from **Institute of Research-Development for Sheep and Goat Breeding r Palas-Constanța –** rams from Merinos de Palas breed, Țigaie breed, Țurcană breed, milk population of Palas meat population of Palas, prolific population of Palas. The animals were individually observed, registering data regarding: calculation of the weight increasing rate; control of fodder consumptionption; body measurements. The reconditioning of the reshaped rams in permanent in-stable was made on lots of 10 animals each, from the sheep populations and breeds which were mentioned before. The rams, immediately after haircutting and after the anti-scabies treatments were reconditioned for 60 days, assuring accommodation spaces in shelters, of 1,6 m^2/animal and front of foddering of 0, 50 m/animal. The water and salt were assured at discretion. The control of the daily consumption of food was made by weighing the administered fodders and the unconsumed rests in the days of control, weekly established, in the middle of the respective week.

The daily average consumption of fodders during reconditioning period was of 1,5 kg Lucerne hay, 0,650 kg barley straw, 1,5 kg concentrated fodders, out of which 0,8 kg corn beans, 0,5 kg barley beans and 0,2 kg sunflower grist, assuring an individual consumption of 3,22 kg SU, 2,68 UNC, 263 g PDIN and 278 g PDIE.

The control of the fattening estate was made by weighing the rams twice a month, marked for this activity from the beginning of the reconditioning.

In the end of the fattening period appreciations were made on the living animal, through the biometric method, which consists in establishing the value of the main body areas. Determination of the measurements regarding conformation on the living animal or on the carcass was made through measurements with the fillet, the ruler, the compasses and the calliper.

The control slaughtering was effectuated by an adequate work methodology, regarding slaughtering, bleeding, peeling. It was made the appreciation of the rate of the consisting parts of the body, weighing the carcass at warm and at cold. The calculus of the output at slaughtering was made as follows: slaughtering output - as rapport between the weight of the carcass after 24 hours since slaughtering and the weight of the living animal; the commercial output – where also the internal organs were included.

It was made the statistic processing of the data.

2. RESULTS AND DISCUSSIONS

The main results obtained at the reconditioning of the reshaped rams being in permanent in-stable are presented in table nr. 1.

Table 1

Body weight, final average weight and the increasing rate at the reshaped and reconditioned rams being in regime of permanent in-stable

Breed or population	n	Initial average weight (kg)	Final average weight (kg)	Total weight increasing rate (kg)
		$\bar{X} \pm s_{\bar{x}}$ V%	$\bar{X} \pm s_{\bar{x}}$ V%	$\bar{X} \pm s_{\bar{x}}$ V%
Milk population-Palas	10	62,27±5,3 27,07	74,83±4,75 20,07	12,56±2,29 57,66
Merinos de Palas	10	67,46±4,2 19,88	84,17±4,91 18,45	16,71±3,26 61,69
Meat population-Palas	10	69,34±4,8 22,12	86,32±4,68 17,14	16,94±2,57 47,98
Prolific population-Palas	10	64,39±3,6 17,97	79,15±3,79 15,14	14,76±1,83 39,21
Ţigaie	10	60,12±2,47 12,99	69,38±2,82 4,72	9,26±1,02 34,83
Ţurcană	10	59,35±3,12 16,62	67,26±1,98 9,30	7,91±0,95 37,97

At the rams of milk population-Palas, reconditioned in system of permanent in-stable the initial average weight was of 62,27 ± 5,3 kg, the final average weight was of 74,83 ± 4,75 kg, the total weight increasing rate of 12,56 ± 2,29 kg. At the rams of Merinos de Palas breed, reconditioned in system of permanent in-stable the initial average weight was of 67,46 ± 4,2 kg, the final average weight was of 84,17 ± 4,91 kg, the total weight increasing rate of 16,71 ± 3,26 kg. At the rams of meat population-Palas, reconditioned in system of permanent in-stable the initial average weight was of 69,34 ± 4,8 kg, the final average weight was of 86,32 ± 4,68 kg, the total weight increasing rate of 16,94 ± 2,57 kg. At the rams of prolific population-Palas, reconditioned in system of permanent in-stable the initial average weight was of 64,39 ± 3,6 kg, the final average weight was of 79,15 ± 3,79 kg, the total weight increasing rate of 14,76 ± 1,83 kg. At the rams of Ţigaie breed, reconditioned in system of permanent in-stable the initial average weight was of 60,12 ± 2,47 kg, the final average weight was of 69,38 ± 2,82 kg, the total weight increasing rate of 9,26 ± 1,02 kg. At the rams of Ţurcană breed, reconditioned in system of permanent in-stable the initial average weight was of 59,35 ± 3,12 kg, the final average weight was of 67,26 ± 1,98 kg, the total weight increasing rate of 7,91 ± 0,95 kg.

After finishing the reconditioning period there were made the experimental slaughtering at the lots of rams and appreciations of the carcasses were made, remarking especially the big dimensions of the leg and the leg's length and width, comparatively to those from the carcasses of the rams which were not reconditioned. The results of the experimental slaughtering are presented in table nr. 2.

Table 2

The weight of carcass and the output at slaughtering of the reshaped and reconditioned rams in regime of permanent in-stable

Breed or population	n	Final average weight (kg)	Weight of carcass (kg)	Output at slaughtering (%)
		$\bar{X} \pm s\bar{x}$ V%	$\bar{X} \pm s\bar{x}$ V%	$\bar{X} \pm s\bar{x}$ V%
Milk population-Palas	10	74,83±4,75 20,07	34,27±3,08 97,40	45,8±2,1 14,50
Merinos de Palas	10	84,17±4,91 18,45	40,82±4,12 31,92	48,5±2,7 17,60
Meat population-Palas	10	86,32±4,68 17,14	42,50±2,77 20,61	49,7±1,6 10,18
Prolific population-Palas	10	79,15±3,79 15,14	35,93±2,43 21,39	45,8±1,8 19,65
Ţigaie	10	69,38±2,82 4,72	30,13±1,07 26,57	43,4±2,7 19,67
Ţurcană	10	67,26±1,98 9,30	29,28±0,94 10,15	43,53±1,8 13,13

At the rams of milk population-Palas, reconditioned in system of permanent in-stable the final average weight was of 74,83 ± 4,75 kg, the weight of carcass was of 34,27 ± 3,08 kg, making an output at slaughtering of 45,8 ± 2,1%. At the rams of Merinos de Palas breed, reconditioned in system of permanent in-stable the final average weight was of 84,17 ± 4,91 kg, the weight of carcass was of 40,82 ± 4,12 kg, making an output at slaughtering of 48,5 ± 2,7%. At the rams from the meat population-Palas, reconditioned in system of permanent in-stable the final average weight was of 86,32 ± 4,68 kg, the weight of carcass was of 42,50 ± 2,77 kg, making an output at slaughtering of 49,7 ± 1,6%. At the rams from the prolific population-Palas, reconditioned in system of permanent in-stable the final average weight was of 79,15 ± 3,79 kg, the weight of carcass was of 35,93 ± 2,43 kg, making an output at slaughtering of 45,8 ± 1,8 %. At the rams of Țigaie breed, reconditioned in system of permanent in-stable the final average weight was of 69,38 ± 2,82 kg, the weight of carcass was of 30,13 ± 1,07 kg, making an output at slaughtering of 43,4 ± 2,7%. At the rams of Țurcană breed, reconditioned in system of permanent in-stable the final average weight was of 67,26 ± 1,98 kg, the weight of carcass was of 29,28 ± 0,94 kg, making an output at slaughtering of 43,53 ± 1,8%.By the commercial cutting of the rams which were reconditioned in the system of permanent in-stable the results presented in table nr. 3 were obtained.

Table 3

The commercial cutting of the carcass rams which were reconditioned in a system of permanent in-stable

Quality of meat (%)	Meat population Palas (n=10)	Merinos de Palas (n=10)	Prolific population Palas (n=10)	Țigaie (n=10)	Milk population Palas (n=20)
	$\bar{X} \pm \bar{s}x$ V%	$\bar{X} \pm \bar{s}x$ V%	$\bar{X} \pm \bar{s}x$ V%	$\bar{X} \pm \bar{s}x$ V%	$\bar{X} \pm \bar{s}x$ V%
1st Quality - leg of mutton	35,18 ± 0,76 6,84	35,98±0,73 6,38	37,27±0,73 6,15	34,57±0,69 6,29	36,09 ±0,84 10,41
- small fiber	10,14 ± 0,20 6,14	7,10±0,14 6,18	8,04±0,13 5,29	8,30±0,18 9,69	8,20 ± 0,14 7,63
- 1st chop	10,30± 0,21 6,32	8,48±0,16 6,07	9,49±0,15 5,14	9,12±0,26 12,74	10,86 ± 0,23 9,47
Total 1st quality	**55,62**	**51,56**	**54,80**	**51,99**	**55,15**
2nd Quality - 2nd chop	6,81 ± 0,11 5,14	5,89±0,09 6,83	7,09±0,13 5,85	8,02±0,15 5,88	8,19 ± 0,13 7,01
- shoulders	21,24 ±0,46 6,83	20,62±0,44 6,63	20,03±0,39 6,12	18,07±0,35 8,66	19,02 ± 0,35 8,22
Total , 2nd quality	**28,05**	**26,51**	**27,12**	**26,09**	**27,21**
3rd Quality - chest	9,83 ± 0,18 5,75	11,53±0,24 5,73	12,05±0,24 6,35	11,37±0,19 7,47	12,10 ± 0,27 7,04
- neck	6,50 ± 0,10 5,08	10,40±0,19 8,17	6,03±0,10 5,24	10,55±0,21 8,90	5,54 ± 0,09 5,13
Total 3rd quality	**16,33**	**21,93**	**18,08**	**21,92**	**17,64**

At the rams from meat population-Palas, reconditioned in system of permanent in-stable the meat of 1st quality represented 55,62% from the carcass, here the leg of mutton with 35,18 ± 0,76%, the small fiber 10,14 ± 0,20% and the 1st chop 10,30± 0,21% being included. At the 2nd quality, which represented 28,05% the 2nd chop with 6,81 ±

0,11% and the shoulders, with 21,24 ±0,46% were included, and at the 3rd quality the chest had the value of 9,83 ± 0,18%, the neck of 6,50 ± 0,10% and per total 16,33%.

At the rams of Merinos de Palas breed the meat of 1st quality represented 51,56% from the carcass, here the leg of mutton with 35,98 ± 0,73%, the small fiber 7,10 ± 0,14%and the 1st chop 8,48 ± 0,16%. being included. At the 2nd quality, which represented 26,51% the 2nd chop with 5,89 ± 0,09 % and the shoulders, with 20,62 ± 0,44 % were included, and at the 3rd quality the chest had the value of 11,53 ± 0,24 %, the neck of 610,40 ± 0,19 % and per total 21,93%.

At the rams of population-Palas, the meat of 1st quality represented 54,80% from the carcass, here the leg of mutton with 37,27 ± 0,73%, the small fiber with 8,04 ± 0,13% and the 1st chop with 9,49 ± 0,15%. At the 2nd quality, which represented 27,12% the 2nd chop with 7,09 ± 0,13% and the shoulders, with 20,03 ± 0,39%, were included, and at the 3rd quality the chest had the value of 12,05 ± 0,24 %, the neck 6,03 ± 0,10 % and by total 18,08%.

At the rams of Ţigaie breed the meat of 1st quality represented 51,99% from the carcass, here the leg of mutton with 34,57 ± 0,69%, the small fiber with 8,30 ± 0,18% and the 1st chop with 9,12 ± 0,26 %. At the 2nd quality, which represented t 26,09% the 2nd chop with 8,02 ± 0,15 % and the shoulders, with 18,07 ± 0,35 %, were included, and at the 3rd quality the chest had the value of 11,37 ± 0,19 %, the neck 10,55 ± 0,21% and per total 21,92%.

At the rams of Milk population Palas the meat of 1st quality represented 55,15% din carcass, here the leg of mutton with 36,09 ± 0,84%, the small fiber with 8,20 ± 0,14% and the 1st chop with 10,86 ± 0,23%. At the 2nd quality, which represented 27,21% the 2nd chop with 8,19 ± 0,13% and the shoulders, with 19,02 ± 0,35%, were included, and at the 3rd quality the chest had the value of 12,10 ± 0,27%, the neck 5,54 ± 0,09% and per total 17,64%.

3. CONCLUSIONS

➢ At reconditioning of rams in system of permanent in-stable the following were noted:

- The rams of the milk population-Palas had the initial average weight of 62,27±5,3 kg, the final average weight of 74,83 ± 4,75 kg, the total weight increasing rate of 12,56 ± 2,29 kg;
- The rams of Merinos de Palas breed had the initial average weight of 67,46 ± 4,2 kg, the final average weight of 84,17 ± 4,91 kg, the total weight increasing rate of 16,71 ± 3,26 kg;
- The rams of the meat population-Palas had the initial average weight of 69,34 ± 4,8 kg, the final average weight of 86,32 ± 4,68 kg, the total weight increasing rate of 16,94 ± 2,57 kg;
- The rams of the prolific population-Palas had the initial average weight of 64,39 ± 3,6 kg, the final average weight of 79,15 ± 3,79 kg, the total weight increasing rate of 14,76 ± 1,83 kg;

- The rams of Țigaie breed had the initial average weight of 60,12 ± 2,47 kg, the final average weight of 69,38 ± 2,82 kg, the total weight increasing rate of 9,26 ± 1,02 kg;

- The rams of Țurcană breed had the initial average weight of 59,35 ± 3,12 kg, the final average weight of 67,26 ± 1,98 kg, the total weight increasing rate of 7,91 ± 0,95 kg.

➢ At the experimental slaughtering of the rams which were reconditioned in a system of permanent in-stable it was noted that:

- The rams of the milk population-Palas had the weight of the carcass of 34,27 ± 3,08 kg and an output at slaughtering of 45,8 ± 2,1%;

- The rams of Merinos de Palas had the weight of the carcass of 40,82 ± 4,12 kg and an output at slaughtering of 48,5 ± 2,7%;

- The rams of the meat population-Palas had the weight of the carcass of 42,50 ± 2,77 kg and un output la sacrificare de 49,7 ± 1,6%;

- The rams of the prolific population-Palas had the weight of the carcass of 35,93 ± 2,43 kg and an output at slaughtering of 45,8 ± 1,8 %;

- The rams of Țigaie breed had the weight of the carcass of 30,13 ± 1,07 kg and an output at slaughtering of 43,4 ± 2,7%;

- The rams of Țurcană breed had the weight of the carcass of 29,28 ± 0,94 kg and an output at slaughtering of 43,53 ± 1,8%.

➢ Through the commercial cutting of the reconditioned rams it was noted that:

- The rams of the meat population-Palas had the meat of 1st quality 55,62% from the carcass, at the 2nd quality, 28,05%, at the 3rd quality 16,33%;

- The rams of the Merinos de Palas breed had the meat of 1st quality 51,56% from the carcass; at the 2nd quality 26,51%, at the 3rd quality 21,93%;

- The rams of the prolific population-Palas, had the meat of 1st quality 54,80% from the carcass, at the 2nd quality 27,12%, and at the 3rd quality 18,08%;

- The rams of Țigaie breed had the meat of 1st quality 51,99% from the carcass, at the 2nd quality, 26,09%, at the 3rd quality 21,92%;

- The rams of the Milk population Palas had the meat of 1st quality 55,15% from the carcass, at the 2nd quality 27,21%, and at the 3rd quality 17,64%.

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ANIMAL FIBER PRODUCTION IN TURKEY

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Key words: Turkey, animal fiber production

SUMMARY

The aim of this paper is to examine the situation of animal fiber production in Turkey. For this respect it was given the source of animal fiber production, the textile characteristics of animal fibers and the evaluation ways (use areas) of the wool, mohair, cashmere, coarse hair and silk in Turkey.

1. INTRODUCTION

In whole over the world and especially European Union countries, different projects and programs are developed and applied in order to increase the income of agriculture enterprises which have located in the regions in which hard environmental conditions affect negatively on agricultural production and to facilitate from animal fibers production and their handicrafts. There are various types of animal fibers and their traditional handicrafts in Turkey. However Turkey could not facilitate from these sources ideally. In this paper, the recent situation of animal fiber production in Turkey has been explained.

2. THE SOURCE OF ANIMAL FIBER PRODUCTION IN TURKEY

Main types of animal fibers are wool, mohair, cashmere (down fiber), coarse hair, and silk in Turkey. The wool is obtained from 14 different types of sheep breeds. In terms of production amount Akkaraman, Morkaraman, İvesi types are the important domestic sheep breeds known in Turkey. Number of Angora goats has decreased too fast in recent years. Mohair production is mainly obtained from Angora goats bred in Central Anatolia region. Source of cashmere and coarse hair are the hair goats bred in Turkey. Silk production has decreased too fast in recent years, too.

In 2008, 44.166 tons wool, 2.238 tons goat hair, 194 tons mohair, 125 tons fresh silk cocoons were produced in Turkey (1). The exports worth of textile end their raw materials was 6.807 million US dollars which constitute the 5.3 percent of the total exports (2). On the other hand exports worth of animal fibers and their yarns was 88 million US dollars which constitute the 4.82 percent of the total exports of fibers and yarns in Turkey. The imports worth of animal fibers and their yarns was 250 million US dollars which constitute the 5.78 percent of the total imports of fibers&yarns in Turkey(3).

3. THE QUALITY CHARACTERISTICS OF ANIMAL FIBERS IN TURKEY

3.1. THE QUALITY CHARACTERISTICS OF WOOL OF MAJOR SHEEP BREEDS IN TURKEY

In Table 1, some quality characteristics of wools produced in Turkey are shown.

Table 1

Some quality characteristics of wool of major sheep breeds raised in Turkey

sheep breeds	*greasy fleece weight (kg)*	*yield (%)*	*fiber diameter (µ)*	*staple and single fiber length (cm)*		*strength (g) and elasticity (%)*		*crimp number (2.54cm)*	*reference*
Akkaraman	*1.59-2.73*	*48.75-69.72*	*23.39-35.02*	*8.54-12.16*	*7.06-19.34*	*9.25-17.93*	*25.27-46.40*	*4.01-5.44*	*(4)*
Morkaraman	*1.06-1.84*	*62.10-69.33*	*29.10-39.40*	*9.26-12.45*	*7.42-14.44*	*9.69-20.50*	*29.10-34.95*	*-*	*(5)*
İvesi	*1.35-3.19*	*63.02-78.27*	*29.71-37.60*	*11.90-19.90*	*15.05-20.08*	*14.95-24.05*	*33.57-54.52*	*3.53*	*(6)*
Dağlıç	*1.51-2.98*	*55-60*	*26.86-37.39*	*7.84-24.80*	*-*	*10.40-30.31*	*25.20-35.42*	*-*	*(7)*
Kıvırcık	*1.32-2.35*	*58.10*	*27.72-35.45*	*6.77-12.20*	*4.65 - 9.47*	*8.12-27.13*	*19.98-28.63*	*0.87-1.54*	*(8), (9), (10), (11), (12), (13)*
Sakız	*1.49-1.95*	*55-60*	*28.10-28.26*	*8.23-12.40*	*-*	*24.46-24.78*	*61.66-63.81*	*-*	*(14)*
Karayaka	*1.92-4.51*	*68.90*	*37.68-48.53*	*9.18-26.21*	*12.43-24.80*	*14.20-23.61*	*29.33*	*-*	*(12), (15), (16), (17), (18), (19), (20)*

Fiber diameter is very important data to determine the use areas of wool fibers. In this table when wool fibers are considered, it is said the thickness values are so high and only carpet, kilim, mattress, upholstery, blanket, knitting yarn production are appropriate.

3.2. THE QUALITY CHARACTERISTICS OF MOHAIR OBTAINED FROM ANGORA GOATS IN TURKEY

In Table 2, some quality characteristics of mohair produced in Turkey are shown.

Table 2

Some quality characteristics of mohair in Turkey

greasy fleece weight (kg)	*clean fleece weight (kg)*	*yield (%)*	*fiber diameter (µ)*	*staple and single fiber length (cm)*		*strength (g) and elasticity (%)*		*crimp number (5cm)*	*references*
1.15-4.51	*0.81-1.78*	*66.54-88.40*	*23.54-48.44*	*13.28-21.00*	*9.64-20.60*	*12.98-27.55*	*26.55-50.12*	*1.39-2.26*	*(21), (22), (23), (24), (25), (26), (27), (28), (29)*

In this table, according to references the ranges of greasy fleece weight, clean fleece weight, yield, fiber diameter, staple and single fiber length, strength and elasticity, crimp number values of mohair are shown. When these values are considered and compared to other producer countries the quality of mohair that produced in Turkey is too low.

3.3. THE QUALITY CHARACTERISTICS OF CASHMERE AND COARSE HAIR IN TURKEY

In Table 3, some quality characteristics of cashmere and coarse hair produced in Turkey are shown.

Table 3

Some quality characteristics of cashmere and coarse fiber

goat breed	*goat fiber type*	*greasy fleece weight (kg)*	*fiber diameter (μ)*	*single fiber length (cm)*	*strength (g) and elasticity (%)*		*color*	*references*
hair goat	*down fiber (cashmere)*	*0.040-0.050*	*15.60-17.60*	*3.68-5.49*	*2.40-6.22*	*31.92-33.10*	*White, Black, Grey, Brown*	*(30), (31), (32)*
	coarse hair	*0.336-0.596*	*64.70-72.29*	*11.57-12.43*	*71.87*	-	-	*(32), (33)*
Kilis goat	*down fiber (cashmere)*	*0.050*	*16.12*	*5.22*	-	-	-	*(31)*
	coarse hair	*0.423*	*71.50-72.33*	*11.66*	-	-	-	*(34)*

In this table according to references, the values of greasy wool fleece of weight, fiber diameter, single fiber length, strength and elasticity, color of cashmere and coarse fiber obtained from hair goats and Kilis goats are shown. Weaving sector demands 11-18 μ of cashmere fineness however knitting sector demands 8-24 μ (35). The values in this table with fineness of down fibers from hair and Kilis goats are very near to demanding value of textile sector.

3.4. SOME QUALITY CHARACTERISTICS OF SILK FIBER IN TURKEY

In Table 4, some quality characteristics of silk produced in Turkey are shown.

Table 4

Some quality characteristics of cocoon and silk fiber

dried cocoon weight (g)	*sericin ratio (%)*	*length of silk fiber (m)*	*silk fiber fineness (μ)*	*raw silk fiber denier*	*cooked fiber denier*	*references*
0,586-0,050	*16.78-27.11*	*652.13-1275.00*	*11.48-15.89*	*0.199-0.384*	*1.917-2.854*	*(36), (37), (38),(39), (40)*

In this table according to references, the values of dried cocoon weight, sericin ratio, length of silk fiber, silk fiber fineness, raw silk fiber denier, cooked silk fiber denier produced in Turkey are shown. When these values are considered and compared to other producer countries the quality of silk that produced in Turkey is good level.

4. USE AREAS OF ANIMAL FIBERS IN TURKEY

4.1. USE AREAS OF THE WOOL FIBERS

Wools produced in Turkey is mainly evaluated as the family usage and marketing.

The family usage: a) The making of quilt, mattress, pillow b) The producing of knitting products as pullover, sweater, sock, glove, hat c) The producing of carpet, kilim, floor cushion and tablet weaving (Table 5).

The marketing: 1) the marketing of raw wool: The raw wool produced in Mediterranean region of Turkey is marketed by brokers to the plants producing machine carpet, kilim and blanket that are present in the region and/or out of region. It is also marketed to knitting industry even low levels.

2) the marketing of the textile and traditional handicrafts products from wool:

a) the direct marketing by producers in local markets; b) the marketing in great shopping centers; c) the marketing in the hotel and/or holiday village and the using of the these products as decorative materials in the these and similar centers; d) The direct marketing by the carpet and kilim production plants that have hand woven loom.

4.2. USE AREAS OF THE MOHAIR

Turkey was the most important mohair producer country 50 years ago. Today, because of mohair fibers quality is not good, number of Angora goats and production of mohair are getting decreased so much in every year. However in central Anatolia and southeastern Anatolia where Angora goats breed, blanket, traditional fabrics by using traditional looms and sweater, pullover, socks by knitting has been produced (Table 6).

Table 5

The main products (traditionally handicrafts and industrial) made fromwool in Turkey

type of product	*production method*	*color*	*design*	*fiber type*
carpet, kilim, saddle bag, girth (tablet weaving)	*hand woven loom*	*red ,dark blue, cream and other pastel color tones*	*traditional and local motifs and designs peculiar to region*	*coarse fiber*
carpet, kilim, blanket	*machine loom*	*all colors (specially pastel)*	*Decorative geometrical and usually flower*	*coarse and fine fiber*
sweater, pullover, cardigan, sock, glove	*hand knitting*	*original animal fiber colors*	*traditional and local motifs and design*	*coarse and fine fiber*
felt	*hand and machine making*	*original animal fiber colors*	*plain and traditional*	*coarse and fine fiber*
quilt, mattress, pillow	*filling*	*colored fibers*	-	*coarse and colored fiber*

Table 6

The main products (traditionally handicrafts and industrial) made from mohair in Turkey

type of product	*production method*	*color*	*design*	*fiber type*
traditional blanket and other fabrics	*hand weaving loom*	*white, brown, gray, reddish*	*traditional and local motifs and design*	*mohair*
sweater, pullover, socks,dress	*hand and machine knitting*	*white, brown, gray, reddish*	*local motifs and design*	*mohair*
carpet, kilim, upholstery fabric	*machine loom*	*white and colored mohair*	*decorative geometrical and usually flower*	*mohair, wool, synthetic fibers*

4.3. USE AREAS OF THE CASHMERE AND COARSE HAIR

Cashmeres are mostly used in the family and the rest of them is marketed as handicraft products (Table 7).

The family usage: Cashmere fibers obtained by combing and/or deharing are used to produce some handicraft products for family usage. The marketing;
a) The selling of raw cashmere directly to broker: the rate of marketing of raw cashmere by this way is very low. That’s why there are not data about this marketing way
b) The handicraft products made from only cashmere and /or cashmere mixed with wool and coarse hair are marketed directly by producer in the open markets and/or in the shopping centers in the hotels and holiday villages and/or in the outside that are presented at towns and/or provinces that have intense tourism potential.

The evaluation of coarse fibers: Coarse fibers are also evaluated as the family consumption and marketing. The family usage: The evaluating of products made of coarse fibers in the family especially, on the hilly and high rural areas of the Mediterranean region are more common.

The ways of marketing: a) The coarse fibers as raw material are marketed directly to brokers; b) The raw coarse fibers are mainly marketed by brokers to plants producing machine woven tend and goat hair interlining; c) Some handicrafts items from coarse fibers are marketed very low levels in the open markets and/or tourism centers (41,42).

Table 7

Main traditional handicrafts products and other items made from cashmere and coarse hair in Turkey

type of product	*production method*	*color*	*design*	*fiber type*
tent	*hand weaving loom machine loom*	*usually black*	*plain weaving*	*coarse hair and cotton*
kilim, bag, girth (tablet weaving	*hand weaving loom*	*natural goat fiber colors*	*traditional geometrical design*	*coarse hair and wool*
gloves, socks, scarf	*hand knitting*	*natural goat fiber colors*	*traditional geometrical design*	*cashmere*
socks	*hand knitting*	*natural goat fiber colors*	*traditional geometrical design*	*coarse hair*

4.4. USE AREAS OF THE SILK FIBER

The Sericulture is generally conducted in Antalya, Hatay, Isparta provinces in Mediterranean region and Bilecik, Bursa provinces in Marmara region of Turkey. The silk fibers are mainly used in carpet and fabric production. Traditional shawl, scarf, handkerchief are woven and marketed in especially tourism centers of Turkey.

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INCREASING THE MILK PRODUCTION BY ADMINISTERING VEGETAL LECITHIN IN THE FOOD OF SHEEP AND GOATS

SPORIREA PRODUCȚIEI DE LAPTE PRIN ADMINISTRAREA LECITINEI VEGETALE ÎN HRANA OILOR ŞI CAPRELOR

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Key words: vegetal lecithin, milk production, milked milk

SUMMARY

By administering a supplement of vegetal lecithin, residue (mucilage) from the processing of sunflower and soy oil in the ratio of sheep and goats it was made an increase of the total milk production and of the quantity of milked milk. At all the experimental lots which received adding of vegetal lecithin in their fodder ratios, both at sheep, and at goats the chemical composition of milk was modified, higher values at the dry substance, fat and protein being noticed. The differences regarding the prolificacy between the lots of mother sheep and mother goats were registered as a result of the different populations which are exploited, differences determined by the selection, also differences between the experimental and witness lots being registered, the reproduction indicators being higher at the experimental lots.

1. MATERIALS AND METHODS

The works were made on effectives of sheep and goats from the **Institute of Research-Development for Sheep and goats' breeding Palas-Constanța.**

The animals included in the works were watched individually under the rapport of the own performances, registering data regarding: control of productions, main reproduction indicators; control of milk production and qualitative determinations of the milk (determination of SU, fat and protein from milk).

The control of the milk production was made based on the Romanian method of the control coefficient, that of ***Nica-Dermengi,*** through which both sheep and goats which are milking and those which weaned their lambs or kids are controlled (the method is based on the rapport between the daily milk production and the quantity at a single milking session from the same day, it can be applied on the whole lactation period, once or twice a month, on the whole effective of mother sheep and goats since the first week from dropping, with the condition that the lambs and kids to be sufficiently developed to support the separation from their mothers for 10 and 12 hours – the method expresses truly the milking capacity of sheep and goats, the error being of approx. 2%). The maintenance of sheep and goats was made in stable for 150-160 days and 205-215 days at pasture, for sheep and goats there were assured fodder ratios depending on their physiological estate. Watering the sheep and goats was effected with potable water, assuring 6,5 liters/animal. The sheep and goats grazed on areas planted with a mixture of

70-75% grain plants and 25-30% perennial vegetable plants, with high degree of consumption, of 94,12%, administering also a mixture of 0,5-0,7 kg, made of chopped and concentrated hays. It was made the control of the fodder consumption.

For the qualitative determinations of the milk, there were used: Gerber method for the percent of fat; Kjeldahl method for the percent of protein; the method of thermosetting (6-7 hours at 105±2°C), for the percent of dry substance. For the qualitative determinations of the lecithin: determination of the acidity by titrating with NaOH, determination of the humidity by drying at the drying oven, determination of the percent of fat by Soxhlet method, determination of the phospholipids.

To establish the reproduction performances there were calculated the main reproduction indicators, as follows: fecundity (F%), prolificacy (P%).

It was made the statistic processing of the data.

2. RESULTS AND DISCUSSIONS

During the lactation period, the sheep from the experimental and witness lots received the same fodder ratio, 1,68 SU, 1,62 UNL, 118 g PDIN, 147 g PDIE, to which calcium of 14,8 g and phosphor of 7g were added , and also the goats from the experimental and witness lots, received the same fodder ratio, 1,61 SU, 1,50 UNL, 112 g PDIN, 137 g PDIE, calcium of 14,5 g and phosphor 6,53g. The sheep and goats in lactation received a supplement of vegetal lecithin, residue (mucilage) from the processing of the soy oil, acquisitioned from S.C. ULEROM Constanța (the quality certificate states its chemical composition: water and volatile substances 50 %, fat substances -oil- 20-22 %, lecithin 18-20%). The vegetal LECITHIN was administered in the morning, in the drinking water, after a previous dilution with warm water, in proportion of 1/1. It was noticed that the vegetal LECITHIN does not modify the palatability of water and it is well supported by sheep and goats. It was determined the milk production at sheep and goats through Nica-Dermengi method (tables no. 1 and 2).

Table 1

The total average milk production, the average production of merchandise milk and the duration of lactation at the sheep which were treated with lecithin and at the control lots

Sheep breed or population /lot	n	Total average milk production (liters)	Average production of milked milk (liters)	Duration of lactation (days)
		$\bar{X} \pm s\bar{x}$ V%	$\bar{X} \pm s\bar{x}$ V%	$\bar{X} \pm s\bar{x}$ V%
Merinos de Palas – experimental lot	58	117,51 ± 3,1 20,16	48,66 ± 1,85 28,95	112,9±3,1 20,91
Merinos de Palas- control lot	38	84,21± 3,4 24,96	24,05 ± 1,01 25,89	97,4± 2,6 16,65
Prolific Population of Palas-experimental	46	137,2 ± 4,6 22,74	56,2 ± 2,6 31,37	161,8±3,9 16,34
Prolific Population of Palas – control lot	25	110,25 ± 2,1 9,75	42,75 ±1,63 19,06	156,3± 4,1 13,11
Milk population of Palas-experimental lot	25	217,3 ± 7,8 17,94	81,6 ± 2,8 17,15	203,6± 3,9 9,57
Milk population of Palas – control lot	70	197,6± 10,3 43,61	72,8 ± 3,9 44,82	184,7±6,3 28,53

At the sheep of Merinos de Palas breed from the experimental lot, the total average milk production was of 117,5±3,1 liters, with an average production of milked milk of 48,66±1,85 liters, in a lactation which lasted for 112,9±3,1 days; at the sheep from the witness lot the total average milk production was of 84,21±3,4 liters, with an average production of milked milk of 24,05±1,01 liters, in a lactation which lasted for 97,4±2,6 days. At the sheep from the prolific population of Palas, at the experimental lot, the total average milk production was of 137,2 ±4,6 liters, with an average production of milked milk of 56,2 ± 2,6 liters, in a lactation which lasted for 161,8 ± 3,9 days; at the witness lot the total average milk production was of 110,25 ±2,15 liters, with an average production of milked milk of 42,75±1,63 liters, in a lactation which lasted for 156,3±4,1 days. At the sheep from the milk population of Palas, from the experimental lot, the total average production was of 217,3±7,8 liters, with an average production of milked milk of 81,6 ± 2,8 liters, in a lactation which lasted for 203,6 ± 3,9 days; at the witness lot the total production was of 197,6 ±10,3 liters, with an average production of milked milk of 72,8±3,9 liters, in a lactation which lasted for 184,7± 6,3 days.

Table 2

The average total milk production, the average production of merchandise milk and the duration of lactation at the goats which were treated with lecithin and at the control lots

Sheep breed or population /lot	n	Total average milk production (liters)	Average production of milked milk (liters)	Duration of lactation (days)
		$\bar{X} \pm s\bar{x}$ V%	$\bar{X} \pm s\bar{x}$ V%	$\bar{X} \pm s\bar{x}$ V%
Carpathian - experimental lot	25	233,01±8,7 18,67	147,42±3,7 12,54	211,44±4,5 10,64
Carpathian - control lot	49	227,49±6,3 19,38	128,47±2,8 15,25	184,65±5,1 19,33

At the goats of Carpathian breed, at the experimental lot the total average milk production was of 233,01± 8,7 liters, the average production of milked milk of 147,42±3,7 liters, in a lactation which lasted for 211,44±4,5 days; at the witness lot the total average milk production was of 227,49±6,3 liters, the average production of milked milk of 128,47 ± 2,8 liters, in a lactation of 184,65 ± 5,1 days.

From the presented data it can be concluded that at all experimental lots, both at sheep, and at goats the total milk production increased.

It was determined the chemical composition of the sheep and goat milk per months and per experimental and witness lots. At the experimental lots of sheep and goats, which received an adding of vegetal lecithin in their fodder ratios, there were noticed slightly higher values at the dry substance, fat and protein (tables no. 3 and 4). At the sheep of Merinos de Palas breed, at the experimental lot, the dry substance was 19,05± 0,21%, the fat 6,86±0,13% and the protein 5,51±0,04%, and at the witness lot the dry substance was 18,34±0,23%, the fat 6,66±0,17% and the protein 5,47±0,05%. At the sheep from the prolific population of Palas, at the experimental lot the dry substance was of 18,97±0,31%, the fat 6,53±0,02% and the protein 5,55±0,04%, and at the witness lot the dry substance was 18,54±0,33%, the fat 6,46±0,02% and the protein 5,50±0,04%. At the sheep from the milk population of Palas, at the experimental lot the dry substance was 19,03±0,27%, the fat 6,54±0,02% and the protein 5,48±0,04%, and at the witness lot the dry substance was 18,89±0,24%, the fat 6,43±0,02% and the protein 5,44±0,04%.

Table 3

Chemical composition of the sheep milk

Breed or population /lot	n	Dry substance %	Fat %	Protein %
		$\bar{X} \pm s\bar{x}$ V%	$\bar{X} \pm s\bar{x}$ V%	$\bar{X} \pm s\bar{x}$ V%
Merinos de Palas – experimental lot	18	19,05± 0,21 4,67	6,86±0,13 8,03	5,51±0,04 3,87
Merinos de Palas- control lot	18	18,34±0,23 5,32	6,66±0,17 11,10	5,47±0,05 3,29
Prolific population of Palas- experimental lot	19	18,97±0,31 7,12	6,53±0,02 1,23	5,55±0,04 3,43
Prolific population of Palas – control lot	19	18,54±0,33 7,75	6,46±0,02 1,46	5,50±0,04 3,54
Milk Population of Palas - experimental lot	20	19,03±0,27 6,34	6,54±0,02 1,37	5,48±0,04 3,31
Milk Population of Palas – control lot	20	18,89±0,24 5,68	6,43±0,02 1,25	5,44±0,04 3,37

Table 4

Chemical composition of the goat milk

Breed /lot	n	Dry substance %	Fat %	Protein %
		$\bar{X} \pm s\bar{x}$ V%	$\bar{X} \pm s\bar{x}$ V%	$\bar{X} \pm s\bar{x}$ V%
Carpathian- experimental lot	15	13,65± 0,23 6,53	3,77±0,21 21,57	3,68±0,22 23,15
Carpathian- control lot	15	13,27±0,29 8,46	3,53±0,48 50,47	3,44±0,48 28,28

At the goats of Carpathian breed, at the experimental lot the dry substance was 13,65± 0,23%, the fat 3,77±0,21% and the protein 3,68±0,22%, and at the witness lot, the dry substance was 13,27±0,29%, the fat 3,53±0,48% and the protein 3,44±0,48%.

After registering the droppings and weighing the kids, the main reproduction indicators made by sheep were calculated. (table no. 5).

The fecundity indicator at the sheep lots was: at Merinos de Palas breed the fecundity was of 97,50% at the experimental lot and of 95,00% at the witness lot; at the prolific population of Palas the fecundity was of 97,50% at the experimental lot and 95,00 at the witness lot; at the milk population of Palas the fecundity was of 95,00% at the experimental lot and of 90,00% at the witness lot.

Table 5

The main reproduction indicators made by sheep

Breed or population of sheep /lot	Mounted Sheep	Dropped Sheep	Obtained lambs	Fecundity (%)	Prolificity (%)
Merinos de Palas experimental lot	40	39	45	97,50	115,38
Merinos de Palas control lot	20	19	21	95,00	110,52
Prolific population of Palas experimental lot	40	39	49	97,50	125,64
Prolific population of Palas control lot	20	19	23	95,00	121,05
Milk population of Palas experimental lot	40	38	43	95,00	113,15
Milk population of Palas control lot	20	18	21	90,00	110,52

The prolificacy indicator was: at Merinos de Palas breed the prolificacy was of 115,38% at the experimental lot and of 110,52% at the witness lot; at the prolific population of Palas the prolificacy was of 125,64% at the experimental lot and 121,05% at the witness lot; at the milk population of Palas the prolificacy was of 113,15% at the experimental lot and of 110,52% at the witness lot.

After registering the droppings and the weighing of kids, the main reproduction indicators made by all the lots of goats were calculated (table no. 6).

Table 6

The main reproduction indicators made by goats

Breed /lot	Mounted Goats	Dropped Goats	Obtained kids	Fecundity (%)	Prolificacy (%)
Carpathian/ Experimental lot	40	38	47	95,00	123,68
Carpathian/ Control lot	20	18	22	90,00	122,22

At the goats of Carpathian breed the fecundity at the experimental lot was of 95,00% and the prolificacy of 123,68%, and at the witness lot the fecundity was of 90% and the prolificacy of 122,22%.

The differences regarding the prolificacy between the lots of mother sheep and mother goats were registered as a result of the different populations which are exploited, differences determined by selection, differences between the experimental and witness lots being also registered.

3. CONCLUSIONS

- At all the experimental lots, both at sheep, and at goats the total milk production increased.

- At the sheep of Merinos de Palas from the experimental lot the total average milk production was of 117,5±3,1 liters, the average production of milked milk of 48,66±1,85 liters, and at the sheep from the witness lot the average total milk production was of 84,21±3,4 liters, the average production of milked milk of 24,05±1,01 liters.
- At the sheep from the prolific population of Palas, at the experimental lot, the total average milk production was of 137,2 ±4,6 liters, the average production of milked milk of 56,2 ± 2,6 liters, and at the witness lot the total average milk production was of 110,25 ±2,1 liters, with an average production of milked milk of 42,75±1,63 litri.
- At the sheep from the milk population of Palas, from the experimental lot, the total average production was of 217,3±7,8 liters, with an average production of milked milk of 81,6 ± 2,8 liters and at the witness lot the total average production was of 197,6 ±10,3 liters, with an average production of milked milk of 72,8±3,9 liters.
- At the goats of Carpathian breed, at the experimental lot the total average milk production was of 233,01± 8,7 liters, the average production of milked milk of 147,42±3,7 liters, and at the witness lot the total production of milk was of 227,49± 6,3 liters, the average production of milked milk of 128,47 ± 2,8 liters, in a lactation which lasted for 184,65 ± 5,1 days.
- S-a determinat compoziția chimică a milklui de oaie and de capră pe luni and pe lots experimental and witness, constatându-se la lotsle experimental de sheep and goats, care au primit adaus de lecithin vegetal în rațiile furajere valori ușor mai ridicate la substanță uscată, fat and protein.

The differences regarding the prolificacy between the lots of mother sheep and mother goats were registered as a result of the different populations which are exploited, differences determined by selection, differences between the experimental and witness lots being also registered, the reproduction indicators being higher at the experimental lots.

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COLOSTRUM QUANTITY AND QUALITY OF PRIMIPAROUS HOLSTEIN COWS

CANTITATEA ȘI CALITATEA COLOSTRULUI LA VACILE PRIMIPARE HOLSTEIN

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Key words:colostrum,immunoglobulins,primiparous
Cuvinte cheie:colostru,imunoglobuline,primipare

SUMMARY

The objectives of the present study were to evaluate colostrum quantity and quality in primiparous Holstein cows,and the implications of these results for colostrum feeding management .From February to August 2009 first 4 postpartum (p.p.) milking of colostrum were recorded from 24 primiparous Holstein cows.Average colostrum yield was 22.2 kg in the first 4 milking p.p.The date and time of calving,the time of milking and the weight of colostrum were recorded.Each primiparous cow was milk out completely within 1 hour (h) after parturition,than at 6. 12 and 14 h p.p.,and a 500 ml sample was taken for analysis.Average cololostrum yield was 22.2 in the first 4 milking p.p.

Fat, protein, solid non-fat and immunoglobulins(Igs) decrease with time p.p.Colostrum is a good source of protein,fat and solids non-fat,but is lower in Igs.The implications of these results for colostrum feeding management will be discussed.

INTRODUCTION

Bovine colostrum, strictly defined, consists a mixture of lactal secretions and constituents of blood serum.Colostrum contains proteins, essential and non essential aminoacids and faty acids, lactose, vitamins, minerals and other bioactive molecules, including growth factors. Colostrum is important for the nutrition, growth and developement of newborn calves and contributes to the immunologic defence.

Energy in colostrum to the neonate immediately after birth. Calves are born with low energy stores and poor insulative protection.

Colostral fat content plays a major role in the supply of energy and in glucose homeostasis of the newborn and is critical to proper thermoregulation.

Colostral proteins are utilised by the neonate for protein synthesis in addition to the absortion of Ig. Stimulation of protein metabolism requires large amounts of amino acids by the neonate.

Vitamins A, D and α-tocopherol do not cross the placenta in significant amounts and the neonate is dependent upon colostral intake for these vitamins.

Colostrum contains high levels of immunoglobulins which play an important rol in establishing passive immunity in the neonate calves. There are 3 types of Ig in colostrum of diary cattle: IgG, IgM and IgA. These Ig work together to provide the calf with passive immunity until the calf's own active immunity develops.

Passive immunization of the bovine neonate depends on absortion of antibodies from colostrum. Low Ig concentrations in blood serum of the calves have been asociated with high morbidity and mortality rates in calves. Low Ig concentrations in blood serum of the calves after colostrum feeding usually are explained by:

1. insuficient amount of colostrum consumed
2. low colostral Ig concentration
3. late feeding of colostrum
4. variation in birth weight
5. genetic ability to absorb Ig
6. influences of enviromental temperature

In practice, calves commonly are fed on volume with little or no consideration of its value or Ig concentration.

The objectives of this study was to determine colostrum production, and to analyze the nutrient composition of colostrum from primiparous Holstein cows, and to suggest several practical recomandations.

1. MATERIALS AND METHODS

We recorded first 4 p.p. milkings from all cows calved in the period February-August 2009. The work was completed at Agricultural Research & Development Station Șimnic (A.R.D.S.S.) Romania.

The following information about the cows were recorded: lactation number, time of calving, calving difficulty, retained placenta and the weight of first 4 milkings at 1h, 6h, 12h and 24h p.p. (obtained by pouring colostrum into a bucket and suspending the bucket from a scale). Folowing weighting,approximately 500 ml of colostrum were taken for analyze.

Fat, solids non-fat, protein were determined using Ultrasonic Milk Analyzers ECOMILK. The Ig content was determined by specific gravity (SG) using a colostrometer (Fleenov et al., 1980), pH using pH meter 315 i WTW and SCC with Porta SCC milk test-Porta check. Statistical analyses were performed. Data from experiments are presented as means ± standard deviations.

2. RESULTS AND DISCUSSIONS

In this paper we will present the results only from primiparous Holstein cows.

Colostrum production. Average colostrum yield from 24 primiparous Holstein cow was 22,2 kg (table 1) in the first 4 milkings.

First calf heifers produce less colostrum than multiparous cows. Huber,1974 (cited by Foley et al. 1978) reported average colostrum yields of 32,7 kg. Yu et al, 1976 reported average colostrum yields of 24 kg for Holstein primiparous and 54 kg for multiparous Holstein cows. Older cows have larger udders and better milk secretion capability.

Physical characteristics, fat, solids non-fat, protein and immunoglobulin content and somatic cell count are presented in table 2.

Composition and physical characteristics of colostrum from primiparous cows vary with a number of factors including individuality, prepartum ration and time p.p.

Fat was measured at an average of 6.97±2.87 in the first milking p.p.(table 2) and decreases to 5.14± 1.76 in the 4th milking p.p.

Solids non-fat, protein and Igs concentrations and somatic cell count (SCC) decrease at subsequent milking (table 2).

Aproximatelly 27% of the primiparous cows produced inferior grade first milking colostrum (Ig content < 50 g/L of colostrum). Faber et al., 2005 reported 15% of the cows with inferior grade colostrum. Gulliksen et al., 2008 reported 57,8% of the 1250 sample with less than desired 50 g of IgG/L of colostrum.

Concentration of Ig are highest in colostrum (49.35±5.78g/L) from the first milking after parturition and decrease at subsequent milking (table 2).

High producing primiparous Holstein cow tend to have low Ig colostrum even at the first milking. As genetic selection for high milk production continues, an increase in the occurrence of colostrum with low Ig concentrations at first milking would be expected (Morin et al.,1996).

Table 1

Colostrum production by primiparous Holstein cows in the first 4 post partum milking

Milking	No of cows	Total colostrum production -kg-	Average yield -kg-
1	24	148.8	6.2
2	24	115.2	4.8
3	24	127.2	5.3
4	24	141.6	5.9
All milkings	24	532.8	22.2

Table 2

Physical characteristics and composition of colostru

Item	Colstrum(no.of p.p. milking)¹			
	1	2	3	4
Specific gravity	1045.7	1040.3	1034.4	1032.2
pH	6.44	6.47	6.28	6.21
Fat	6.97±2.87	6.54±3.29	5.21±0.97	5.14±1.76
Solid non-fat%	20.27±2.89	14.53±3.48	11.60±2.54	10.04±0.43
Protein %	7.63±1.07	5.50±1.22	4.38±0.95	3.79±0.38
Imunoglobulins g/L	49.35±5.78	34.48±13.45	20.39±12.16	14.47±8.28
Somatic cell count 1000	2.122±5.72	1.841±428	844±206	326±113

1st milking within 1 h p.p.
2nd milking at 6 h p.p.
3rd milking at 12 h p.p
4th milking at 24 h p.p

Colostrum from many primiparens cows with low Ig content will be inadequate to feed their calves.

Ingestion and absorption of colostral immunoglobulins are 2 of the most important aspects in the prevention of neonatal calf desease.

A management target of 10 g/L have been suggested as a minimum level of IgG in the serum of calves by approximately 24 houres of age.

A colostrometer can be used in colostrum management programs to eliminate colostrum that is poor quality. The IgG content of colostrum can be determined using the following equation: colostrum IgG miligrams per mililiter = 958 x S.G – 968. S.G. measured at 20 ^{o}C (Mechor et al., 1992).

The amount of colostrum to feed really depends on several factors including the amount of Igs in colostrum, the body weight of the calf, the age of the calf at first feeding and the efficiency of IgG absorption. To calculate the amount (or mass) of IgG that a calf needs, several assumption may be made, based on existing research data. For example a 35 kg calf has a plasma volume at 24 houres of age approximately 3,150 l (9% of its body weight (Quigly et al., 1998). To achieve 10 g/L, a new born calf needs 31,5 g of IgG. IgG consumed is not absorbed with 100% efficiency. Research data suggest the efficiency is coloster to 35%. So the calf must consume 90 g of IgG (31,5/35%) by 24 houres. If colostral IgG concentration is 40 g/L, required amount of colostrum to feed is 2,250 L.

If a margin of safety is included in the calculations (achieving a plasma IgG concentration of 12 g of IgG per liter) the calf needs to consum 108 g of IgG. If colostral IgG concentration is 40 g amount of colostrum to feed is 2,7 L. Achievement of adequate serum concentrations of IgG in calves is not difficalt if high Ig colostrum is available. Surplus colostrum with high Ig (> 50 g of IgG/L of colostrum) content must be colected and stored for later use to feed the calf from premiparous cows with low Ig concentration in colostrum.

3. CONCLUSIONS

- Sufficient excess colostrum from first milking is available to feed calves from primiparous cows with poor quality;
- Colostrum from primiparous Holstein cows can be insufficient for the transfer of passive immunity to newborn calves;
- A colostrometer for estimation of colostral Ig should enable the dairyman or practitioner to establish the quality of colostrum prior to feeding;
- Education in colostrum management and feeding needs to be emphosized and must be continued to keep improving the care of dairy calves.

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STUDIES ON MORPHOLOGICAL TRAITS AND BODY INDICES IN A ROMANIAN BLACK AND WHITE COW POPULATION FROM THE WESTERN ROMANIA

STUDII ASUPRA UNOR ÎNSUŞIRI MORFOLOGICE ŞI INDICI CORPORALI LA O POPULAȚIE DE VACI DIN RASA BĂLȚATĂ CU NEGRU ROMÂNEASCĂ DIN VESTUL ROMÂNIEI

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Cuvinte cheie: dimensiuni corporale, indici corporali, vaci, Bălțată cu negru românească
Key words: body dimensions, body indices, cows, Romanian Black and White

SUMMARY

The aim of the paper was to investigate the influence of the parity on the morphological traits in a Romanian Black and White cow population. Cows were divided into three groups: first, second, and third and over lactations. Morphological traits were measured in 66 cows out of which 15 primiparous cows, 22 cows at the second lactation and 29 cows at the third or higher lactation. The body measurements were: height at withers, height at back, height at rump, oblique trunk length, chest depth, trunk depth, chest width, hips width, pins width, rump length, body length, heart girth and shinbone circumference. Body weight was determined with a special tape. Seven body indices were calculated: lateral body format index, height difference index, chest depth index, rump shape index, rump sharpness index, massiveness index and shinbone burden index. Differences among the three age groups were tested using analysis of variance. Body dimensions of the Romanian Black and White cows were significantly influenced by the parity ($p<0.05$), increasing as animals grew older. Generally, the highest growth of body regions was observed between the second and third lactations. Body indices were not significantly influenced by the age of cows ($p>0.05$), except for the rump shape index that was higher in older cows ($p<0.05$), rump sharpness index that was higher ($p<0.05$) in primiparous cows, massiveness index that was higher ($p<0.05$) in multiparous cows and shinbone burden index that was significantly lower ($p<0.05$) in multiparous cows.

1. MATERIALS AND METHODS

Researches were carried out on the active cow population belonging to Romanian Black and White from the Didactical Station Timişoara, in year 2007.

The morphological traits were measured on 66 cows out of which 15 primiparous cows, 22 cows at the second lactation and 29 cows at the third or higher lactation. The following measurements were measured: height at withers, height at back, height at rump, oblique trunk length, chest depth, trunk depth, chest width, hips width, pins width, rump length, body length, heart girth and shinbone circumference. Body weight was determined with a special tape, and then converted into kilograms. Based on these measurements seven body indices were calculated, as follows: lateral body format index (oblique trunk length x 100 / height at withers), height difference index (height at rump x 100 / height at withers), chest depth index (chest depth x 100 / height at withers), rump shape index (hips width x 100 / rump length), rump sharpness index (hips width x 100 / pins width), massiveness index (heart girth x 100 / oblique trunk length), and shinbone burden index (shinbone circumference x 100 / body weight).

Averages and dispersion indices were calculated for all the traits for first, second and third+ lactations. Differences among the three age groups were tested using analysis of variance.

2. RESULTS AND DISCUSSIONS

Table 1 presents the average values for body dimensions of the cows. Generally, all the body dimensions increased with age of the cows ($p<0.05$). Exceptions to this rule were observed for the oblique trunk length (166.6 cm in first calving cows and 168.97 cm in third calving cows) and the shinbone circumference (19.1 cm in primiparous cows and 19.46 in adult cows), which remained unchanged as animals grew older, differences among age groups did not reached the significance level ($p>0.05$).

Table 1

Body dimensions (average±SEM) of the Romanian Black and White cow population

Trait	Lactation		
	1 (n=15)	2 (n=22)	3 and over (n=29)
Height at withers (cm)	133.80 ± 0.527^{a}	135.47 ± 0.900^{b}	137.60 ± 0.754^{ab}
Height at back (cm)	136.27 ± 0.995^{a}	136.57 ± 0.991^{b}	139.38 ± 0.813^{ab}
Height at rump (cm)	136.63 ± 0.895^{a}	137.16 ± 0.918^{b}	139.57 ± 0.857^{ab}
Oblique trunk length (cm)	166.60 ± 1.687^{a}	167.25 ± 1.989^{b}	168.97 ± 2.042^{c}
Body length (cm)	146.27 ± 1.761^{a}	147.47 ± 2.184^{b}	153.02 ± 1.408^{ab}
Chest depth (cm)	74.40 ± 0.747^{a}	75.38 ± 0.655^{b}	76.79 ± 0.602^{a}
Trunk depth (cm)	78.70 ± 0.733^{a}	79.89 ± 0.630^{b}	80.52 ± 0.635^{a}
Chest width (cm)	40.60 ± 0.498^{ab}	42.61 ± 0.566^{a}	42.76 ± 0.677^{b}
Hips width (cm)	51.73 ± 1.178^{a}	52.43 ± 0.736^{b}	56.64 ± 0.699^{ab}
Pins width (cm)	32.33 ± 1.352^{ab}	36.00 ± 0.767^{a}	37.36 ± 0.907^{b}
Rump length (cm)	51.57 ± 0.730^{a}	52.91 ± 0.645^{b}	53.67 ± 0.440^{a}
Heart girth (cm)	193.87 ± 2.797^{a}	197.73 ± 1.927^{b}	203.00 ± 1.481^{ab}
Shinbone circumference (cm)	19.10 ± 0.332^{a}	19.11 ± 0.296^{b}	19.46 ± 0.182^{c}
Body weight (kg)	519.45 ± 22.139^{a}	526.75 ± 15.156^{b}	593.22 ± 12.459^{ab}

Values on the row with the same letters superscript differ significantly ($p<0.05$)

There were no significant differences for body dimensions between the first and second calving cows ($p>0.05$), except for chest width that was 2.01 cm ($p<0.05$) and pins rump width that was 3.67 cm ($p<0.05$) higher in the second than in the first lactation cows.

Irrespective of the animals' age, the height at back and rump were higher than the height at withers, which described an animal with the upper line slightly ascending from front to rear (Figure 1). In the adult cows the height was 137.6 cm at withers, 139.38 cm at back and 139.57 at rump.

The largest growth of the height from the first to the third lactation was observed in height at withers that significantly increased by 3.8 cm ($p<0.05$), from 133.8 cm to 137.6 cm.

Body length, measured with the tape from the highest point of the withers to the pins, was 6.75 cm ($p<0.01$) and 5.55 cm higher ($p<0.05$) in adult cows (153.02 cm) compared to the first and second parities cows, respectively.

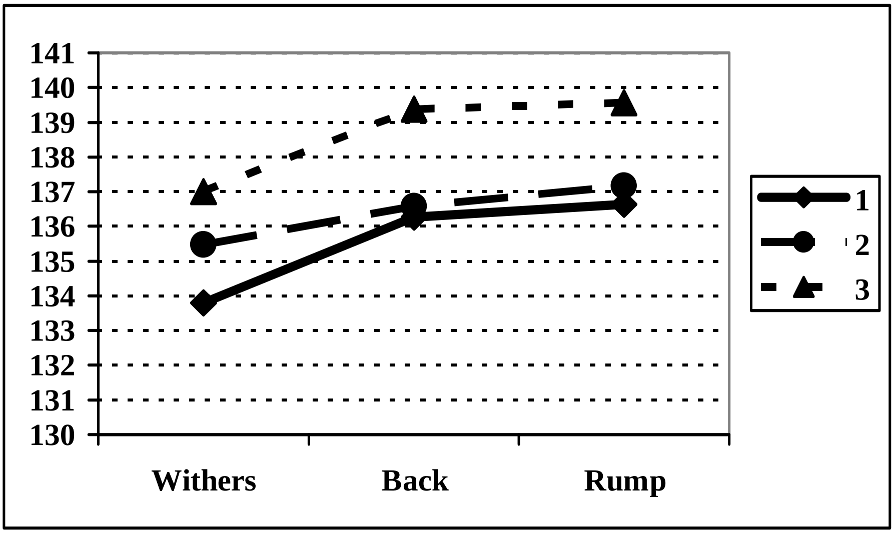

Figure 1 - The three heights of the body according to the age in the Romanian Black and White cows

Both chest and trunk depths were significantly higher in adult cows compared to primiparous cows. Thus, chest depth was 2.39 cm higher ($p<0.05$) and trunk depth was 1.82 cm higher ($p<0.05$) in adult cows compared to primiparous cows.

Body chest significantly increased ($p<0.05$) from 40.6 cm in primiparous cows to 42.61 cm in the second parity and to 42.76 cm in third and over parities.

Rump was 16-19 cm wider at hips compared to pins (Table 1 and Figure 2). Rump width at hips was similar ($p>0.05$) in first and second parities and significantly different ($p<0.001$) between the other age groups. Rump width at pins was similar ($p>0.05$) between the second and third parities, while was significantly different ($p<0.05$) between the other age groups. This is leading to the conclusion that the pins width is reaching the maturity earlier than hips width that is growing mostly after the second parity.

Heart girth was 203 cm in adult cows, being 9.13 cm significantly higher ($p<0.01$) than in first parity and 5.27 cm significantly higher ($p<0.01$) than in second parity.

Body weight was similar in the first and second calving cows (597.07 kg and 605.45 kg, respectively, $p>0.05$), while third and over parities were significantly heavier ($p<0.01$) by 84.79 kg and 76.41 kg, respectively.

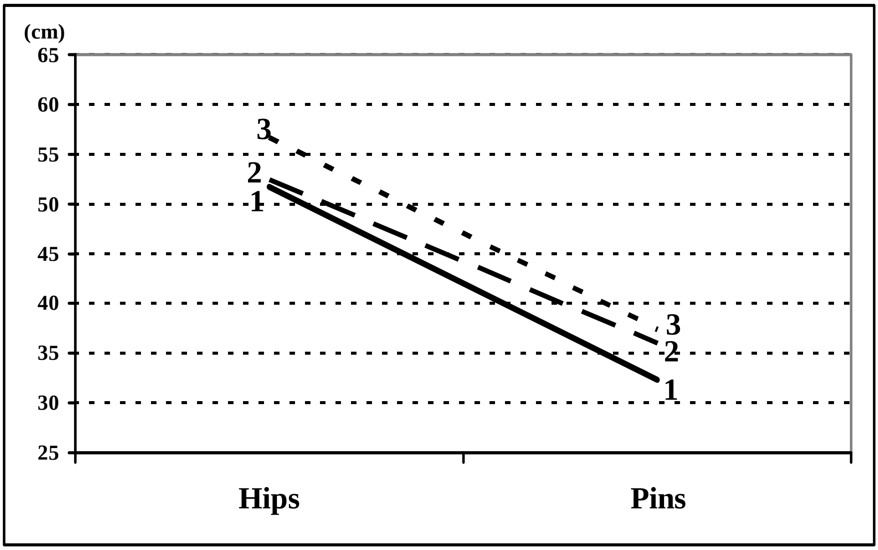

Figure 2 - Hips and pins rump width according to the age in the Romanian Black and White cows

Body indices of the Romanian Black and White cows are presented in Table 2. Age of cows did not had a significant influence (p>0.05) on the body indices in cows.

A lateral body format index ranging from 122% and 124% described a dual purpose cow population with high specialization in milk production. This index decreased slowly with age, showing a transformation of the type towards a specific milk type as cows became adult.

Table 2

Body indices (average±SEM) in the Romanian Black and White cow population

Index	Lactation		
	1 (n=15)	2 (n=22)	3 and over (n=29)
Lateral body format index (%)	124.57±1.327[a]	123.45±1.216[b]	122.72±1.064[c]
Height difference index (%)	102.14±0.551[a]	101.26±0.438[b]	100.71±0.374[c]
Chest depth index (%)	55.62±0.549[a]	55.65±0.388[b]	55.82±0.363[c]
Rump shape index (%)	100.23±1.349[a]	99.24±1.377[b]	105.69±1.507[ab]
Rump sharpness index (%)	164.10±8.183[a]	146.96±3.679[a]	153.74±3.716[b]
Massiveness index (%)	116.46±1.766[a]	116.69±1.546[b]	120.49±1.282[ab]
Shinbone burden index (%)	3.76±0.152[a]	3.67±0.089[b]	3.32±0.068[ab]

Values on the row with the same letters superscript differ significantly (p<0.05)

The height difference index demonstrates that the upper line of the trunk is ascendant from fore to rear end of the body (Figure 1). However, the value of this index is decreasing with age because of the significant growth of the height at withers from lactation to lactation.

Chest depth index was similar in all the three age groups. The value of this index was over 55%, showing a very good chest depth in the analyzed cow population.

The rump shape index describes the shape of the rump seen from above. The ideal value of this index is 100%, meaning that the length and width of the rump are equal. This was the case of the first and second calving cows, the index being 100.23% and 99.24%, respectively. In the adult cows this index was 5.46% and 6.45% significantly higher ($p<0.05$) than in the first and second calving cows, respectively. Functionally, this is very good only if the rump is wide both at hips and pins.

Rump sharpness index representing the ratio between hips and pins width shows the width development of the rump and is very important for reproduction animals. Ideally this index would be 100%, meaning that the two widths are equal. As the index value increase the rump will be narrower at pins and will negatively influence the calving. The highest value for this index was obtained in primiparous cows (164.1%), value that was significantly higher ($p<0.05$) than in second lactation cows.

Massiveness index, calculated as the ratio between heart girth and oblique trunk length, increase with the age of the animal. This was the case of our cow population. The massiveness index significantly ($p<0.05$) increased from 116.46% in primiparous to 120.49% in multiparous cows.

Shinbone burden index, obtained by dividing the shinbone circumference to the body weight, significantly decreased ($p<0.05$) in the multiparous cows (3.32%) compared to primiparous and secundiparous cows.

3. CONCLUSIONS

Body dimensions of the Romanian Black and White cows were significantly influenced by the parity ($p<0.05$), increasing as animals grew older. Generally, the highest growth of body regions was observed between the second and third lactations.

Lateral body format index, height difference index and chest depth index were not significantly influenced by the age of cows ($p>0.05$).

Rump shape index was significantly higher ($p<0.05$) in older cows (three or more than three lactations) while primiparous cows had a significantly higher ($p<0.05$) rump sharpness index.

Shinbone burden index was significantly lower in multiparous cows, while the massiveness index was the lowest compared to primiparous and secundiparous cows.

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OBSERVATIONS ON THE STATUS OF CORTISOL IN POSTPARTUM PRIMIPAROUS HOLSTEIN COWS IMPORTED FROM EUROPE

OBSERVAȚII ASUPRA STATUSULUI CORTISOLULUI LA VACILE PRIMIPARE HOLSTEIN IMPORTATE DIN EUROPA

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SUMMARY

The hypothalamic-pituitary-adrenocortical HPA axis is a vital neuroendocrine regulatory system for adaptation of animals to environmental changes.

The status of plasma cortisol concentrations were studied on 30 primiparous Holstein cows imported from Europe in a Commercial dairy farm.30 blood samples were analized for cortisol concentrations.In the present study,we found 18 cows with cortisol serum concentrations below 0.23µg/dL and 12 cows with cortisol serum concentration between 0.24-1.94 µg/dl.We consider the concentrations of cortisol from 18 primiparous cow as under baseline concentrations and concentration of the 12 cows as baseline concentrations.It is difficult to assess effects of different conditions on HPA activity by taking a single blood samples.

Key words:cortisol,hypothalamic-pituitary-adrenocortical axis,acute stress,chronic stress.
Cuvinte cheie: cortizol, axa hipotalamo-picuitaro-adrenocorticala, stres acut, stres cronic.

The hyopotalamic-pituitary-adrenocortical axis (HPA) is a vital neuroendocrine regulatory system for adaptation of animal to environmental changes.

In dairy cows cortisol is an important component of many physiological functions including metabolism,mammogenesis,lactogenesis and galactopoesis (Ackers et al.,1981, Ackers 1990 cited by Jeffry Rushen et al,2008).

Studies that have taken repeated blood samples with minimal disturbance show that basal cortisol concentrations in adult cattle and young calves are generally between 2 and 5 ng/ml (Ladewing and Suit 1989,Lefcourt et al. 1993,cited by Jeffry Rushen et al,2008).

The objective of this study was to evaluate the status of plasma cortisol concentration of primiparous Holstein cows and to see if a single blood sample can be used to asssess effects of different conditions on HPA activity in primiparous Holstein cows imported from Europe as pregnant heifers.

1. MATERIALS AND METHODS

Blood samples one per animal were taken between 8 a.m. to 11^{00} a.m. by jugular vein using 10 ml vacuette tubes with heparin. Blood samples were analysed at Institut of Animal Diagnostic and Health Bucharest-Romania using TOSON AIA 600 immunoassay analyzer.

30 Holstein primipareus cows were selected from a private farm that contained a total of 749 Holstein breed cattle including 445 lactating dairy cows. All cows were haused in free stall barn facility.

2. RESULTS AND DISCUSSIONS

Plasma cortisol concentration were: < 0,2 μg/dl at 10 cows, 0,2-0,3 μg/dl at 10 cows, 0,31-0,40 μg/dl at 1 cow, 0,61-0,90 μg/dl at 5 cows and 1,44-1,94 μg/dl at 4 cows. Lefcourt et al., 1993, cited br Rushen et al., 2008 reported 2-6 ng/ml of cortisol, Munksgaard et al. 1996, cited by Rushen 2008, 0,5-4,0 ng/ml of cortisol and Hopster 1999 0,5-15 mg/ml as basal plasma cortisol concentrations. Data from Hamninen et al. 2006 cited by Rushen 2008 shows circardian rhythms of plasma concentrations of cortisol in young calves. Circardian and ultradian rhythms and the highly pulsatile secretion have important implications for the measurement of plasma cortisol levels.

Applications of a short-term stress such as social isolation period of transport, branding or dehorning (table 1) results in a relatively quick increase in plasma cortisol concentrations which reach peak values of 12-40 ng/ml within 20-45 min (table 1) and which usually return to baseline values within a few hours.

Table 1

Effect of various acute treatements on plasma cortisol concentrations of cattle concentrations as ng/ml or nmol/l (Jeffrey Rushen et al., 2008)

Treatement	Type of animal	Baseline	Peak values	Time of pick	Return to baseline
Breeding	Yearling beef heifers	10-15 ng/ml	35-37 ng/ml	20 min	60 min
Breeding	Beef calves	10-20 ng/L	35 ng/ml	N.A.	N.A.
Dehorning	3-4 month old calves	20-40nmo/L	130-140 nmol/L	30 min	7 h
Dehorning and analgesia	3-4 month old calves	20-40nmo/L	65 nmol/L	6-7 h	~12h
Castration	5 month old calves	5-9 ng/ml	46 ng/ml	30 min	8-10 h
Castration and analgesia	5 month old calves	5-9 ng/ml	35 ng/ml	30 min	8-10 h
Transport	Pregnant heifers	< 5 ng/ml	25-35 ng/ml	N.A.	N.A.
Isolation/ new surrondings	Lactation cow	5-7 ng/ml	25ng/ml	45 min	90 min
Milking	Lactation cow	2-3 ng/ml	12 ng/ml	15 min	2 h
ACTH injection	Pregnant heifers	10 ng/ml	50-60 ng/ml	15-90 min	> 5 h

Accuratate assessement of cortisol concentrations require that sufficient blood samples be taken over the whole period. Typically, blood samples are taken every 15-20 min.

Peak values in cortisol concentrations may not provide the best estimates of HPA activity because of a „plateau” effect were cortisol concentrations soon reach a maximum and cannot increase further (Rushen et al., 2008). This platean effect suggest that large increase in HPA activity may not be apparent in the maximum plasma cortisol concentrations but in the lengh of time that plasma cortisol concentrations remain elevated above base line.

A single sample measurte of cortisol secretion is insufficient to measure the changes in plasma concentrations of cortisol.

In this study the concentrations of cortisol in a single sample vary greatly (from 0,2 μg/dL to 1,94 μg/dL) depending on when the sample was taken relative to a pulse.

Due to the pulsatile secretion of cortisol from the adrenal gland, plasma cortisol concentrations can change by as much as 5-20 ng/ml in a few minutes or a few houres (Ladewing and Swit, 1989, cited by Rushen et al. 21008). This makes it difficult to assess effects of different conditions on HPA activity by taking single blood sample.

Prelonged or chronic stress may alter the sensitivity of various component of the HPA axis wich may not be apparent in the plasma levels of cortisol (Rushen et al., 2008).

In this study the plasma concentrations of cortisol at 18 cows was under baseline, 60% from all cows. To detect the effect of chronic stress it is necesarelly various measures of HPA responsiveness (chalange test).

Animals subject to chronic stress generally suffer from marked disturbances of metabolism associated with reduced feed intake and negative energy balance (Elsasser et al., 200, Dallman 2001 cited by Rushen et al., 2008).

3. CONCLUSIONS

- It is difficult to assess effects of different conditions on HPA activity by taking a single blood sample.
- Accuratate assessament of cortisol concentrations require that sufficient blood sample be taken, typically every 15-20 min.

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TEMPORARY PASTURES EXPLOITED WITH SHEEP OF *MERINOS DE PALAS* BREED

PAJISTI TEMPORARE EXPLOATATE CU OVINE DIN RASA *MERINOS DE PALAS*

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Keywords: cultivated pastures, female sheep youth, *Merinos de Palas* breed, grazing

SUMMARY

The purpose of experiences consisted in exploitation with sheep youth of *Merinos de Palas* breed of a temporary pasture of grain plants and perennial vegetable plants, founded in 2008. For the development of the experiences there were organized two lots of female young sheep fed by grazing two complex mixtures of grain plants and perennial vegetable plants. The lots of young sheep have also received a supplement of concentrated fodders (barley) of 0,3 kg/animal/day. In the second year of vegetation it was obtained a production of dry substance of 5,4-7,6 t/ha (5 cycles of crop-grazing), in the conditions that the year 2009 was very draughty and the pasture was not irrigated. Dobrogea is considered to be a draughty area, due to the small quantities of precipitations during year and also their unequal spreading during vegetation period. The water from precipitations is not in this area an important reserve for the soil. Also, the winds from South-East during summer are dry, they mix the layer of air near the soil, they transport the wet air to the superior layer of the atmosphere and replace it with dry air, thus intensifying the evaporation and transpiration and thus, a faster drying of the soil. The average quantity of green fodder consumed by day and by animal was of 6,0-6,3 kg. The final body weight was of 50,72-51,69 kg, bigger with 1,91% at lot II. The average daily increasing rate was of 98 g at lot I and of 107g at lot II, being superior at lot II with 9,18 %.

1. MATERIALS AND METHODS

The experiences were located in the experimental field of the bio-basis of the research sector of ICDCOC Palas-Constanța. The soil belongs to vermin black earth type, it is profound and with high content of humus, with middle texture, normal total porosity at the surface and in profundity and middle between 11 and 36 cm. The researches were made on a pasture with an area of 5 hectares, divided in 2 experimental lots, each with an area of 2,5 ha. At founding, there were used 2 types of complex mixtures consisting in the following species of grain and vegetable plants: **A1-** *Lolium perenne 20%, Dactylis glomerata 30%, Festuca pratensis 15%, Festuca arundinacea 20%, Trifolium repens 10%, Lotus corniculatus* 5% and **A2** mixture from *Lolium perenne 15%, Lolium hybridum 10%, Dactylis glomerata 20%, Festuca pratensis 15%, Festuca arundinacea 20%, Trifolium repens 10%, Medicago sativa 10%.* In the year of founding, the pasture was exploited only by mowing. For combating the weeds, repeated mowing was made, at a bigger height, so that to eliminate the less possible from the foliar apparatus of the seeded plants. To establish the percent of fodder plants from the pasture the floristic composition at all crop cycles was determined. The beginning of grazing, in spring, was made when the plants had a height of 28-30 cm. The production of dry substance per grazing cycle was determined per parcels of 1 m^2 each, in two repetitions, the gathering of the samples being made on sunny weather.

The female young sheep used in the experiments were divided in two lots, of 40 animals each, separately maintained, on the pasture of 2 types of complex mixtures (A1 and A2). Both lots were fed by grazing, but also received a supplement of concentrated fodders (0,3 kg/animal/day). The concentrated fodders (barley) were distributed at the morning meal.

The surface of pasture for each experimental lot was of 6 parcels. In the beginning of the grazing period the sheep were 15 months old and weighed 36,5 kg/animal.

From the pasture 5 production cycles were obtained. The use of the pasture was made by the rules of rational grazing by rotation. Water and salt were assured at discretion. The average period of grazing was of 142 days. It was determined the living weight increasing rate at animals, by individual weighing in the beginning of grazing and in the end of each grazing cycle.

2. RESULTS AND DISCUSSIONS

The obtained production in the 5 vegetation cycles was of 5,4 t/ha S.U. on the area seeded with A2 mixture and of 7,6 t/ha S.U. on that seeded with A1 mixture. The production obtained in the 2nd year of vegetation shows influenced by the floristic composition of the grass carpet and by the manner of exploitation.

In the 2nd year of vegetation, the floristic composition of the pasture is characterized by the domination of the grain plants, with a percent of 74,5% in the case of A1 mixture and 68,7% at A2 mixture. The higher percent of participation of the vegetable plants of 28,2% is met in the case of A2 mixture, and at A1 mixture, respectively 21,3%. The percent of weeds which is included in the category of other families of plants was of 4,2% at A1 mixture and 3,1 % at A2 mixture (table 1). The percent of weeds was relatively low in the 2nd year, because the dominant weeds were represented by annual species, which disappear after mowing (mowing of the 1st year).

Table 1

Floristic composition of the temporary pasture in the 2nd year of vegetation

Mixture	Year	Nr. Of cycles	Size (cm)	Grain plants %	Vegetable plants %	Other plants %
A1	2009	5	30	74,5	21,3	4,2
A2			28	68,7	28,2	3,1

The production of raw protein obtained shows that, in the mixture with a higher percent of vegetable plants A2 the percent of protein is of 12,36%, at the A2 mixture is of 11,14% (table 2).

Table 2

Chemical composition of the mixtures of perennial grain and vegetable plants (% SU)

Mixture	SU 60º C	SU 105º C	Ashe %	Protein %	Fat %	Cellulose %	SEN %	Org Subst %
A1	65,15	61,26	8,84	11,14	3,19	22,86	15,23	52,42
A2	67,20	63,09	8,46	12,36	2,90	23,46	15,91	54,63

The content of raw cellulose was 22,86 % at A1 complex mixture and of 23,46 % la mixture A2, fact that shows that at both pastures it was not exceeded the moment of beginning the grazing, thus increasing the degree of consumption and digestibility.

The researches were made on female sheep youth of *Merinos de Palas* breed, two lots, which were homogenous and analog under the aspect of the genetic type, body weight, age, being organized.

The experiment was developed after the experimental scheme presented in table 3. Through the experimental scheme it was aimed the optimum level of food which to assure the productive potential of the pasture.

Table 3

The experimental scheme of the experiment development

Lot	Fodder ratio
L I	(A1) Pasture + 300 g concentrated fodders (barley)
L II	(A2) Pasture + 300 g concentrated fodders (barley)

In table 4 it is presented the average consumption of fodders and nutritive substances per lots.

Table 4

The average consumption of fodders and nutritive substances

Specification	U.M.	Lot	
		L I	L II
Green fodder (grazing)	Kg	6,0	6,3
Barley	Kg	0,3	0,3
Dry substance	Kg	1,43	1,50
UNL	-	1,54	1,61
PDI (PDIN/PDIE)	g	103/96	117/109

The average quantity of green fodder consumed per day and animal was of 6,0-6,3 kg, bigger with 5,0% at the 2nd lot.

The average consumption of dry substance/animal/day of 1,43 kg at the 1st lot and of 1,50 kg at the 2nd lot, bigger with 4,89% at the latter.

The consumption of energetic substances, expressed in milk nutritive units (UNL) was between 1,54 UNL and 1,61 UNL, being superior at the 2nd lot, with 4,54%.

The level of the azoth-based protein, at both lots was bigger comparatively to the level of the energy-based protein with 7,29-7,34%.

The body weights of the female young sheep were determined by individual weighing in the beginning and in the end of the experimental period (142 days). The body weights of the female young sheep and the average daily increasing rate at the two lots are presented in table 5.

Table 5

The body weight (kg) and the average daily increasing rate (g) at the female young sheep

Lot	n	Body weight (kg)				Average daily increasing rate (g)	
		In the beginning		In the end		X ± sx	V%
		X ± sx	V%	X ± sx	V%		
I	40	36,8±1,10	18,90	50,72±1,61	20,08	98±2,9	18,71
II	40	36,5±1,15	19,93	51,69±1,59	19,45	107±3,1	18,32

In the beginning of the experimental period the body weight of the two lots presented sensibly equal values, of 36,5-36,8 kg, the differences not being significant (Fisher Test, P>0,05).

The final body weight was of 50,72 kg at the 1st lot and of 51,69 kg at the 2nd lot, bigger with 1,91% at the latter.

The average daily increasing rate was between 98 g and 107 g, bigger with 9,18% at the 2nd lot, the differences not being significant (Fisher Test, P>0,05).

3. CONCLUSIONS

- The obtained production in the 5 vegetation cycles was 5,4 t/ha S.U. at A2 mixture and of 7,6 t/ha S.U. at A1 mixture.
- The final body weight was of 50,72 - 51,69 kg, bigger with 1,91% at the 2nd lot.
- The average daily increasing rate was of 98 g at the 1st lot and of 107 g at the 2nd lot, being superior with 9,18% at the 2nd lot.

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THE STRATEGY OF FEEDING THE MALE YOUNG GOATS DURING THE PERIOD OF GROWING AND FATTENING

STRATEGIA DE HRĂNIRE A TINERETULUI CAPRIN MASCUL ÎN PERIOADA DE CREŞTERE ŞI ÎNGRĂŞARE

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Key words: male young goats, fodder ratios, fattening.

SUMMARY

The scientific researches were made on male young goats from the local population, aiming to establish the performances of fattening and also the analysis of certain quality indicators of the carcasses.

The studied male young goats were weaned at the age of 60 days, a lot being intensively fattened (68% concentrated fodders, 30% fiber fodders) and semi-intensively (40% concentrated fodders, 58% fiber fodders). The used fodder ratios assured 0,86 kg SU, at 1 kg SU coming 0,78-0,94 UNC and 54-68 g PDI, depending on the fattening system.

The average daily weight increasing rate was of 100,3-118,3 g, bigger with 17,95% at the intensively fattened lot.

The average consumption of dry substance /animal/day was between 0,81 kg and 0,94 kg, being bigger with 16,05% at the males which were fattened in semi-intensive system.

For a kg of living weight increasing rate there were consumed 6,83 kg SU at the intensively fattened lot being lower with 26,72% than the semi-intensively fattened lot, at which the specific consumption was of 9,32 kg SU.

The output at slaughtering was of 43,24-46,79% bigger at the intensively fattened lot with 8,21%.

By fattening in intensive system the rate of the carcass areas of 1st quality was of 50,5%, and in the semi-intensive fattening of 46,70%.

The chemical composition of the meat was not significantly influenced by the system of growing and fattening, the meat being characterized by a content of 27,70-27,85% SU; 19,01-19,38% proteins; 7,12-7,65% fats and 1,19-1,20% ashes.

1. MATERIALS AND METHODS

The scientific researches were developed in the frame of ICDCOC Palas-Constanța, using as biologic material male young goats of 60 days old from the Carpathian local population, the experimental scheme and the characteristics of the lots being presented in table 1.

Table 1

The experimental scheme and characteristics of the lots

Lot	n	System of fattening	The nutritive value of the administered fodder mixture			Initial body weight (kg)		Experimental duration (days)
			SU/kg (kg)	At 1 kg SU		X ± sx	V%	
				UNC	PDI (kg)			
I	17	intensively	0,86	0,94	68	12,56±0,56	18,38	153
II	17	Semi-intensively	0,86	0,78	54	12,78±0,57	18,39	153

The two used lots were homogenous and analogue concerning the age, sex and body weight.

The used fodder ratios assured, depending on the fattening system 0,86 kg SU, at a kg SU being 0,78-0,94 UNC and 54-68 g PDI.

The structure of the used fodder ratios is presented in table 2.

Table 2

Structure of fodder ratios

Fodder	UM	System of growing and fattening	
		Intensive	Semi-intensive
Lucerne Hay	%	30	58
Barley	%	43	40
Peas	%	25	-
Salt	%	1	1
Chalk	%	1	1
Total	**%**	**100**	**100**

From table 2 it is noticed that the ratios of semi-intensive type had in their structure 58% fibrous fodders and 40% concentrated fodders, and the ratios of intensive type had only 30% fibrous fodders and 68% concentrated fodders.

2. RESULTS AND DISCUSSIONS

The dynamics of the body weights and also the average daily increasing rate made by the two lots are presented in table 3.

In the beginning of the experiment the average body weights of the two lots were between 12,56 kg and 12,78 kg, the differences not being significant. The final average body weights were of 28,13-30,66 kg, bigger at the intensively fattened lot with 8,99%, the differences being significant ($P < 0,05$).

Table 3

Body development of the youth

Lot	System of growing and fattening	n	Body weight (kg)				Average daily increasing rate (g)	
			Initial		Final			
			X ± sx	V%	X ± sx	V%	X ± sx	V%
I	intensive	17	12,56 ± 0,56	18,41	30,66 ± 1,39	18,69	118,30 ± 5,26	18,33
II	Semi-intensive	17	12,78 ± 0,57	18,38	28,13 ± 1,22	18,01	100,33 ± 4,47	18,37

The average daily increasing rate was of 118,30 g at the intensively fattened lot and de 100,33 g at the semi-intensively fattened lot, being bigger at the first with 7,91% (significant differences, $P < 0,05$).

Table 4

Fodder Consumption

Specification	UM	Intensively fattened lot	Semi-intensively fattened
Consumption of SU/animal/day	kg	0,81	0,94
d.c.-fibrous fodders	kg	0,24	0,80
-concentrated fodders	kg	0,57	0,14
Specific consumption of SU (kg SU/kg increasing rate)	kg	6,83	9,32
d.c.-fibrous fodders	kg	2,05	5,59
-concentrated fodders	kg	4,78	3,73

The average consumption of dry substance/animal/day was bigger at the semi-intensively fattened lot with 16,05%. The daily consumption of fibrous fodders was 29,63% from the consumed dry substance but at the semi-intensive fattening, the consumed dry substance from the fibrous fodders represented 85,11%.

The specific consumption of dry substance (kg SU/kg living weight increasing rate) was between 6,83 kg and 9,32 kg, being bigger at the lot which was semi-intensively fattened with 36,46%.

The results of slaughtering depending on the fattening system are presented in table 5.

The weight of the carcass was of 14,41 kg at the intensively fattened lot with 16,40% bigger besides the semi-intensively fattened lot, where the weight of the carcass was of 12,38 kg.

The output of slaughtering was of 43,24-46,79%, and the commercial one presented values between 48% and 51,40%, the superior values being registered in the case of the intensive fattening with 8,21% and respectively 7,08%.

Table 5

The results of experimental slaughtering

Specification	UM	Intensive fattening (n = 10)		Semi-intensive fattening (n = 10)	
		X ± sx	V%	X ± sx	V%
Living weight	kg	30,80±1,51	15,50	28,63±1,39	15,35
Weight of carcass	kg	14,41±0,81	17,77	12,38±0,71	18,14
Slaughtering output	%	46,79±2,31	15,61	43,24±2,21	16,16
Internal organs	kg	1,42±0,07	15,59	1,36±0,07	16,28
Commercial output	%	51,40±2,95	18,15	48,0±2,68	17,66
Internal fat	kg	1,06±0,03	8,95	0,84±0,03	11,29

The internal fat was of 1,06 kg in the intensive fattening and of 0,84 kg at the semi-intensively fattened lot, being bigger at the first lot with 26,19%, the differences being distinctly significant ($P < 0,01$).

The categories of quality of the cut commercial areas are presented in table 6.

Table 6

Rate of the quality categories of the carcasses

Specification	1st quality		2nd quality		3rd quality	
	X ± sx	%	X ± sx	%	X ± sx	%
Intensively fattened lot	7,28±0,29	50,50	4,46±0,19	30,90	2,67±0,13	18,6
Semi-intensively fattened lot	5,78±0,29	46,70	4,08±0,19	33,0	2,51±0,13	20,3

The rate of the commercial regions of the 1st quality was of 50,5% at the intensively fattened lot and of 46,70% at the semi-intensively fattened lot. As absolute value the commercial regions of first quality presented superior values in the case of intensive fattening with 25,95%.

The commercial regions of 2nd quality and of 3rd quality represented over 50% of the weight of carcass in the semi-intensive fattening (53,3%), but in the intensive fattening they had a rate of 49,5%.

The chemical composition of meat presents relatively similar values at both lots the fattening system influencing in a small rate this character (table 7).

Table 7

Chemical composition (%) of the meat

Specification	Intensively fattened lot (n = 10)		Semi-intensively fattened lot (n = 10)	
	X ± sx	V%	X ± sx	V%
Dry substances	27,85±1,65	18,73	27,70±1,50	17,12
Proteins	19,01±1,02	16,92	19,38±1,03	16,81
Fats	7,65±0,36	14,88	7,12±0,35	15,54
Ashes	1,19±0,05	13,29	1,20±0,04	10,54

The dry substance was between 27,70-27,85%, the proteins 19,01-19,38%, the fats 7,12-7,65%, and the ashes was of 1,19-1,20%.

The bigger differences between the two lots were registered at the content of fat, it being higher with 7,44% at the intensively fattened lot.

3. CONCLUSIONS

From the scientific researches concerning the strategy of feeding the male young goats during growing and fattening period a series of conclusions are drawn:

- The average daily weight increasing rate was between 100,33 g and 118,30 g, being bigger with 7,91% at the intensively fattened lot.
- The body weight in the end of the fattening period (153 days) was of 28,13-30,66 g, being superior with 8,99% in the case of intensive fattening.
- The average daily consumption of dry substance was of 0,81-0,94 g, being bigger at the semi-intensively fattened lot with cu 16,05%.
- The specific consumption of dry substance (kg SU/kg living weight increasing rate) was bigger in the case of semi-intensive fattening, with 36,46%.
- The output at slaughtering was of 43,24-46,79%, and the commercial one of 48,0-51,4%, being bigger at the intensively fattened lot with 8,21% and respectively with 7,08%.
- By fattening in intensive system it was obtained a superior rate of the valuable commercial regions comparatively to the semi-intensive fattening. Thus the cut commercial regions of first quality represented 50,5% in the intensive fattening and only 46,70% at the semi-intensively fattened lots.
- The chemical composition of meat presented similar values at the two lots no matter the growing or fattening system. Due to the low content of fats, the meat is dietetic being a valuable sort for the market.
- The obtained weight increasing rates of the goat youth are good, comparing to the young sheep of Ţurcană and Ţigaie.
- It is recommended that the fattening to be done in intensive or semi-intensive system, depending on the existent possibilities, for a period of maximum 3-4 months after weaning.

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SURVEY ON ROMANIAN CONSUMERS' WILLINGNESS-TO-PAY FOR ANIMAL PRODUCTS OBTAINED IN ANIMAL WELFARE CONDITIONS

STUDIU PRIVIND ACCEPTAREA CONSUMATORILOR DIN ROMÂNIA DE A PLĂTI PENTRU PRODUSE OBȚINUTE ÎN CONDIȚII DE ASIGURARE A BUNĂSTĂRII ANIMALELOR

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Cuvinte cheie: bunăstare animală, produse animale, consumatori, acceptare de plată, factori
Key words: animal welfare, animal products, consumers, willingness to pay, factors

SUMMARY

The aim of the paper was to investigate the influence some factors on the willingness to pay for animal products obtained under animal welfare systems. The specific question that was analysed for this paper was: "What additional price premium would you be willing to pay for animal products sourced from an animal welfare friendly production system?" The respondents have to choose only one answer out of the six offered: no additional price premium, an additional 5%, 10%, 25%, more than 25% and don't now. A total of 190 questionnaires were returned, and some of them had no answers for this specific question. The results were statistically computed according to five factors: gender, age, living area, net household income per month, and internet access in the household. The most male consumers would not agree to pay any additional price for these products, while females would largely pay a 5% price premium. The older the consumers the lowest the percentage of additional price to pay for animal products obtained in good welfare raising systems. Consumers aged between 26 and 35 years of age expressed in the largest proportion to pay more than 5% price premium. Small and middle towns' consumers showed their willingness to pay in the highest percentage an additional price of 5% for animal friendly products. Consumers from large towns were not that eager to pay more for these products. Consumers form rural area would like to pay 5% or 10% price premium for these products. Most consumers with monthly income less than 1000 RON (53.3%) did not know how to respond to this question, but 13.3% of them would pay a 25% price premium. More than 35% of consumers earning 1000-2999 RON per months expressed their willing to pay 5% price premium, while the same percentage of consumers earning 3000-3999 RON per month would pay 10% price premium. Most consumers earning 4000 RON or more per month (34.4%) were not willing to pay for animal friendly products. Even they have access to internet consumers did not show a willingness to pay more for animal products produced in welfare conditions.

Some animal welfare measures increase the cost of production, but this may be offset by higher product quality or fewer losses due to disease or injury. There are ways to improve animal welfare that do not compromise productivity and are not necessarily costly. It is important to explore the economic and societal impact of animal-friendly measures and production alternatives, so as to reconcile animal welfare and economic imperatives (1).

Consumers may respond to concerns about animal welfare in a number of ways (Blandford et al., 2000). First, they may cease to consume some or all animal-based food products. Thus, for example, many consumers in the United Kingdom and Ireland refuse to consume veal or Foie Gras because of concerns about the welfare of the animal in the production process. They may become vegetarian. Becoming a vegetarian reflects not only concerns about animal rights and animal welfare, but also issues associated with food safety, nutrition and health and the environment. Second, consumers may choose product variants that are perceived to be associated with higher levels of animal welfare. These may include products that are explicitly labelled as being produced with higher levels of welfare or products for which the consumer perceives this to be the case, for example organic products or those having a particular geographic origin. Third, consumers may not change their food purchase behaviour, even though they may be concerned about animal welfare. There may be many reasons for this: 1) they may not perceive that their purchase decisions will not have any significant impact on how food is produced; 2) they may mistrust information provided on the manner in which food is produced; and 3) they may not be able to afford the price premium associated with products perceived to be associated with higher levels of animal welfare.

Appleby (1999) argues that buying meat produced with high welfare standards does more to improve farm animal welfare than eating a vegetarian diet.

For consumers from western countries, price is not the only determinant behind animal-food purchases as they are acquiring an increasing interest in farming practices and the related animal welfare standards (Napolitano, 2008). Consumers do not seek the cheapest food but the best value for money (i.e. the maximum benefit for what they are prepared to spend) (McInerney, 2004). Some consumers in the EU are willing to pay more, even enough to cover higher production costs, for some “animal-friendly products”, like free-range eggs (Mitchell, 2000).

Danish consumers are generally willing to pay more for labels indicating animal-friendly production methods (Andersen, 2005). Comparing the willingness to pay of barn eggs, free-range eggs and organic eggs it appeared that consumers living in the urban areas are willing to pay more for animal welfare than people in rural areas.

In a study for establishing the willingness to pay for yogurt products in Italy, Napolitano et al., 2008 found that within each product, consumers expressed a higher willingness to pay for products with labels indicating high welfare standards as compared with yogurts with labels reporting intermediate and low welfare standard.

A comparison of chicken price in leading UK supermarkets indicates a welfare related premium of between 6 and 250% (McVittie et al., 2005).

1. MATERIALS AND METHODS

The survey was carried out in year 2009, based on a questionnaire developed within the framework of the third work package of the WELANIMAL project (www.welanimal.aku.edu.tr).

The questionnaire had 12 questions, and 16 demographic questions. The respondents were able to respond the questions from the WELANIMAL project site, or they were asked to respond by students from the Banat University of Agricultural Sciences and Veterinary Medicine in Timişoara with different occasions.

The specific question that was analysed for this paper was as follows: “What additional price premium would you be willing to pay for animal products sourced from an animal welfare friendly production system?” There were six possible answers for the respondents to choose: No additional price premium; An additional 5%; An additional 10%; An additional 25%; More than additional 25%; Don't know. The respondents have to choose only one answer out of the six offered.

A total of 190 questionnaires were returned, and some of them had no answers for this specific question. The results were statistically computed according to five factors, as follows: gender (male and female), age class (under or equal to 25 years, 26-35 years, 36-45 years, 46-55 years, and over 55 years), the living area (rural, small and middle towns, and large towns), net household income per month (under 1000 RON, 1000-1999 RON, 2000-2999 RON, 3000-3999 RON, and over and equal to 4000 RON), and internet access in the household (yes and no).

2. RESULTS AND DISCUSSIONS

Table 1 presents the results of the willingness to pay according to the gender of respondents. Over 50% of the respondents were not ready to pay a premium for animal products obtained under good animal welfare systems, or they are ready to pay a maximum of 5% additional price, while 18.8% did not know to answer to this question.

Table 1

Romanian consumers' willingness to pay for animal-friendly products according to gender

Item		n	Additional price premium to pay (%)					
			none	5%	10%	25%	>25%	DK
Total respondents		**186**	**24.2**	**28.5**	**19.9**	**5.4**	**3.2**	**18.8**
Out of which	Male	138	28.3	27.5	21.7	3.6	2.9	15.9
	Female	48	12.5	31.3	14.6	10.4	4.2	27.1

There were differences between genders of respondents. Thus, the majority of the male responders (24.2% plus 28.5%) would not pay more than 5% premium price for animal-friendly products. Anyway, 21.7% of the male responders were ready to pay 10% premiums. In the mean time, only 12.5% of the female respondents will not pay any premium for these animal products, and 31.3% would pay 5% premium price. Also, 25% (14.6% plus 10.4%) of the females are ready to pay between 10% and 25% price premium for products obtained by using animal welfare friendly systems. More than a quarter of females (27.1%) did not know to answer to this question.

Results of the willingness to pay according to age of respondents are presented in Table 2. Out of 170 responses 25.3% did would not pay more for animal welfare friendly products, 28.8% would pay a 5% additional price and 20.6% would pay a 10% additional price. Only 2.9% would like to pay 25% or more price premiums for these products.

From Table 2 one could conclude that the young people up to 25 years old and those that are older than 46 years would not like to pay more for products obtained in conditions that provide a good animal welfare. About 30% of these categories would like to pay 5% price premium for these products. About 50% of the middle-aged people, from 26 to 45 years old, are willing to pay 5% or 10% price premiums for such animal products. The highest ratio of consumers that would pay 25% or more price premium for animal friendly products was observed in the age group from 26 to 35 years (5.4%), while none of the consumers older than 55 years would like to pay that much.

Table 2

Romanian consumers' willingness to pay for animal-friendly products according to age

Item		n	Additional price premium to pay (%)					
			none	5%	10%	25%	>25%	DK
Total respondents		**170**	**25.3**	**28.8**	**20.6**	**5.3**	**2.9**	**17.1**
Out of which	<=25 years	38	31.6	23.7	23.7	5.3	2.6	13.2
	26-35 years	37	16.2	24.3	27.0	2.7	5.4	24.3
	36-45 years	41	12.2	34.1	14.6	9.8	2.4	26.8
	46-55 years	26	38.5	30.8	7.7	3.8	3.8	15.4
	>55 years	28	35.7	32.1	28.6	3.6	0.0	0.0

Table 3 show the distribution of the responses according to the living area of respondent consumers. The largest percentage of consumers that would not pay any price premium for the animal welfare friendly products was observed in people that live in large towns (34.7%), followed by people that live in the rural area (21.1%) and people that live in small or middle towns (10.8%). The highest percentage of consumers that would pay and extra 5% price for these products was observed in people living in small and middle towns, while the lowest percentage in people living in large towns (19.4%). A great percentage of people living in large towns (22.2%) would pay a 10% price premium for these products, while for the other living areas this percentage was about 18.5%. The percentage of consumers that would pay a 25% premium for animal friendly products was similar across age groups, about 5.5%.

Table 3

Romanian consumers' willingness to pay for animal-friendly products according to the living area

Item		n	Additional price premium to pay (%)					
			none	5%	10%	25%	>25%	DK
Total respondents		**185**	**24.3**	**28.6**	**20.0**	**5.4**	**3.2**	**18.4**
Out of which	rural area	76	21.1	31.6	18.4	5.3	1.3	22.4
	small/middle town	37	10.8	40.5	18.9	5.4	5.4	18.9
	large town	72	34.7	19.4	22.2	5.6	4.2	13.9

The influence of the household monthly net income on the willingness to pay for animal welfare friendly products is presented in Table 4. More than half of consumers that had an income lower than 1000 RON (53.3%) did not know to respond to this question and 20% of them were not willing to pay any price premium for these products. But, 13.3% of this income category is willing to pay a price premium of 25%, which makes the highest percentage among the income categories.

Table 4

Romanian consumers' willingness to pay for animal-friendly products according to monthly net income

Item		n	Additional price premium to pay (%)					
			none	5%	10%	25%	>25%	DK
Total respondents		**140**	**25.0**	**29.3**	**17.9**	**5.0**	**2.1**	**20.7**
Out of which	<1000 RON	15	20.0	6.7	6.7	13.3	0.0	53.3
	1000-1999 RON	39	25.6	38.5	15.4	7.7	2.6	10.3
	2000-2999 RON	40	17.5	35.0	22.5	2.5	0.0	22.5
	3000-3999 RON	14	28.6	14.3	35.7	7.1	7.1	7.1
	>=4000 RON	32	34.4	28.1	12.5	0.0	3.1	21.9

The highest percentage of refusal to pay any price premium for the animal friendly products was observed in the respondents that had a monthly income of 4000 RON or greater (34.4%). People that earn monthly between 1000 and 2999 RON were the most willing to pay an additional price of 5% for these products (38.5% and 35.0%, respectively). The highest percentage of people willing to pay 10% price premium was that of consumers whose monthly household net income was between 3000 and 3999 RON (35.7%).

The responses distribution according to the presence or absence of the internet access into the household in presented in Table 5.

The people that have internet access in the house were equally (25%) not willing or willing to pay a 5% premium for the animal products obtained in good welfare conditions. Almost 3% (2.8%) of these consumers were expressed their willing to pay a price premium higher than 25% for these products.

The largest proportion of the people that do not have access to the internet were willing to pay 5% price premium, while the same percentage (20.9%) responded that they will pay no additional price or pay a 10% price premium. None of this category expressed the willing to pay a premium higher than 25% for animal friendly products.

Table 5

Romanian consumers' willingness to pay for animal-friendly products according to access to internet in the household

Item		n	Additional price premium to pay (%)					
			none	5%	10%	25%	>25%	DK
Total respondents		**179**	**24.0**	**28.5**	**20.7**	**5.6**	**2.8**	**18.4**
Out of which	Yes	136	25.0	25.0	20.6	5.9	3.7	19.9
	No	43	20.9	39.5	20.9	4.7	0.0	14.0

More than 20.5% of either people that have or not access to internet was willing to pay 10% premium price for these products.

3. CONCLUSIONS

Generally, consumers act differently in their willingness to pay for animal welfare friendly products according to their gender, age, living area, income and internet access.

The most male consumers would not agree to pay any additional price for these products, while females would largely pay a 5% price premium.

The older the consumers the lowest the percentage of additional price to pay for animal products obtained in good welfare raising systems. Consumers aged between 26 and 35 years of age expressed in the largest proportion to pay more than 5% price premium.

Small and middle towns' consumers showed their willingness to pay in the highest percentage an additional price of 5% for animal friendly products. Consumers from large towns were not that eager to pay more for these products. Consumers form rural area would like to pay 5% or 10% price premium for these products.

Most consumers that have the monthly income less than 1000 RON (53.3%) did not know how to respond to this question, but 13.3% of them would pay a 25% price premium. More than 35% of consumers earning between 1000 and 2999 RON per months expressed their willing to pay 5% price premium, while the same percentage of consumers that earn between 3000 and 3999 RON per month would pay 10% price premium. Most consumers that earn 4000 RON or more per month per household (34.4%) were not willing to pay for animal friendly products.

Even they have access to internet consumers did not show a willingness to pay more for animal products produced in welfare conditions.

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ACKNOWLEDGMENTS

This survey was supported from the Leonardo da Vinci project entitled "A new approach on different aspects of welfare, environment and food interactions in Central and Southeastern Europe with the use of ICT" –WELANIMAL www.welanimal.aku.edu.tr

STUDY REGARDING AGE AT LAMBING AND LAMBING SEASON INFLUENCE ON THE SEX RATIO IN TRANSYLVANIAN MERINO BREED REARED IN BANAT REGION

STUDIU PRIVIND INFLUENȚA VÂRSTEI ŞI A SEZONULUI DE FĂTARE ASUPRA RAPORTULUI DE SEXE LA RASA MERINOS DE TRANSILVANIA DIN ZONA BANATULUI

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Cuvinte cheie: oaie, sezon de fătare, raport de sexe, Merinos Transilvănean
Key words: sheep, lambing season, sex ratio, Transylvanian Merino

SUMMARY

In this research, the evaluation of sex ratio during normal reproduction season and in counter-season was aimed, in Transylvanian Merino breed reared in Banat region.

Study was carried out in 2008 at S.C. SINNAGRO S.A farm from Sânnicolau Mare, Timiş County, on a flock of 1736 breeding ewes, from which 1543 ewes (88.9%) gave birth to a number of 1699 lambs. From a total of 1699 lambs, 818 were males (48.14%) from which 670 were born as singles (48.30%) and 148 as twins, and 51.85% were females from which 717 (51.70%) as singles and 164 as twins (52.56%). During the entire period of the study, differences between the two sexes were, on average, 3.7 % in favor of females lambs representing a non-significant value (p>0.05) as resulted by Pearson test.

In our research, lambing season and age at lambing influenced in very wide limits the sex ratio, but these fluctuations do not have a statistical value (p>0.05). Our study suggests that in Transylvanian Merino sheep bred, in Banat region, sex ratio is situated around the value of 1:1.

Studies carried out on large number of animals and prolonged periods of time emphasized that in some circumstances and in some sheep breeds, sex ratio is obvious modified, among possible causes assuming to be age of parents when conceiving.

1. MATERIALS AND METHODS

Study was carried out at S.C. Sinnagro S.A. farm from Sânnicolau Mare, Timiş County, on a flock of 1736 breeding ewes, from witch 1543 (88.9%) gave birth to a number of 1699 lambs.

Data regarding the type of birth (simple or double) and sex of the lambs were collected from the breeding register, the flock being included in the official control of productions and descent.

Pearson test (χ^2) was used in order to test the differences among the two genders.

2. RESULTS AND DISCUSSIONS

A yearlong assessment of lambing type was pursued, during the normal reproduction season and also in counter-season.

Table 1 shows that males among the single born lambs represented 48.3% and among the twin born lambs 47.43%, a slightly lower rate for those born as doubles. Female lambs represents 51.70% among single born and greater rates of 52.56% for those born as doubles.

During the entire period of the study, from 1699 born lambs, 818 (48.14%) were males and 881 females (51.85%), results that are situated around the normal value of 1:1, with a little difference of only 3.71%.

Table 1

Sex ratio at lambing for entire research period

Type of birth	**Males**		**Females**		**Total**
	n	**%**	**n**	**%**	**lambs**
Simple (1 lamb)	670	48.30	717	51.70	1387
Double (2 lambs)	148	47.43	164	52.56	312
Total	818	48.14	881	51.85	1699

Note: difference of 3.71 % in favor of females was statistically insignificant ($p>0.05$)

Performing an analysis on the homogeneity of two sexes using Pearson test, a value of $\chi^2 = 0{,}077$ was revealed, value witch denotes that difference registered of 3.71 % between sexes was incidental and insignificant ($p > 0.05$).

Table 2 presents the influence of age on the sex ratio (males/females) in lambs born as singles. From the table it can be observed that in simple lambing, sex ratio varied randomly between 43.3 and 56.7%, regardless of age, with the exception of ewes in age of 6 years, witch give birth to 37.5% males, exception that may do ($n = 51$) to the haphazard ($p > 0.05$).

Age of ewes at lambing influence the sex ratio in double births, during normal breeding season and counter-season as is rendered in table 3.

Considering the number of ewes with twin lambing (156 ewes), 47.43% were of type male-female (M-F), 23.72% male-male (M-M) and 28.85% of type female-female (F-F). Overall, the frequency of the couple males-females is almost equal wit the frequency of homogeneous couples (males-males or females-females), difference registered of 5.14% being statistically insignificant ($p > 0.05$).

In modern animal husbandry were made several attempts to alter the sex ratio and results were inconclusive, proportion of 1:1 between sexes was not modified noticeable towards the natural percentage. A multitude of researches sustain the idea that in humans and ruminants sex ratio is influenced by a series of factors like: latitude (Grech V. et all. 2000), climate (Lerchl A., 1998), rutting frequency (Jemes N., 1997), ration structure (Stolkowsky J., 1981), ram age (Jacobsen R. et. all., 1999), age difference between parents (Manning J.T. et. all., 1997), blood type of the mother (Allan T.M., 1975), glucose content in blood (Larson M.A. et. all., 2001) and even vaginal pH (Pratt N.C. et. all., 1987).

Henning et all. (1993) reviewed results obtained on English sheep breeds, concluding that from 127587 lambs, 48.96% were males.

Pascal et all. (1995) registered a number of 264 births, in Palas Merino breed, from witch 51.1% were males and 48.9% females.

Stăncescu L. (2008) performed a study during 22 years on Merino sheep breed from C.C.D.C.E.S. Perieni, and found that from 33107 lambs, 49.73% were males and 50.27% females, but with great fluctuations between the experimental years of 9%. By mating young ewes (1.5 years) with aged rams (6.5 years) a greater number of male lambs is obtained, while mating younger rams (1.5-3 years) with aged ewes (5.5-7.5 years) a greater number of female lambs is registered.

These results are confirming once more that in autumn births after counter-season rutting, as in the case of those carried out in the spring, sex ratio remains around the value of 1:1.

All these data are congruent with those published by Pădeanu et all. (1999), which has registered in Polwarth sheep breed, who give birth to twins, after rutting in counter-season, incidence of male-male couples was registered 23.29%, couples female-female incidence registered was 26.22% and couples male-female incidence was 50.48%.

3. CONCLUSIONS

- When born as singles (n = 1387) during both lambing seasons (normal season and counter-season), 48.3% lambs were males and 51.70% females, registered difference of 3.4% was statistically insignificant ($p > 0.05$);
- When born as twins, in the same period (n = 312), 47.43% lambs were males and 52.56% females, but the difference of 5.13% was statistically insignificant ($p > 0.05$);
- Altogether (born as single or double), sex ratio was 48.14% for male lambs and 51.85% for female lambs, difference of 3.71% in favor of females was statistically insignificant ($p > 0.05$);
- Age of ewes influences occasionally and statistically insignificant ($p > 0.05$) the sex ratio;
- Sex ratio in Transylvanian Merino breed is situated around the value of 1:1.

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Table 2

Age at lambing and lambing season influence on the sex ratio (M-F) in lambs born as singles

Age (years)	Total lambs	Males				Females			
		Total		whereby		Total		whereby	
		n	%	normal season	counter-season	n	%	normal season	counter-season
1.5	316	141	44.6	12	129	175	55.4	45	130
2	353	181	51.3	49	132	172	48.7	28	144
3	245	123	50.2	34	89	122	49.8	30	92
4	133	75	56.4	15	60	58	43.6	15	43
5	60	26	43.3	7	19	34	56.7	12	22
6	136	51	37.5	10	41	85	62.5	18	67
7	63	29	46.0	9	20	34	54.0	10	24
8	81	44	54.3	18	26	37	45.7	12	25
Total	**1387**	**670**	**48.30**	**154**	**516**	**717**	**51.70**	**170**	**547**

Note: M – male; F - female

Table 3

Ewes age influence on the sex ratio and body weight at birth in lambs born as doubles (yearlong)

Age (years)	Total N	Couple M - M						Couple M - F						Couple F - F					
		nr. total	% from total	Rutting season				nr. total	% from total	Rutting season				nr. total	% from total	Rutting season			
				Counter-season		Normal				Counter-season		Normal				Counter-season		Normal	
				n	%	n	%			n	%	n	%			n	%	n	%
1.5	21	5	24	5	24			10	48	10				6	28	6			
2	30	8	27	6	20	2	7	17	57	11	37	6	20	5	16	2	6	3	10
3	12	5	42	4	33	1	9	3	25	1	8	2	17	4	33	2	16	2	17
4	21	5	24	4	19	1	5	8	38	7	33	1	5	8	38	6	29	2	9
5	8	2	25	2	25			4	50	4	50			2	25	2	25		
6	30	3	10	3	10			17	57	14	47	3	10	10	33	10	33	0	
7	16	4	25	4	25			4	25	1	6	3	19	8	50	2	12	6	38
8	18	5	28	3	16	2	12	11	61	10	56	1	6	2	11	1	5	1	6
Total	**156**	**37**	**23.72**	**31**	**19.87**	**6**	**3.85**	**74**	**47.43**	**58**	**37.18**	**16**	**10.25**	**45**	**28.85**	**31**	**19.87**	**14**	**8.98**

Note: % from N along age

FACTORS THAT AFFECT MILK PRODUCTION OF “FRIESIAN BLACK SPOTTED ROMANIAN BREEDING CATTLE” IN THE FARMS FROM TRANSYLVANIA

I. RANGA

Key words: V.P.F., quantitative milk production, BNR primiparous breeding cattle

SUMMARY

Obtaining quantitative production constantly increasing in milk quantity and of improved quality in maxim economic conditions is determined by the features of the biologic material of the breed.

A group of 294 primiparous cattle heads was the subject of our research and we established the age effect of the first parturition/calving on the phonotypic features of milk production at first lactation and the economic effect on the grading up/improvement process of the Friesian Black Spotted Romanian breeding cattle from the private farms in 3 Transylvanian counties: Bihor, Cluj, Mureş.

The results of the research highlight the fact that the primiparous cattle that have been studied have a V.P.F. that is with 35-42 % highest than the average values, which are requested and estimated for this breed. The cattle group studied in this research project was divided into 5 age groups, which have presented significant differences regarding the obtained milk production. The values of the milk production of the age group between 850-950 days, are similar with the average value of the primiparous cattle at farm level and this shows an extended investment period with financial and economic consequences which are not fully justified per cattle head. The V.P.F. values can be reduced by adopting some improvement strategies regarding technology, organization and administration and by focusing attention on the importance of the reproduction role of young cattle.

Competitive animal breeding and high quality production that rise up to the European standards demands thorough theoretical and practical knowledge in the field.
The quantitative and qualitative milk production of breeding cattle is influenced by numerous factors under certain forms, but in most cases the finite product – the milk – is the result of interaction between internal factors specific to each organism, individual or population and external factors of environment and breeding technology and its implementation respectively.

1. MATERIALS AND METHODS

A group of 294 primiparous breeding cattle heads of “Friesian Black Spotted Romanian Breeding Cattle” was the subject of our research; these breeding cattle were exploited in similar conditions of breeding technology and exploitation in private farms from 3 counties in Transylvania: Bihor, Cluj, Mureş.

According to the age of the first calving, the group of cattle was structured in different age groups from the age under 850 days up to over 1151 days, each group having a frequency of 7- 35 cattle.

The paper has the purpose to establish the effect of first calving (V.P.F.) upon the phenotypic features of milk production in the first lactation and the economic implications in the amelioration process of these populations.

In all cases, the results have been processed and interpreted from statistic point of view.

2. RESULTS AND DISCUSSIONS

Obtaining quantitative production constantly increasing and of improved quality in maxim conditions of economy is determined by the features of the biologic material of the breed.

V.P.F. effect clearly appears when the individual milk production and the total average productive life are calculated. The efficiency according to the milk production is indirectly proportional to the V.P.F. value and directly proportional to the economic exploitation and the quantity of the production obtained.

These researches started from the need to know and identify the most efficient investment period in connection with the milk production obtained through normal lactation in the case of the “Black Spotted Romanian cattle” from private farms in the following counties: Bihor – S.C. “Acțiunea Felix” S.A., Cluj - S.C. “Ada –Prodcom” S.R.L., Mureş – S.C. “Silvaur Impex” S.R.L. – Lechința.

The data from Table 1 show the fact that there are small differences between the primiparous cattle of each group and that there are no significant differences in the production level. Though, there is one exception in the case of the first group, when the V. P. F. differences are of 88 days and the production level is of 1603 kg of milk in favour of the farm from Bihor. The number of individuals that can be included in this group belongs to the same farm, representing, 67,9%, which at a V.P.F. of 23 months and 21 days have a milk production of 6500 kg milk at a normal lactation. The same milk production of over 6500 kg is obtained in the farms from Cluj county, but at a V.P.F. of approximately 33 months. The maximum milk production is obtained in the farms from Mureş county and it is of over 6150 kg milk at a V.P.F. of 25 months and 13 days.

The V.P.F effect on the milk production at the primiparous cattle is very evident due to the significant changes (for $t_{0,05}$) registered between the first age group and the others. This means that it is a greater advantage from economic point of view to obtain a milk production of 4987 kg at 808 days than 5400-6600 kg at 1000-1100 days from calving. (e.g., the farm from Cluj)

The graphic representation (Diagram 1) shows the milk production fluctuations according to V.P.F., for all 3 analysed farms during the research. The maximum V.P.F. differences are of 440 –550 days, and the maximum milk production differences are of 274 – 1702 kg of milk, depending on the analysed farm.

In all cases, it has been noticed that starting with the interval II, the milk production has similar values with the average value, which illustrates an extension of the pre-productive life which means it is an unjustified financial investment per cattle head.

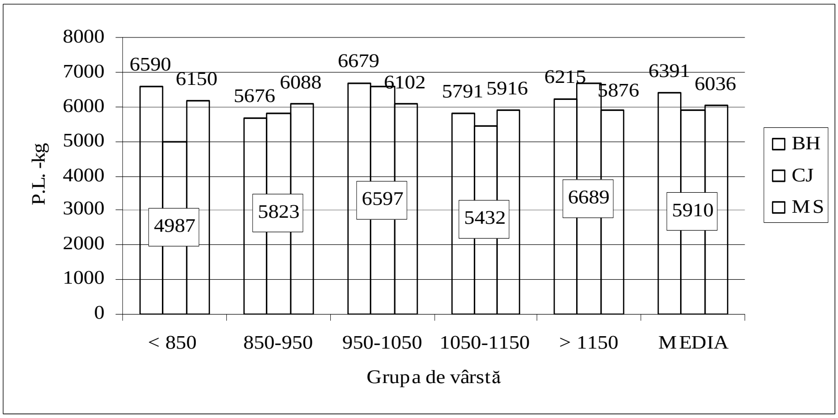
Table 1

The effect of the first calving/parturition on the milk production indices at the primiparous cattle

Farm	V.P.F.	n	Normal Lactation							I.N. %
			V.P.F. days	D.L.N. - days	P.L - kg	Gr. - %	Gr. - kg	Pr. - %	Pr. - kg	
BH	<850	72	720,31 ±8,316	297,38 ±1,740	6590,01 ±127,041	3,90 ±0,019	256,81 ±4,902	3,27 ±0,011	215,62 ±4,289	91,03 ±2,285
CJ		7	808,00 ±13,841	293,86 ±8,413	4987,40 ±390,235	3,82 ±0,083	191,19 ±17,294	3,03 ±0,029	163,28 ±19,452	106,73 ±0,936
MS		29	773,31 ±13,594	297,00 ±2,760	6150,05 ±204,980	3,81 ±0,032	233,62 ±7,014	3,08 ±0,020	189,01 ±6,276	92,64 ±4,342
BH	851-950	16	895,88 ±8,030	299,44 ±2,828	5676,25 ±411,964	3,77 ±0,047	214,81 ±16,125	3,25 ±0,038	193,55 ±15,710	83,01 ±5,690
CJ		12	915,00 ±7,138	302,17 ±1,813	5823,18 ±332,247	3,79 ±0,037	220,14 ±12,027	3,05 ±0,025	177,55 ±9,944	83,45 ±4,912
MS		27	897,00 ±5,496	293,56 ±3,150	6088,48 ±246,695	3,77 ±0,033	230,02 ±9,695	3,11 ±0,034	189,62 ±8,122	88,33 ±4,782
BH	950-1050	8	992,75 ±9,750	303,63 ±0,905	6679,25 ±858,555	3,89 ±0,047	257,76 ±31,061	3,25 ±0,044	232,34 ±23,332	83,68 ±6,494
CJ		7	1000,14 ±13,351	299,86 ±5,143	6596,67 ±536,172	3,91 ±0,053	259,09 ±23,585	3,14 ±0,080	217,87 ±18,879	90,50 ±5,577
MS		35	1001,23 ±4,822	295,06 ±2,685	6102,31 ±216,871	3,80 ±0,031	231,55 ±8,020	3,12 ±0,030	190,92 ±7,104	90,51 ±3,881
BH	1051 -1150	8	1101,25 ±8,928	301,00 ±2,693	5791,00 ±447,427	3,92 ±0,071	226,18 ±16,610	3,26 ±0,041	207,38 ±12,665	72,83 ±5,959
CJ		9	1083,56 ±8,590	300,78 ±3,639	5431,60 ±487,952	3,93 ±0,054	213,70 ±19,775	3,17 ±0,042	186,17 ±13,627	90,98 ±6,246
MS		34	1091,68 ±4,479	288,35 ±2,842	5916,13 ±247,448	3,82 ±0,035	224,97 ±9,172	3,08 ±0,026	182,17 ±7,622	94,11 ±2,744
BH	> 1151	2	1220,50 ±43,500	305,00 ±0,000	6215,00 ±146,000	3,90 ±0,092	243,45 ±62,050	3,15 ±0,000	241,20 ±0,000	79,61 ±2,601
CJ		9	1356,56 ±25,255	298,89 ±4,043	6689,04 ±245,813	4,04 ±0,062	269,86 ±9,475	3,28 ±0,047	219,22 ±7,877	82,35 ±7,330
MS		19	1213,68 ±10,376	295,42 ±3,624	5876,23 ±216,283	3,80 ±0,040	223,29 ±8,858	3,06 ±0,033	180,23 ±7,477	81,25 ±5,804
BH		106	805,56 ±14,563	298,58 ±1,282	6391,44 ±132,208	3,88 ±0,016	247,98 ±5,107	3,26 ±0,010	213,66 ±4,176	88,21 ±1,941
CJ		44	1036,32 ±28,781	299,52 ±1,920	5910,28 ±194,271	3,89 ±0,028	230,58 ±8,094	3,14 ±0,025	193,87 ±6,375	87,21 ±2,985
MS		144	985,17 ±12,381	293,63 ±1,335	6035,54 ±103,148	3,80 ±0,015	229,04 ±3,853	3,09 ±0,013	186,82 ±3,307	90,22 ±1,837

Diagram 1

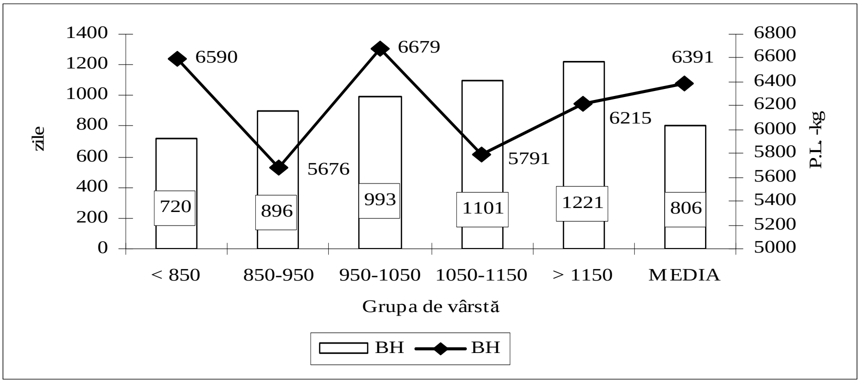
The V.P.F. effect on milk production of the primiparous Black Spotted Romania breeding cattle from the farms in Transylvania



If we refer to each farm separately (Diagrams 2-4), we will notice a variation of milk production in the case of the farm from Bihor, once the period of investment has increased and at the same time the number of primiparous cattle that belong to the last 2 age groups. We should mention that 83% out of the total cattle sample belongs to the first 2 age groups and 68% have a V.P.F. value which is within the limits required by the amelioration programs for the Friesian cattle race. (Diagram 2)

Diagram 2

The V.P.F. effect on milk production of the primiparous Black Spotted Romania breeding cattle from the farm Acțiunea Felix – Bihor

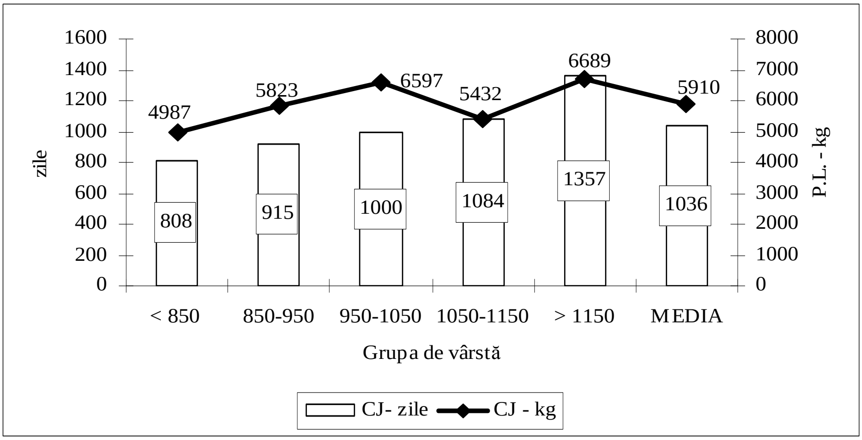


In the farm from Cluj there has been registered an increase of the productive level in the same time with the extension of the investment period and only 16% out of the cattle sample have the age of the first calving of de 26 months and 17 days. (Diagram 3)

Unlike the farm from Cluj, in the farm from Mureş county there has been registered a decrease of milk production simultaneously with the increase of V.P.F. Though, 20% of the cattle sample have a V.P.F. which is according to the norms of the amelioration program for the Black Spotted Romanian Breeding cattle, approximately 37 % have a milk production of 5900 kg / normal lactation, at over 1100 days from birth. (Diagram 4)

Diagram 3

The V.P.F. effect on milk production of the primiparous Black Spotted Romania breeding cattle from the farm Ada-Prodcom –Cluj

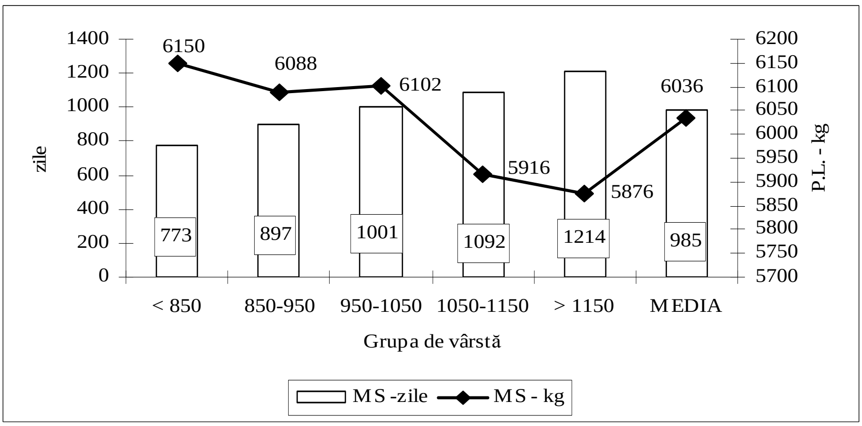


The V.P.F. values demonstrate that the technology of breeding reproduction young cattle is not respected in the farms from Transylvania. The farmers must understand that they should focus more on this aspect that has a very important role in the future of the farm.

A V.P.F. value over the limits imposed by the amelioration programs, higher that the duration of the gestation has a negative effect on the milk production obtained at first lactation but also at the following lactations; it will have a great impact on the costs and on the amortization of the unproductive period as well.

Diagram 4

The V.P.F. effect on milk production of the primiparous Black Spotted Romania breeding cattle from the farm Silvaur - Impex –Mureş



3. CONCLUSIONS

1. At farm level, the V.P.F. of the cattle under research is a lot higher than the average value specific to the Black Spotted Romanian Breeding cattle, especially in the case of the farms from Cluj and Mureş (35-45 %).
2. In the farms from Bihor and Mureş, 63% and 20% respectively out of the cattle group studied have a V.P.F. value, which can be compared with that from the farms within the European Union.
3. The most favourable V.P.F. value of the cattle group under research according the ratio between the level of milk production and economic impact belongs to the first 2 age groups which represent in fact 39 – 44 – 83% out of the primiparous cattle analysed during our research.
4. The difference of milk production registered between the age groups is significant in proportion of 5% especially between the first age group and the others.
5. We consider that the average V.P.F. values can be reduced by adopting some improvement strategies and taking actions regarding technology, organization and administration and by focusing attention on the importance of the reproduction role of young cattle.

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EVOLUTION OF WORLD PORK MARKET

EVOLUTIA PIETEI MONDIALE A CARNII DE PORC

AGATHA POPESCU

Cuvinte cheie: evolutie, carne de porc, piata mondiala
Key words: evolution, pork, world market

SUMMARY

The paper aimed to present the evolution of world pork market during the period 1985-2006.In this purpose , the following specific indicators have been used : world pork production, pork consumption, producer's pig price, pork export and import , the main pork producing, exporting and importing countries in the world . The data have been collected from FAOStat for the period 1985-2006 . The methodology is based on the calculation of the specific indices showing the evolution in time and the comparison method was used to present the differences by country and regions compared to world average . In the period 1985-2006, the world pork production increased by 92 % .The EU contributes by 19 % to the world pork production , by 70 % to the world pork exports and by 57 % to the world pork imports. The main pork producers are China , the USA , Germany, Spain, Brazil and the main exporting countries are Denmark , the USA, Germany , Belgium and Spain. The main importing countries are Germany, The USA , Mexico, Italy and China.

Pork is an important sort of meat for the diet of many inhabitants of the world. Its high nutritive value is given by its rich content in protein and energy. It is known that 100 g pork contains 20 g proteins, 3 g fats, 105-135 kcal, but also vitamins and minerals (iron, selenium) assuring a balanced diet. For this reason, pork market has been continuously extended during the last 20 years. This study aims to present the evolution of pork production, consumption and trade in order to identify its trends in the future by country and region.

1. MATERIALS AND METHODS

In order to analyze the evolution of world pork market, the following specific indicators have been used: world pork production, pork consumption, producer's pig price, pork export and import, the main pork producing, exporting and importing countries in the world. The data have been collected from FAOStat for the period 1985-2006 . The methodology is based on the calculation of the specific indices showing the evolution in time and the comparison method was used to present the differences by country and regions compared to world average.

2. RESULTS AND DISCUSSIONS

World Pork Production. During the last 20 years, the world pork production increased by 92.52% from 59,968 thousand tons in the year 1985 to 115,454 thousand tons in the year 2006. The main pork producer is China, whose share in world pork production was 29.29% in 1985 and 45.98% in 2006. In the year 2006, Chinese pork production was 3 times higher than in 1985. Pork production also increased 4 times in Brazil, 3.8 times in Philippines, 2.3 times in Spain, 1.7 times in Canada, 1.6 times in Denmark, 1.5 times in the USA, 1.4 times in Poland and Belgium-Luxemburg, 1.3 times in Italy. Pork production registered a decline in The Netherlands (less than 9.22%), Romania (less than 47.02%), United Kingdom (less than 28.33%), Russia (less than 72%), Japan (less than 18.61%), Mexico (less than 14.24%). The EU pork production represented 29.12% in 1985 and 18.93% in 2006 of world pork production. Therefore, the most important contribution to world pork production is brought by China (46%), the EU (19%), the USA (8.6%), Germany (4%), Spain (2.8%) and Brazil (2.7%). Romania's pork production was 853 tons in 1985 and 452 tons in 2006, representing 0.39% of world pork production (Table 1).

The average Pork Production, in terms of live weight, was 831 Hg/head at world level and 873 Hg/animal in the EU. The decreasing order of the main pork producers concerning average pig live weight is the following one: Italy (1,167 Hg/head) , Belgium (935 Hg/head), Germany (931 Hg/head) , the USA (920 Hg/pig).

Table 1

World Pork Production during the period 1985-2006 (Thousand tons)

Country/Region	1985	1990	1995	2000	2005	2006	2006/1985%
WORLD	59,968	69,867	80,122	90,075	103,488	115,454	192.52
The EU	17,466	18,797	19,614	21,779	21,534	21,861	125.16
Belgium-Luxemburg	725	784	1,043	1,042	1,015	1,008	139.03
Denmark	1,083	1,208	1,494	1,625	1,793	1,749	161.49
France	1,662	1,727	2,144	2,312	2,018	2,011	120.99
Germany	4,620	4,457	3,602	3,982	4,500	4,662	100.90
Italy	1,187	1,333	1,346	1,478	1,515	1,559	131.33
The Netherlands	1,412	1,661	1,622	1,623	1,297	1,296	91.78
Poland	1,486	1,855	1,962	1,923	1,956	2,071	139.36
Romania	853	788	673	502	437	452	52.98
Spain	1,389	1,789	2,175	2,905	3,168	3,219	231.79
United Kingdom	971	946	1,017	899	706	696	71.67
USSR/Russia	5,853	6,654	1,865	1,569	1,520	1,641	28.03
Brazil	780	1,050	2,800	2,600	3,110	3,120	400.00
Canada	1,088	1,124	1,276	1,640	1,920	1,898	174.45
China	17,567	24,016	33,401	41,406	51,202	53,093	302.23
Japan	1,532	1,555	1,300	1,256	1,245	1,247	81.39
Mexico	1,293	757	922	1,030	1,103	1,109	85.76
Philippines	397	684	805	1,008	1,415	1,501	378.08
USA	6,715	6,964	8,097	8,597	9,383	9,950	148.17

The producers' pork price was different from a country and region to another because of the applied fattening technologies and environment factors . The highest price was registered in Japan (USD 3.76/kg), Mexico (USD 3/kg) but also USD 2/kg in Russia, Greece , Italy, Romania and the United Kingdom. In Romania, producers' price increased from USD 1.3/kg in 1985 to USD 2.1 /kg in 2006. Producers price has increased in almost all the pork producing countries (Table 2).

The Pork Consumption. During the last 20 years, pork consumption has substantially increased. In 2006, the world pork consumption was 249.8 Million Tons, by 17.97% higher than in 1975 and represented 39% of meat consumption, pork representing the most consumed meat type. Due to the world population increase, all the meat sorts have registered an increase. The share of meat types within world consumption is: pork 39%, chicken 30%, beef 24%, mutton 5% and 2% other sorts (Table 3).

Table 2

Producers' pig price during the period 2000-2006 (USD/Ton)

Country	2000	2003	2006	2006/2000 %
Belgium	1,284.51	1,391.82	1,702.41	132.53
Denmark	1,254.46	1,258.72	1,694.76	135.09
France	1,187.48	1,282.57	1,644.27	138.46
Germany	1,229.94	1,275.35	1,718.10	139.69
Greece	1,934.77	2,257.25	2,724.76	140.83
Italy	1,764.74	1,802.75	2,217.73	125.66
The Netherlands	1,158.07	1,345.32	1,505.90	130.03
Spain	1,429.52	1,593.62	1,458.94	102.05
Poland	1,100.86	1,064.60	1,489.67	135.61
Romania	1,314.65	1,409.23	2,134.20	162.33
United Kingdom	1,500.91	1,768.24	2,014.73	134.23
Russia	1,321.83	1,713.28	3,081.93	233.15
Brazil	749.12	498.52	943.26	125.91
China	834.33	1,176.03	1,486.26	178.13
Canada	1,410.67	1,320.44	1,570.03	111.29
Japan	3,605.52	3,253.99	3,768.14	104.51
Mexico	2,135.25	1,979.79	2,397.55	112.28
The USA	1,332.40	1,164.80	1,543.70	115.85

Table 3

The evolution of consumption by meat sort (Million Tons)

Sort	1975	1980	1985	1990	1995	2000	2006	2006/1975 %
WORLD Consumption	114.6	134.9	151.9	177.0	203.2	2321	249.8	217.97
Beef	44.8	46.6	50.2	54.7	55.9	58.8	60.1	134.15
Pork	41.2	52.1	59.4	68.9	79.3	90.1	97.8	237.37
Mutton/Goat	6.6	7.2	7.9	9.4	10.1	11.0	11.8	177.44
Chicken	18.5	25.4	30.5	40.3	53.4	67.3	74.8	404.32
Others	3.5	3.6	3.8	3.7	4.5	4.8	5.3	151.42

In 2006, the average world pork consumption was 15 kg/capita but in the EU was 3 times higher , more exactly 44 kg/capita. The highest pork consumption per capita was recorded in Austria (74 kg), Spain (66 kg), Denmark (63 kg), Hungary (52 kg) and the lowest one in the United Kingdom (25 kg), Russia (16 kg), Brazil (13 kg), Mexico (12 kg). In Romania, pork consumption decreased from 31 kg/capita in 1975 to 28 kg in 2006, when it was 1.5 times higher than the world average and 36% less than the EU average pork consumption (Table 4).

The Pork Trade .

The World Pork Exports increased 2.32 times from 2,046 thousand tons in 1985 to 4,765 thousand tons in 2006. The EU pork exports represent 69.96 % of the world pork exports . The most spectacular increase of pork exports was registered by Spain, from 0.9 thousand tons in 1985 to 287 thousand tons in 2006 and France, whose pork exports increased from 33 to 286 thousand tons in the same period of time. Other countries registered a decline of pork exports. For instance, The Netherlands, which was on the first position in 1985 but then it reduced its pork exports by 60% in 2006. The main pork exporter in the world is Denmark, whose exports recorded 1,155 thousand tons in 2006, being 3.37 times higher than in 1985. Its share in world pork exports is 34.64%. On the second position comes the USA and Germany on the third position, whose exports represent 19% and, respectively, 10% of the world exports. Therefore, Denmark, the USA , Germany, all together , contribute by 64 % to the world pork exports (Table 5).

Table 4

Pork Consumption per Inhabitant during the period 1985-2006 (kg/capita/year)

Country	1985	1990	1995	2000	2006	2006/1985 %
WORLD	12	13	14	14	15	125.00
The EU	39	40	40	44	44	112.82
Austria	60	66	69	74	74	124.33
Belgium-Luxemburg	48	46	39	38	35	72.91
Denmark	56	64	64	70	63	112.50
France	35	33	35	37	38	108.57
Germany	63	60	52	53	54	85.71
Italy	28	31	32	39	43	153.57
The Netherlands	43	45	49	52	36	83.42
Spain	36	47	52	64	66	183.33
United Kingdom	25	25	24	24	25	100.00
Hungary	76	70	47	42	52	68.42
Poland	36	46	48	47	50	138.88
Romania	31	35	27	24	28	90.32
Russia	22	23	16	13	16	72.72
Brazil	5	6	17	14	13	260.00
Mexico	17	9	10	12	12	70.52
China	16	20	26	32	35	218.75
Japan	14	15	17	17	18	128.57
Philipinnes	7	11	11	13	17	242.85
Canada	31	27	29	30	27	87.09
The USA	29	28	29	29	30	103.44

The World Pork Exports Value increased by 242.29% from USD Million 3,461.1 in 1985 to USD Million 11,847.2 in 2006. The EU pork exports value represents 72.73% of the world pork exports value in 2006 compared to 66.02% in 1985. The value of Denmark pork exports was USD Million 3,403.2 in 2006, representing 39.49% of the EU pork exports value and 28.72% of the world exports value. In 2006, the most important contribution to the pork exports value was given by Denmark, the USA, Germany , Belgium-Luxemburg, Spain, France, the Netherlands (Table 6).

Table 5

The evolution of Pork Exports during the period 1985-2006 (Thousand Tons)

Country	1985	1990	1995	2000	2006	2006/1985 %
WORLD	2,046	2,485	2,334	3,256	4,765	232.89
The EU	1,424	1,853	1,691	2,474	3,334	234.12
Belgium-Luxemburg	198	278	265	314	351	177.27
Denmark	342	471	706	951	1,155	337.71
France	33	128	166	261	286	866.66
Germany	77	164	80	122	471	611.68
The Netherlands	618	771	494	270	248	40.12
Spain	0.9	5.5	54	172	287	31,888.88
Poland	22	24	27	56	187	850.00
Brazil	5.2	12.4	1.2	18	135	2,596.15
China	179	126	39	41	57	31.84
Canada	189	108	72	108	165	87.30
The USA	34	67	230	462	906	2,664.70

Table 6

The Pork Exports Value during the period 1985-2006 (USD Millions)

Country	1985	1990	1995	2000	2006	2006/1985 %
WORLD	3,461.1	6,565.6	5,933.0	6,210.4	11,847.2	342.29
The EU	2,285.1	4,927.4	4,318.2	4,470.9	8,617.3	377.10
Belgium Luxemburg	338.3	781.5	596.5	493.8	812.1	240.05
Denmark	744.5	1,621.8	2,271.4	2,078.0	3,403.2	457.11
France	56.9	352.1	377.8	450.4	668.2	1,174.34
Germany	132.7	402.8	171.8	178.8	1,199.2	903.69
The Netherlands	933.5	1,955.5	1,042.0	448.6	610.0	65.35
Spain	1.9	1.6	120.7	265.3	691.5	36,394.73
Poland	32	34	38	49.6	360	1,125.00
Brazil	7.7	22	20	18.9	217.5	2,824.67
China	395.0	221.8	70.6	34.7	74.3	18.81
Canada	346.5	224.7	124.9	161.8	280.1	80.83
The USA	61.9	289.2	750.5	1,251.9	2,220	3,586.42

The World Pork Imports increased by 89.52% from 1,900 thousand tons in 1985 to 3,601 thousand tons in 2006. The EU pork imports increased by 56.48 % from 1,310 thousand tons to 2,050 thousand tons in the same period. In 2006, the EU pork imports represented 56.92% of world pork imports. The main importing countries are Germany, the USA, Mexico, Italy, China and Greece, whose imports, all together, totalize 1,329 thousand tons, representing 73.81% of world imports. Romania imported 5.4 thousand tons in 1985 and 136 thousand tons in 2006, that is 25 times more than 20 year ago. Romania's imports represent 3.8 % of the world pork imports (Table 7).

The World Pork Imports Value increased from USD Million 3,474.6 in 1985 to USD Million 8,092.5 in 2006. The share of the EU pork imports value was 59.32% of the world imports value in 2006. The main pork importers are Russia, Germany, the USA, Italy, Greece, Mexico, United Kingdom, Romania, China and France (Table 8).

Table 7

The evolution of Pork Imports during the period 1985-2006 (Thousand Tons)

Country	1985	1990	1995	2000	2006	2006/1985 %
WORLD	1,900	2,461	1,907	2,318	3,601	189.52
The EU	1,310	1,677	1,227	1,275	2,050	156.48
Denmark	0.6	10.8	13.1	44.5	51.4	8,566.66
France	298	290	160	116	102	34.22
Germany	440	548	386	331	168	38.18
Greece	55.4	58.7	69.7	195	168	303.24
Italy	414	503	440	205	230	55.55
The Netherlands	16.6	22.9	8.1	37.7	83.6	503.61
United Kingdom	33.8	76.2	38.3	85.5	142	420.11
Romania	5.4	63.1	1.2	20.5	136	2,518.51
Russia	-	-	309	213	516	-
China	61.6	66.4	73.3	196	182	295.45
Japan	190	344	1.9	1.2	1.8	0.94
Mexico	-	30	11	139	239	-
The USA	254	234	194	321	342	134.64

Table 8

The Pork Imports Value during the period 1985-2006 (USD Millions)

Country	1985	1990	1995	2000	2006	2006/1985 %
WORLD	3,474.6	7,274.9	4,005.5	3,607.1	8,092.6	232.90
The EU	2,144	4,620.3	2,767.9	1,951.1	4,800.0	223.88
Denmark	1.5	33.5	41.0	96.6	216.5	14,433.33
France	483.9	795.4	385.7	184.6	240.7	49.74
Germany	699.8	1,472.9	820.8	493.9	1,144.6	163.56
Greece	95.3	169.5	156.9	215.8	464.5	485.87
Italy	699.5	1,449.3	1,027.9	350.4	572.5	81.84
The Netherlands	28.3	64.0	18.8	55.8	194.2	696.21
United Kingdom	63.5	219.4	79.0	116.1	304.1	478.89
Romania	6.7	90.2	1.6	30.6	288.6	4,307.46
Russia	-	-	454.8	212.6	1,189.1	-
China	85.1	116.8	135.5	265.3	273.8	321.73
Japan	700.4	1,687.2	12.2	6.1	9.5	1.35
Mexico	-	55.6	13.0	171.4	378.4	-
The USA	409.3	526.1	440.6	709.6	863	210.84

Romania’s pork imports value increased from USD Million 6.7 in 1985 to USD Millions 288.6 in 2006, being 43 times higher than 20 years ago. Romania’s pork imports value represents 3.6 % of the world pork imports value.

3. CONCLUSIONS

1. In the period 1985-2006, the world pork production increased by 92% .The EU contributes by 19% to the world pork production, by 70% to the world pork exports and by 57% to the world pork imports.

2. The main pork producers are China, the USA, Germany, Spain, Brazil and the main exporting countries are Denmark, the USA, Germany, Belgium and Spain. The main importing countries are Germany, The USA, Mexico, Italy and China.

3. Romania produces 0.39% of the world pork production and imports 3.8% of the world pork imports.

4. The world pork consumption is in average 15 kg/capita, but in the EU is 3 times higher. The main pork consumers are the Austrians, the Spanish, the Danish, the Hungarians and the Polish. The Romanians consume 28 kg pork in average per year.

5. The world pork market will continue to extend because of the high nutritive value of pork and its contribution to hunger eradication .

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CONSIDERATIONS CONCERNING ROMANIA'S MEAT MARKET

CONSIDERATII PRIVIND PIATA CARNII IN ROMANIA

AGATHA POPESCU

Cuvinte cheie: carne, piata, Romania
Key words: meat, market, Romania

SUMMARY

The paper aimed to present some aspects of Romania's Meat Market using the following specific indicators : animal farm structure, the number of slaughtered animals , the average live weight at delivery, meat production in terms of live weight, the number of meat processing enterprises, slaughter ratio, investments and profitability in meat processing industry , meat consumption, exports and imports of live animals , meat and meat preparations. The study refers to the years 2006 and 2007 and is carried out based on the empirical data provided by the National Institute for Statistics. The comparison method was used in order to emphasize the evolution of each indicator mentioned above from a year to another. In the analyzed period , the number of slaughter cattle and poultry increased , while the number of sheep and pigs decreased. The average live weight at delivery increased for all the species resulting to a meat production gain. Meat consumption registered a decline due to the lower purchasing power and higher meat price. Romania is a net meat importer but a net exporter of live animals. The recover of meat production and consumption imposes a better infrastructure, high meat potential animals, a better feeding, production integration along the whole meat chain for assuring a higher profitability and food safety.

Meat is an important part of human diet providing high value protein, essential amino acids, vitamins and minerals. In Romania, the decline of slaughtered animals during the last 19 years had a negative influence upon meat production, whose level has deeply decreased. However, the slight increase of average live weight is a positive aspect. Important efforts were made by meat processing enterprises for covering the EU standards related to carcass classification and the assurance of food safety. Meat consumption registered a decline due to the increased meat price. Important amounts of meat are imported affecting the domestic producers, so that Romania has become a net meat importer, but a net live animals exporter. In this context, the present paper presents the recent statement of meat production.

1. MATERIALS AND METHODS

The following specific indicators have been used: animal farm structure, the number of slaughtered animals, the average live weight at delivery, meat production in terms of live weight , the number of slaughter houses and meat processing enterprises, slaughter ratio, investments and profitability in meat processing industry, meat consumption, exports and imports of live animals, meat and meat preparations. The reference period for the study is represented by the years 2006 and 2007. The empirical data have been provided by the National Institute for Statistics. 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

The number of animal farms. At present, in Romania there are 3,931,350 animal farms of which 15.19% are utilizing agricultural land and raising animals, 2.03% are raising only animals and the remaining farms are utilizing only agricultural land.

The structure of animal farms in terms of UGB (Unite de Gros bovin) by farm type in terms of UDE (Unite de Dimension Economique) shows that 91.1% of animal farms have less than 10 UGB , 2.2% farms are raising 10-20 UGB , 0.7% farms are growing 20-50 UGB and 0.2% are keeping over 50 UGB (Table 1).

Table 1

Romania's animal farm structure by UGB (%)

Farm classification, UDE	Farm size – UGB				
	Less than 10	10-20	20-50	50-100	Over 100
Less than 1	91.1	2.2	0.7	0.1	0.1
1-2	95.0	0.4	-	-	-
2-4	89.1	4.5	0.8	-	-
4-8	65.5	16.7	6.8	0.8	-
8-16	43	14	17	4	0.6
16-40	27.1	6.3	10.8	7.5	2.8
40-100	14.7	3.4	4.9	3.5	5.9
Over 100	10.4	3.1	4.4	3.2	14.5

Source : Eurostat 41/2005

Taking into account UDE , the highest share of animal farms is registered by the ones raising granivorous animals (6.5-9.5 % for 4-16 UDE) but also by the ones dealing both with crop and animal production (16.4-18.8 % for 4-16 UDE) (Table 2).

Table 2

Romania's animal farms structure by UDE (%)

Specification	Farm size – UDE							
	Less 1	1-2	2-4	4-8	8-16	16-40	40-100	Over 100
Dairy farms	0.6	0.6	0.5	1	1	0.7	0.4	0.3
Cattle Fattening farms	-	-	-	0.1	0.1	0.1	-	-
Dual purpose cattle farms	0.2	0.2	0.2	0.2	0.4	0.2	0.1	-
Sheep/Goat farms	1.3	1	1.3	2.9	5.6	13.5	17	8
Other animal farms except granivorous	3.9	3.7	3.9	5.8	8.1	6.4	3	6
Herbivorous animal farms	10.3	12.2	6.4	4.2	2.7	1	0.3	0.1
Granivorous animal farms	18.9	21.1	15.1	9.6	6.5	3.3	0.7	0.4
Crop and herbivorous farms	3.9	4.4	2.9	1.7	1.8	2.1	1.8	0.7
Crop and other animal farms	15.5	15.5	15.2	18.8	16.4	5.1	1.3	1.1

Source : Eurostat 41/2005

The number of slaughter animals. In the year 2007, the number of slaughtered animals was: 155,505 cattle (by 24.36% more than in the year 2006), 1,300,387 pigs (20% less than in 2006), 195,423 sheep (5% less than in 2006), 116,967,465 poultry (21.16% more than in 2006) (Table 3).

Table 3

The number of slaughtered animals (heads)

Species	2006	2007	2007/2006 %
Cattle	125,036	155,505	124.36
Pigs	1,641,944	1,300,387	79.19
Sheep	205.748	195.423	94.98
Poultry	96,543,095	116,967,465	121.16

The number of slaughtered animals represents 5.51% (2,819 thousand heads) of cattle stock, 19.81% (6,563 thousand heads) of pig stock, 2.30% (8,469 thousand heads) of sheep stock and 142.58 % (82,036 thousand heads) of poultry stock.

In the year 2007, a number of 155,505 cattle were slaughtered compared to 125,036 heads in 2006, that is more than 24.36% of the total number of slaughtered cattle. In 2006, a number of 1,300,387 pigs were slaughtered compared to 1,641,944 heads in 2006, meaning 21.81% less. In the year 2007, the number of slaughtered sheep was 195,423 heads, by 5% less compared to 205,748 heads in the year 2006. The number of slaughtered lambs was 34,389 heads, representing 16% of the slaughtered sheep. The number of slaughtered poultry increased by 21.16% from 96,534,095 heads in 2006 to 116,967,465 heads in 2007 , of which 99.59 % is represented by broilers. The number of fattened chickens increased by 22.88 % from a year to another.

Meat Production in terms of live weight increased from a year to another. The live weight of the slaughtered cattle was 66,100 tons in 2007, by 29.63 % higher than in 2006. The live weight of the slaughtered pigs was 168,538 tons in 2007, by 3245 % higher than in 2006 (127,241 tons). In the year 2007, the live weight of the slaughtered sheep was 5,691 tons by 1.55% higher than in 2006. The live weight of slaughtered lambs represented 8.82 % of the sheep live weight. In 2007, an amount of 243,595 tons poultry live weight was slaughtered, being by 20.70% higher than in the year 2006.The broilers live weight represented 97.18% of slaughtered poultry live weight.

Table 4

Meat Production in terms of Animal Live Weight (Tons)

Species	2006	2007	2007/2006 %
Cattle	50,992	66,101	129.63
Pigs	127,241	168,538	132.45
Sheep	5,604	5,691	101.55
Poultry	201,803	243,595	120.70

The average live weight at delivery . The cattle average live weight increased by 4.24 % from 407.8 kg/head in 2006 to 425.1 kg/head in 2007. The average live weight of young slaughtered cattle represents 94.44% of slaughtered cattle live weight. The average pug live weight was 102.6 kg in 2007 compared to 97.8 kg in 2006, that is by 4.90%

higher. In the year 2007, the average sheep live weight was 29.1 kg /head by 6.98% higher than in 2006.The average lamb live weight at delivery was 14.6 kg in 2007 and the average poultry live weight was 2.1 kg/head.

Table 5

Average Animal Live Weight at slaughter (kg/head)

Species	2006	2007	2007/2006 %
Cattle	407.8	425.1	104.24
Pigs	97.8	102.6	104.90
Sheep	27.2	29.1	106.98
Poultry	2.1	2.1	100.00

The slaughter ratio (carcass weight/slaughter live weight x 100) increased from 49.69% in 2006 to 50.09% for cattle, from 72% to 73.13% for pigs, but it decreased from 45.6% to 44.82% for sheep and from 76.76% to 75.61% for poultry as shown in Table 6.

Table 6

Slaughter Ratio (%)

Species	2006	2007	2007/2006 %
Cattle	49.69	50.09	100.80
Pigs	72.00	73.13	101.56
Sheep	45.60	44.82	98.28
Poultry	76.76	75.61	79.85

The number of slaughter houses. Animal slaughtering and meat processing requires specialized units, well endowed, according to the EU standards for assuring food safety. In 2007, there were 978 slaughtering enterprises, of which 58.90% small processing enterprises (576 units) with less than 9 employees and 41.40%, that is, 402 enterprises with more than 9 employees. About 2.86% processing plants had more than 250 employees and assure a high productivity.

Technical Endowment. In order to cover the EU requirements related to the implementation of Quality Management System and food safety , thousand Lei 702,555 have been invested in meat processing industry, of which 7.62% in small business enterprises with less than 9 employees and 43.54% in larger enterprises with more than 250 employees.

The Turnover in meat processing industry. In the year 2007, meat processing industry sales counted for Million Lei 5,973.7, meaning Lei 6,108/enterprise in average.

Profitability depends on meat processing enterprise size , technical endowment, resource management. In general, the larger the meat processing company , the higher the profitability. In the year 2006 , gross profit totalized Lei Thousand 299,913, of which -0.46 % (loss rate) in case of small enterprises (less than 9 employees), 5.07% profit rate in case of the enterprises with 10-19 employees, 6 % profit rate for larger enterprises with 20-49 employees, 25.07% profit rate for the processing factories with 50-249 employees and 64.38 % profit rate for enterprises with more than 250 employed persons. In the year 2007, the average gross profit counted for Lei 313,557 per meat processing enterprise.

Meat Consumption registered a decline for beef, pork an poultry, but an increase for mutton. In 2006, the average meat consumption per inhabitant was 64.7 kg , of which 9.6 kg beef (14.83%), 31.5 kg pork (48.68%), 2.2 kg mutton (3.40%) and 21.4 kg poultry meat (33.07%). In the year 2007, the annual average consumption was 62.7 kg/capita, by 3.10% less than in 2006. In 2007, the structure of meat consumption was the following one: 12.76% beef , 50.07% pork, 3.98% mutton and 32.05% poultry meat. Therefore, the share of beef, mutton and pork increased compared to poultry meat consumption (Table 7).

Table 7

Average Meat Consumption per Inhabitant

Specification	Average annual consumption Kg/year/capita			Average daily consumption g/day/capita		
	2006	2007	2007/2006 %	2006	2007	2007/2006 %
Total Meat Consumption , of which	64.7	62.7	96.90	138.2	134.3	97.17
Beef	9.6	8.0	83.33	17.9	14.9	83.24
Pork	31.5	31.4	99.68	68.9	68.8	99.85
Mutton and Goat	2.2	2.5	113.63	4.5	5.1	113.33
Poultry	21.4	20.1	93.92	46.9	44.1	94.02

Table 8

Romania's Exports and Imports of Live animals and Meat

Year	MU	Romania	Live animals and Food	Live animals	Meat and meat preparations
EXPORTS					
2006	Euro Mil.	25,850	563	153	37
	%	100.00	2.18	0.59	0.14
2007	Euro Mil.	29,549	659	181	54
	%	100.00	2.23	0.61	0.18
2007/2006 %	%	114.30	117.05	118.30	145.95
IMPORTS					
2006	Euro Mil.	40,746	1,833	37	511
	%	100.00	4.50	0.09	1.25
2007	Euro Mil.	51,322	2,664	47	571
	%	100.00	5.19	0.09	1.11
2007/2006 %	%	125.95	145.33	127.02	117.74
EXPORT/IMPORT RATIO					
2006	-	0.63	0.30	4.13	0.07
2007	-	0.58	0.25	3.85	0.09

Exports of Live animals and Meat . In the year 2007 , and food, Euro Millions 181 live animals and Euro Millions 54 meat and meat preparations. Therefore, the share of live animals and meat in total exports was the following one: 2.23% food and live animals , 0.61% live animals and 0.18% meat and meat preparations. In 2007, the export value for live animals and meat counted for Euro Million 894 compared to Euro Million 753 in the year 2007, meaning an increase of 18.72%. The volume of the exported live animals and food of animal origin increased more rapidly than the volume of Romania's total exports (Table 8).

Imports of Live animals and Meat registered an increase in the year 2007 compared to the level of 2006 as follows: 45.33% for imported live animals and food, 27.02 5 for live animals and 11.74% for meat and meat preparations. In the year 2007, the import value of live animals and food was Euro Million 3,282 , of which 81.17% live animals and food , 1.43 % live animals and 17.39% meat and meat preparations.

Export/Import Ratio shows that Romania is a net importer country of live animals and food and also of meat and meat preparations, because imports value is higher than exports value. There is only one exception concerning live animals, where export value was 4.13 times higher than export value in the year 2006 and 3.85 times higher in the year 2007.

3. CONCLUSIONS

1. In the years 2006 and 2007, the number of slaughtered cattle and poultry increased while the number of pigs and sheep decreased.
2. Meat production increased from a year to another, but meat consumption registered a decline because of the population lower purchasing power and higher meat price.
3. The average animal live weight at slaughter recorded a slight increase with a positive effect upon meat production.
4. Meat processing industry is facing the EU requirements related to the assurance of quality management and food safety and important investments are destined to improve technical endowment, product quality and increase productivity.
5. The larger the meat processing enterprises, the higher the profitability in meat processing industry.
6. Romania is a net importer country of live animals and food and also of meat and meat preparations, but also a net exporter of live animals.
7. The recover of meat production and consumption imposes a better infrastructure, high meat potential animals, a better feeding, production integration along the whole meat chain for assuring a higher profitability and food safety.

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RESEARCHES ON INCREASING THE ECONOMIC EFFICIENCY BY TAKING THE DECISION TO COMPLETE AN INVESTMENT PROJECT

CERCETĂRI PRIVIND CREŞTEREA EFICIENȚEI ECONOMICE PRIN LUAREA DECIZIEI DE REALIZAREA UNUI PROIECT DE INVESTIȚII

IOANA NICULAE, ALINA MĂRCUȚĂ, LIVIU MĂRCUȚĂ

Cuvinte cheie: investiție, eficiență economică, eficiență financiară, rată internă de rentabilitate, venit net actualizat, flux de numerar.
Key words: investment, economic efficiency, financial efficiency, internal rate of return, adjusted net revenue, cash flow

SUMMARY

The role of investments in the economic agents' economy, their economic, financial, social impact, the limited character of investment resources, and the risk they imply give the investment decision a huge responsibility.

Equipping a farm with an irrigation system is efficient because both the internal rate of economic return and the internal rate of financial return are higher than the average efficiency in agriculture and therefore this decision is desirable.

The economic efficiency of investments is an objective need especially within the market economy where competition is dominant.

In the competition system, the free market system, the entrepreneurs' actions are competitive as long as they are efficient, meaning that they ensure achieving effects as large as possible compared to the efforts made.

1. MATERIALS AND METHODS

The survey was carried out for an agricultural enterprise which cultivates an area pf 400 ha and which wants to get an irrigation equipment.

While making the investment decision several project versions are drafted and assessed in order to establish the optimum version. The assessment includes: the financial assessment, the economic assessment, the assessment of the risk involved in implementing the given project.

The investment project versions can be assessed using traditional methods, as well as modern methods. Using traditional methods, the processes and phenomena are approached from a static point of view. We operate with average annual values of the economic effects and of the forecast operation costs and we do not take into account the lack of equivalence among the values of the costs, revenues and profit in different years.

Economic uncertainty and risk are also assessed intuitively.

Based on modern methods, the investment projects are assessed in dynamics during a period of time identical for all the versions, the period of time being made up of the interval for performing the work and the economic life of the investment objectives.

When making the assessment we take into account the influences pf time as a factor, operating with its current value.

2. RESULTS AND DISCUSSIONS

In order to make the investment decision, we analysed the economic efficiency of the enterprise in the no investment version and in the version with investments in irrigation equipment. To do this, we start from the assumption that the enterprise has an irrigable area of 400 ha where wheat, barley, maize and rape are cultivated.

From the performed analysis we notice that the use of irrigation leads to increasing productions and this is implicitly reflected on the financial situation of the enterprise.

The results are presented in table 1.

The irrigation equipment value is RON 489,720, and the normal length of operation thereof is of 10 years.

The equipment purchase is made through the EAFRD, with a 50% non-reimbursable component and the difference is covered through 5-year medium-term loans, with a 20% interest rate. The loan is covered on only one occasion when purchasing the equipment and 50% is reimbursed in the first year when the non-reimbursable component is received within 90 days and the remaining 50% is reimbursed in equal monthly payments during 5 years.

Table 1

Comparative results of the enterprise with a view to making the decision to acquire the irrigation equipment

Indicators	U.M.	Indicator value without investments	Indicator value after completing the project
Cultivated area	ha	400	400
Production value	RON	902,500	1,307,500
Overall expenditures	RON	820,000	987,200
Overall profit	RON	82,500	320,300
Rate of return	%	10.1	32

From the economic analysis regarding this investment project it results that the value of the ratio between the adjusted revenues and adjusted expenditures is of RON 1.196, which means that for an invested RON revenues of RON 1.196 are obtained (table 2). The prerequisite for an investment project to be efficient is that its value should be larger than or equal to 1.

The adjusted net revenue calculated according to the cash flow is of RON 853.8 thousand, and the internal rate of economic return is of 36.7%.

Indicators for the economic analysis (thousand RON)

Table 2

No.	Indicators	Invest-ment years 1	Investment operation interval										Σ
			1	2	3	4	5	D	7	8	9	10	
1.	Investment	489.720	-	-	-	-	-	-	-	-	-	-	
2.	Production expenditures	-	987.200	987.2	987.2	987.2	987.2	987.2	987.2	987.2	987.2	987.2	
3.	Annual revenues	-	1.307.5	1.307.5	1.307.5	1.307.5	1.307.5	1.307.5	1.307.5	1.307.5	1.307.5	1.307.5	
4.	Overall expenditures	489.7	987.2	987.2	987.2	987.2	987.2	987.2	987.2	987.2	987.2	987.2	
5.	Factor a = 0.17	0.8547	0.73051	0.6243	0.5336	0.4561	0.3898	0.3332	0.2847	0.2434	0.2086	0.1778	
6.	Adjustment expenditures	418.5	721.1	616.2	526.7	450.2	384.8	328.9	281.0	240.2	205.9	175.5	4.352.0
7.	Adjusted revenues	-	955	816.2	697.6	596.3	509.6	435.6	372.24	318.24	272.7	232.4	5.205.8
8.	ANR= a = 0.17	- 418.5	230.9	200	170.9	146.1	124.8	106.7	91.24	78.04	63.2	56.9	853.80
9.	Unadjusted cash flow	- 489.7	320.3	320.3	320.3	320.3	320.3	320.3	320.3	320.3	320.3	320.3	-
10.	Adjustment factor a = 0.35	0.7407	0.4587	0.4064	0.3010	0.2230	0.1652	0.1223	0.0906	0.0671	0.0497	0.0368	
11.	ANR a = 0.35	- 362.7	175.7	130.16	96.41	71.4	52.9	39.17	29.01	21.50	15.91	11.78	281.68
12.	Adjustment factor a = 0.40	0.7842	0.1620	0.1501	0.1403	0.1859	0.1028	0.0948	0.0677	0.0484	0.0345	0.0246	
13.	ANR (3 = 0.40)	- 409		97.6	67	37	32.9	30.3	21.6	15.5	11.0	7.8	-83.7

Indicators for the financial analysis (thousand RON)

Table 3

No.	Indicators	Invest-ment years 1	Investment operation interval 1	2	3	4	5	6	7	8	9	10	Σ
	Investment loans + interests	489.720	-	-	-	-	-		-	-	-	-	
		244.0	-	-	-	-	.		-	-	-	-	
2	Production expenditures		987.2	987.2	987.2	987.2	987.2	987.2	987.2	987.2	987.2	987.2	-
3.	Interests and repayments	-	122	203	123	102	-	-	-	-	-	-	
4.	Annual revenues		1.307.5	1.307.5	1.307.5	1.307.5	1.307.5	1.307.5	1.307.5	1.307.5	1.307.5	1.307.5	
3.	Overall expenditures	48977	1.109.2	1.109.2	1.110.2	1.089.2	987.2	987.2	987.2	987.2	987.2	987.2	
6.	Overall revenues	244	1.307.5	1.307.5	1 307.5	1.307.5	1.307.5	1.307.5	1.307.5	1.307.5	1.307.5	1.307.5	
7	Annual profit	- 733.7	198.3	117.3	197.3	218.3	320.3	320.3	320.3	320.3	320.3	320.3	
8.	Corporate tax	0	31.7	18.7	31.5	34.9	51.24	51.24	51.24	51.24	51.24	51.24	
9	Overall expenditures	489.7	1.140.9	1.208.9	1.141.7	1.124.1	1.038.44	1.038.44	1.038.44	1 .038.44	1.038.44	1.038.44	
10.	a = O.I7	0.8547	0.73051	0.6243	0.5336	0.4561	0.3898	0.3332	0.2847	0.2434	0.2080	0.1778	
11.	Adjusted expenditures	418.5	833.4	754.7	6092	512.7	404.7	346.0	295.6	252.7	215.99	184.6	4.828
12.	Adjusted revenues	208	955	816.2	697.6	596.3	509.66	435.6	372.2	318.2	271.9	232.4	5.413
13.	ANR = 90/17	- 210.5	121.6	61.5	88.4	83.6	104.9	89.6	76.6	65.5	56	47.8	798.5
14.	Unadjusted flow	- 733.7	166.6	98.6	165.8	183.4	269.0	269.0	269.0	269.0	269.0	269.0	
15.	$1/(1+a)^4$ = a = 0.20	0.8333	0.6944	0.5787	0.4822	0.4018	0.3349	0.2790	0.2325	0.1938	0.1615	0.1345	
16	ANR = a = 0.20	- 611.3	115	57.5	79.9	73.6	90.0	75.0	62.5	52.1	43.4	36.1	73.8
17.	$l/(l+a)^4$ = a = 0.25	0.8	0.64	0.512	0.4096	0.3276	0.2621	0.2097	0.1677	0.1342	0.1073	0.0859	
18	ANR = a=0.25	- 586.9	106.6	50.4	67.9	60.0	70.5	56.4	45.1	36.0	28.2	23.1	- 42.7

The internal rate of economic return expresses the adjustment rate which equalises the adjusted production values with the costs during the entire operation of the objective.

Within the financial analysis the same indicators are calculated but the revenues column also includes the loans at the time they are granted and the revenues column also includes the interests and the loan repayments as well as the corporate tax.

As in the case of the economic analysis, in the financial analysis the ratio between the adjusted revenues and adjusted expenditures, the adjusted net revenue and the internal rate of financial return are also calculated. The calculations are presented in table 3.

From the financial analysis we notice that the value of the ratio between the adjusted revenues and adjusted expenditures was RON 1.121 and the net revenue obtained calculated according to the cash flow was of RON 798.5.

The internal rate of financial return expresses the adjustment rate which equalises the adjusted production values with the investment and production costs during the entire operation of the investment objective and it reached values of 23.7%. We notice that the investment project is efficient because both the internal rate of economic return and the internal rate of financial return are higher than the average efficiency in agriculture.

3. CONCLUSIONS

Based on the performed calculations we notice that the investment project regarding the enterprise acquiring irrigation equipment is efficient also under the conditions of increasing the interest by 17%, of decreasing the prices by 20%, of increasing the fuel value by 25%, having an internal rate of financial return 8% higher that the rate of return in agriculture.

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LIVESTOCKS ACCORDING TO SPECIES AND ANIMAL PRODUCTIONS IN THE CALARASI COUNTY IN THE INTERVAL 2000-2007

EFECTIVELE DE ANIMALE PE SPECII ŞI PRODUCȚIILE ANIMALE ÎN JUDEȚUL CĂLĂRAŞI ÎN PERIOADA 2000-2007

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Cuvinte cheie: efective de animale, producții animale, evoluție, dezvoltare economică
Key words: livestock, animal productions, evolution, economic development

SUMMARY

Agriculture is the main economic activity in the Calarasi County, and the basis for agriculture is represented by agricultural land which accounts for 426.2 thousand hectares – 2.9% of the country's agricultural area – 97.5% of which is represented by arable land, 1.2% vineyards and orchards and 1.3% pastures and grasslands (at the end of 2007). In animal husbandry, there was an almost constant decrease in livestock between 2000 and 2007 in the case of cattle and sheep, and an increase in the case of swine and goats, and at the end of the interval they recorded the following values: 35,081 bovines, 174,867 swine, 135,981 sheep and 16,674 goats. Over 98% of these were provided by the private sector.

In this paper we will analyse from a statistical point of view the evolution of the livestock and animal productions in the Calarasi County in the interval 2000-2007. The selection of this interval is justified by the profound changes which the economy and society as a whole underwent in the context of Romania's accession to the European Union on January 1, 2007.

1. MATERIALS AND METHODS

In this paper we will use data published in the Statistical Yearbook of Romania, in the Statistical Yearbook of the Calarasi County or in monthly statistical bulletins, and the research methods will be the comparison method (used in establishing evolution trends) and the fixed base indices method (used in calculating ratios).

2. RESULTS AND DISCUSSIONS

The comparison between the first and the last year of the series illustrated in *Table 1* yields surprising results, the number of sheep at the end of 2007 being 17.3% smaller than the one recorded in 2000, the overall number of ewes being reduced by 1.5%, the number of cows and heifers by 4.5%, and the number of sows by 4.7%. The categories which recorded an increase were those of goats (+85.2%), swine (+25.5%) and cattle (+3.4%). The statistical data for the interval 2000-2007 indicate that the number of cattle and goats reached a peak in 2005, then they started decreasing and it was only the number of goats that exhibited a growth trend in 2007. In the case of the number of swine, the peak was reached in 2006, then it dropped slightly in 2007, while in the case of sheep the number fluctuated until 2004 when the lowest level in the entire temporal series was recorded, upon which it started taking a modest growth trend which was maintained in 2007 (below +8%). Also, in comparison with 2000, the ratio of females to the overall number of cattle decreased by 1.2%, while in the case of swine the same ratio increased by 1.3% and in the case of sheep it also increased by 12.2%.

Table 1

Livestock (at the end of the year) in the Calarasi county - heads

Years %	Cattle		Swine		Sheep		Goats
	Total	Of which: cows and heifers	Total	Of which: sows	Total	Of which: ewes	
2000 *%*	33,896	19,691 *58.0%*	139,266	14,416 *10.3%*	164,389	122,402 *74.4%*	8,933
2001 %	33,164	20,092 *60.5%*	142,685	15,193 *10.6%*	139,588	117,837 *84.4%*	8,382
2002 %	31,983	20,100 *62.8%*	141,077	14,591 *10.2%*	126,181	110,071 *87.2%*	12,992
2003 %	31,150	19,867 *63.8%*	141,201	11,933 *8.4%*	127,434	111,488 *87.4%*	11,807
2004[1)] %	32,259	20,490 *63.5*	137,281	10,371 *7.5%*	116,798	98,904 *84.6%*	13,798
2005[1)] %	36,474	21,738 *59.5%*	174,211	15,893 *9.1%*	125,898	107,437 *85.3%*	18,276
2006[1)] %	36,291	19,241 *53.0%*	177,969	17,494 *9.7%*	129,462	113,018 *87.2%*	15,444
2007[1)] %	35,081	18,795 *53.5%*	174,867	13,730 *7.8%*	135,918	120,498 *88.6%*	16,674

Sources: Current statistical researches, Calarasi Regional Statistics Office [1)] *On December 1*

According to the data in *Table 2*, in 2007 the private sector accounted for animal husbandry activities between 98 and 100% in the case of goats and hens. In comparison with 2000, in 2007 the livestock decreased in the case of sheep (-28,082 heads), but increased in the case of cattle (+1,081 heads), swine (+35,867 heads) and goats (+7,674 heads) and hens (+1,330,192 heads). The percentage of the private sector in 2000 was smaller than the one in 2007, by a minimum of -0.1% in the case of hens and a maximum of -10.0% in the case of sheep.

In the interval 2000-2007 presented in *Table 3*, the overall meat production ebbed and flowed, the difference between the first and the last year of the temporal series being of +97.6%. In comparison with 2000, in 2007 the wool production and egg production decreased by 29.7%, respectively 25.0%. The increased recorded in the other productions in 2007 compared to 2000 fall into three categories: insignificant increases (+8.7% in cow's milk and +12.1% in milk in general), significant increases (+42.5% in beef and +67.6% in honey) and spectacular increases (+360.7% in chicken).

Table 2

The ratio of the private sector to the livestock in 2000 and 2007 - heads

	2000			2007		
	Total	of which: private sector	The ratio of the private sector to the total - %	Total	of which: private sector	The ratio of the private sector to the total - %
Cattle	34,000	32,000	94.1	35,081	34,743	98.1
Swine	139,000	136,000	97.8	174,867	174,828	99.8
Sheep	164,000	147,000	89.6	135,918	135,918	99.6
Goats	9,000	9,000	100.0	16,674	16,674	100.0
Hens	2,236,000	2,235,000	99.9	3,566,192	3,566,192	100.0

Source: Romanian Statistical Yearbook, NIS 2000, 2008

Table 3

The animal agricultural production in the Calarasi county in the interval 2000 - 2007 - tons

	2000			2005			2006			2007		
	Total	of which: mostly private property		Total	of which: mostly private property		Total	of which: mostly private property		Total	of which: mostly private property	
			%			%			%			%
Meta – total1)	37,530	36,850	98.1	61,242	61,200	99.9	56,378	56,342	99.9	74,164	73,967	99.7
Beef1)	3,735	3,553	95.1	5,008	4,987	99.5	3,779	3,750	99.2	5,324	5,128	96.3
Pork1)	22,894	22,687	99.0	15,473	15,458	99.9	20,860	20,860	100.0	23,264	23,263	99.9
Mutton and goat1)	1,594	1,483	93.0	2,190	2,187	99.8	1,621	1,614	99.5	1,778	1,778	100.0
Chicken1)	9,289	9,129	98.2	38,560	38,560	100.0	30,111	30,111	100.0	42,798	42,798	100.0
Milk – total2)	633	607	95.8	720	710	98.6	714	702	98.3	710	703	99.0
Cow's milk2)	582	557	95.7	646	635	98.2	635	623	98.1	633	626	98.8
Wool – total (tons)	447	386	86.3	363	362	99.7	317	315	99.3	314	314	100.0
Eggs– total (thou.)	120	121	100.8	124	124	100.0	67	67	100.0	90	90	100.0
Honey (tons)	210	206	98.0	336	334	99.4	461	461	100.0	354	352	99.4

Source: Romanian Statistical Yearbook, NIS 2001-2008
1)Tons live weight – The meat production refers to the weight of the animals slaughtered in agricultural enterprises;
2)Thousand hectolitres - The cow's milk production represents what is milked, including the calves' consumption

3. CONCLUSIONS

The analysis of the animal husbandry sector in the Calarasi county in the interval 2000-2007 leads to the conclusion that, in a context in which there were both decreases and increases in livestock and animal productions, the local economic development is heavily influenced by the national economic context (which was expanding during that interval), but also by the labor market, which provides better jobs in non-agricultural sectors (thus, the agricultural sector declined). It is worth mentioning that Romania's accession to the European Union in 2007 provided more opportunities for farmers to find employment in Europe and consequently the farms they worked on or even administered at local level had to be scaled down.

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VISIONS AND PERSPECTIVES OF PRODUCING QUALITATIVE MEAT IN ECOLOGICAL CONDITIONS OF SWINE EXPLOITATION

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Key words : hybrid, ecologic, economic.

SUMMARY

In the Republic of Moldova, the pork, doesn't have high qualities for the consumption in fresh conditions or for technological processing. To produce qualitative meat we should implement ecological technology of producing competitive meat, use efficiently the genetic potential of performant breed, preparate and use feeds produced through ecological methods and employ an efficient system of swines. For the accomplishement process should be implemented modern technologies of care, nourishment and capitalization of the commercial crossbreeds, which may contribute to the optimizing conditions in order to obtain high output of ecological meat. In the Republic of Moldova, nowadays, the agrarian units produce pork meat without an important goal correlated with consumer's requirements .So, in many cases the meat has low qualities. The preparated products are less qualitative and the prices rise. To satisfy the necessities of the internal and external market for the qualitative meat we should rise the bulk of producing meat by establishing new ecological farms. To obtain ecological production of meat the nutrition technology, maintenance and swine growth will be based on using performant genetic material, combined feed preparated from ecological concentrate and modern exploit technologies. This will contribute to the procurement of qualitative meat without nitrates, heavy metals or other noxious substances. In this conditions, pork is an element of innovation represented by a controlled product benchmarked and attested through using methods of chemical and physical analysis. In this purposes we may use over 100 quality indexes in accordance with the consumer and financial possibilities. The technological assignement consists in producing high qualitative meat. The economic efficiency of the technology implementation will be created from the number of animals produced, grown and fed up till 120 kg. The price would be 39 lei, concerning de special qualities of the pork meat. Annually, we will produce approximately 61 tons of meat, the gain being over 2377440 lei, and the profit over 729211 lei.

1. MATERIALS AND METHODS

There exist few information, in using technologies for producing ecological meat. On national way there are few dates, concerning the implementation of growth system and the fattening of commercial porcine breeds for obtaining ecological and competitive productions in commercial units. So, the problem is present and requires a good solution. To obtain ecological certificates we should ask for the use of new elements in the technology of production such as genetic material, combined feed from ecological concentrates without using hormonal products. In present, applied technologies in the production units obtained is not competitive on the external and internal market. So, this farms bring negative prejudices to the environment and also to the health of human beings.

We should use modern methods of boarding, nutrition and exploit of the porcines such as ecological feed in obtaining carcasses with high quality and qualitative meat, competitive on the market for the input in fresh conditions. There will be used technical and performant means such as Big Dutchman (Germany), Hog Slat Europe ITA, Mecagro (Moldova).

2. RESULTS AND DISCUSSIONS

In this period we will release the technological project and implement the parameters of the farms module. According to this normative we will buy and install speakers for the maintenance of sows with piglets, type BPS- 2made in the Republic of Moldova. Using ecological fodders produced in the agrarian unit" Logofat- prim SRL" we will create and implement recipes for producing combined feeds and food intakes addressed to technological animal groups. In this case we will determine the chemical composition and nutritive value of the ecological forages produced in households.For the reproduction, growth and fattening of the commercial hybrids we will select biological materials(sows),bought and implemented in agrarian units. For the achievement of this project we will forecast obtaining the following results:

- The age of reaching 100 kg – 180 days.
- The specific input – 3,5 UN or 3 kg of combined breed per kg in weight.
- The thickness of layer of bacon – 18-20 mm
- The meat yield of carcasses – 60 %
- The acidity of meat – PH – 5,8
- The content of proteins in meat – 20 %
- The content of thickness in carcasses – 18-20 %
- The content of fat in long dorsal muscle – 3-4%

The result of the implementation of this project will be obtained from the ecological farm module for producing pork. So, we will promote the production of ecological meat in the Republic of Moldova. The investigations made in State Agrarian University show the efficiency in using different types of commercial hybrids.

Finally, it will be promoted the most efficient hybrid in technological and economical way for producing competitive meat. The farm module for producing qualitative meat will have the capacity of multiplication by enlarging the output according to the economical conditions and the financial possibilities of the agrarian units.

The results obtained will be available for all the manufacturers interested in the implementation of ecological technologies. There will be used informational methods of the diffusion of the obtained results. The solution consists in using methods and means of growth and fattening of young hybrids by using ecological fodders in order to obtain good carcasses and meat Social effects- creating jobs, obtaining meat production according to consumers request. Ecological effects- qualitative production without nitrates, heavy metals or other substances. Economical effects- using modern technologies will contribute to the increase of the economical efficacy and augmentation of the profit.

Table 1

The efficiency of commercial hybrids production accordingly to the genetic type of the final boar

(m = 120 kg)

Parental forms		The large length of the carcass, cm	The small length of the carcass, cm	The thickness of fat layer, mm	Ham weight, kg
maternal	paternal				
LW	L	105,1±0,30	87,4±0,21	24,2±0,48	10,6±0,15
LW	H	97,4±0,53	84,0±0,30	22,3±0,63	10,2±0,11
ST x H	Y	98,3±0,62	85,1±0,25	18,5±0,73	11,2±0,06
ST x H	L	99,1±0,66	86,1±0,33	19,2±0,68	10,9±0,17
YxH	L	102,8±1,87	93,5±10,36	26,3±0,32	10,2±0,14
YxD	L	106,2±1,06	90,5±0,33	22,0±0,57	10,4±0,18
YxD	H	105,6±0,83	91,8±0,72	26,6±1,07	11,4±0,09

LW – Large White; L – Landrace; H – Hampshire; ST – “Southern” type; Y – Yorkshire, D - Duroc.

3. CONCLUSIONS

1. There will be created an ecological farm of meat production by using modern technologies, nutrition and exploitation of swine.
2. There will be implemented a system of commercial hybrid fattening, using biological material
3. In consequence, the technical advantage will aggregate in order to obtain good meat , without nitrates, heavy metals and harmful substances.
4. Producing competitive meat in ecological farms will stimulate sales in internal and external market.

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STUDY ABOUT WITHERS HEIGHT AVERAGE PERFORMANCES IN HUCUL HORSE BREED – PRISLOP BLOODLINE

STUDIUL PERFORMANȚELOR MEDII ALE CARACTERULUI TALIE LA RASA HUȚUL - LINIA PRISLOP

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POPA RAZVAN, NISTOR LUCICA

Key words: withers height, hucul, Prislop, bloodline, Lucina

SUMMARY

Study of average performances in a population have a huge importance because, regarding a population, the average of phenotypic value is equal with average of genotypic value. So, the studies of the average value of characters offer us an idea about the population genetic level.

The biological material is represented by 93 hucul horse from Prislop bloodline divided in 3 stallion families (tab. 1) analyzed at 18, 30 and 42 months old, owned by Lucina hucul stood farm.

Analyzing the data presented we find a smaller variability with decreasing tendencies for both sexes but between characteristic limits of the breed.

1. MATERIALS AND METHODS

The study of average performances for different characters in a population, have a great importance because, at the population level, the average of phenotypics value are equal with the average of genotypics value. That's mind that the study of average performances give us an ideea about the genetic level of population.

For realising the purposed objectives, biological material became from Lucina Stood Farm, Suceava county, represented by a sample with 93 horses (males and females) divided at 3 stallion familys, presented in tab. 1.

Table 1

The biological material

Bloodline	Family size	Male	Female
PRISLOP	93	44	49
- Prislop VIII	26	14	12
- Prislop IX	62	27	35
- Prislop X	5	3	2

The sample was studied at three different ages:

- First grading – 1.5 years old
- Second grading – 2.5 years old
- Third grading – 3.5 years old

After the third grade the individuals support a performances testing for energetic capacity.

2. RESULTS AND DISCUSSIONS

The average performances for withers height character are presented in tab. 2 and fig. 1.

Analysing the results from tab. 2, we observe that the average value for withers height are between the characteristical limits of Hucul breed. We observe significant differences of character in special at 3.5 years old.

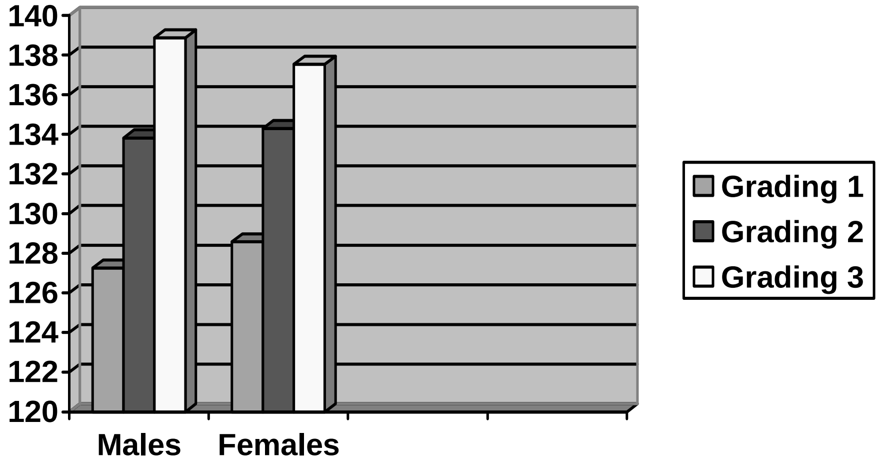

Fig. 1 – Withers height dynamic in Prislop bloodline

It's obvious a normal evolution for growth process, the value being aproximately equals for males and females, with significant differences only at 3.5 years old, when the withers height for stallion is bigger with 1,33 cm than females height.

For statistic testing of observed differences between halfsibs familys from Prislop bloodline at all three analysed ages, we used the *Fisher* test. For observing between which familys are the significant differences, we used *Tuckey* test.

Table 2

The average performances for wither height in Prislop bloodline

Family	Sex	Age (years)											
		1,5				2,5				3,5			
		n	$\overline{X} \pm S_{\overline{X}}$	s	v%	n	$\overline{X} \pm S_{\overline{X}}$	s	v%	n	$\overline{X} \pm S_{\overline{X}}$	s	v%
Pr VIII	M	14	127,36 ± 1,08	4,05	3,18	14	134,93 ± 0,98	3,65	2,71	14	139,57 ± 0,92	3,44	2,46
Pr IX	M	27	127,48 ± 0,8	4,15	3,26	27	133,67 ± 0,59	3,05	2,28	27	138,52 ± 0,44	2,29	1,65
Pr X	M	3	124,67 ± 0,66	1,15	0,92	3	130 ± 2	3,46	2,66	3	138,67 ± 0,33	0,58	0,42
Total M		**44**	**127,25 ± 0,6**	**3,99**	**3,14**	**44**	**133,82 ± 0,51**	**3,41**	**2,55**	**44**	**138,86 ± 0,4**	**2,65**	**1,91**
Pr VIII	F	12	128,92 ± 1,44	4,98	3,86	12	136 ± 0,79	2,73	2,01	12	139,67 ± 0,69	2,38	1,7
Pr IX	F	35	128,43 ± 0,56	3,31	2,58	35	133,86 ± 0,53	3,14	2,35	35	136,8 ± 0,61	3,63	2,65
Pr X	F	2	129 ± 1	1,41	1,09	2	131,5 ± 0,5	0,71	0,54	2	137,5 ± 2,5	3,54	2,57
Total F		**49**	**128,57 ± 0,53**	**3,68**	**2,86**	**49**	**134,29 ± 0,45**	**3,14**	**2,34**	**49**	**137,53 ± 0,5**	**3,52**	**2,56**
Total bloodline		**93**	**127,95 ± 0,4**	**3,87**	**3,02**	**93**	**134,06 ± 0,34**	**3,26**	**2,43**	**93**	**138,16 ± 0,33**	**3,19**	**2,31**
The significance of difference observed between sexes (Student)		1.71 ^{NS}				0.72 ^{NS}				2.11 *			

3. CONCLUSIONS

The calculated F value indicate significant differences of withers height average value between halfsibs families from Prislop bloodline at 2.5 years old (F = 5.88) and at 3.5 years old (F = 4.09).

The calculated value for *Tuckey* test, point out that at 2.5 years old we have significant differences performances of Prislop VIII family and Prislop X and at 3.5 years old we recording significant differences between Prislop VIII family and Prislop IX family.

The growth process in general, and the withers height evolution in special, vary in postutherin period in correlation with age, with an decreasing trend of values due to this factor.

By analysing this data we can observe:

- After parturition the hucul foals from Prislop bloodline have a normal growth.
- The highest growth intensity it's registered until 1.5 years old
- The biggest value for withers height growth are in the first period of postutherin life with a decreasin trend in relation with age factor.

After all this observation we can affirm that any kind of deficiences in foals and young horses management and technology will have a very serious negative effect for production capacity and will be unrecoverable.

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FARMER PROGRAMME
Romanian original solution for increasing uptake European funds and boosting investment in agriculture

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INTRODUCTION

1. *Agriculture before and after 1989.* Romania has an agricultural potential unanimously recognized at the level of securing an agricultural production for a population of approximately 80 million. Due to the varied relief, hydrological system and climate, the structure of agricultural production is very diverse and complete, it can grow and grows most plants and breeds domestic animals species. The national and European role and place of Romanian agriculture cannot be determined without knowledge of its stages in different social and economic systems. The current level of development is therefore the direct consequence of these stages.

In Romania, the agriculture modernization coincided with the totalitarian Communist regime, the land reform coincided with the land ownership dissolution. That's why, a comparative analysis of the development period is very interesting:		
	Before the 1989- the lie	After 1989- the chaos
Land ownership and holdings	Reform of agriculture, nationalization, after forced collectivization completed in 1962, peasants become employees of C.A.P. (Agricultural Production Cooperatives) companies Voldemort OR PERFORM WORK ON THE BASIS OF norms. Peasant's properties are maintained in pre-mountain and mountain area, which were ignored or tolerated by authorities.	The change of the political system in 1989 marks a fundamental turning-point in the Romanian agriculture. The democratic state bases are established. The Constitution recognizes and guarantees the private property. A reparation is imposed of the inequities generated by collectivization.
	Socialist economic system is implemented, the collective property over land is established, peasants are dissolved as social class, and finally, a working class in agriculture is created.	Law No 18 of February 19th ,1991 restored the land ownership, and the land owned by former CAP and IAS was returned to its rightful owners.

	The land is forcedly compacted to establish large surfaces,intensively exploited, large and very large agricultural exploitations producing in the conditions of the centralized economy, large vegetable farms and livestock complexes of thousand hectares and hundred of thousands of animals (poultry or pig complexes) or thousands of cattle. agricultural production implemented based on a centralized plan, with centrally imposed levels of production, allocation of resources, consumption and costs.Agriculture modernization is unidirectional and unequal. On the one hand, large units are built or modernized, modern technologies are implemented, and on the other hand, CAP maintained non-performing or morally worn out technologies with low productivity and efficiency. Romania initially kept in contact with the Western world in agricultural field, importing modern and specialized breeds of animals, varieties of plants and modern technology. After 1980, a regression was recorded in real terms due to Romania deeper isolation from the Western world.	Agricultural ownership, the production structure, the exploitation technologies, the transition to a democratic political system and market economy, prices liberalization, industrial output fall ancillary to agricultural field, have caused chaos in the Romanian rural area. The privatization process took place sometimes without transparence, the transfer of farms property has,mostof the times meant the change of their destination and even the farm DISMANTLEMENT. There was established a large number of subsistence farms and small and medium-sized, private or state-owned farms, without a coherent strategy and without any prospects for development in the market economy. Romania still has the greatest number of farms in Europe. Trans-national companies have been imposed in the Romanian agriculture in recent years, producing hybrids of plants and animals, machinery and equipment for agriculture and livestock husbandry, or processing agricultural production. Romania imported Varieties of Plants, high performance breeds and hybrids of animals but insufficient in number to influence the level of agricultural production and discouraging for the domestic production of biological material, for selection and improvement of livestock and indigenous plant varieties development.
Agricultural production	Although the production levels were quite modest in most farms, very high yields were reported on paper, unjustified by the actual pedoclimatic conditions and by the existing genetic and technologic potential of agricultural and zootechnical species. The preferential distribution of resources generated large differences of production levels, even in the same pedoclimatic zones.. Worth mentioning are also the "technological" losses, mostly ignored by authorities and which quantitatively and qualitatively distorted production yields.	The level of agricultural production has dramatically dropped, or registered large variations from one year to another, of "jig-saw" type. Climatic changes of the last period, the low level of precipitations, the dismantlement of power-eating and non-performing irrigation systems triggered a collapse of agricultural production and animal breeding in the first years after 1989. A qualitative increase is manifest in agricultural products and livestock, but they are are still below the European quality, both in aspect and commercial potential. However, they are still clearly superior in taste.
infrastructure and technology	Agricultural and animal breeding buildings are standardized, industry is developing unidirectionally, without creating alternatives and lags behing the technological progress. Land is extensively planned, dams are built, land reclamations are done (terraces and river improvements), large surfaces, unsuitable for agriculture are turned into arable land (flooded areas, sands, slopes, forest zones). A vast irrigation system is built on almost 3, 5 million ha, which subsequently proved to be power-eating and economically non-performing..	The period between 1089 and 2000 is very difficult for the Romanian agriculture. The programme land restitution launched in 1990 by CAP and then IAS dissolution, was unfortunately not followed by a program supporting the development of new structures of production (family famrs, agricultural associations). based on private property, by investments in new production means for the structuring and regulation of agri-food markets based on market economy principles. Farms were suffering from chronic lack equipment and technology.
	Starting with 1980 investment process is slowed down, ever cheaper unconventional solutions are used, replacing the necessary imports, culture and exploitation technologies are adapted the exponential production growth, to the detriment of production quality and of the animals minimum comfort.	Infrastructure is much lagging behind, most land reclamation works are done on small areas, previous infrastructure projects are abandoned or destroyed, with a few exceptions. The irrigations system proves to be too expenssive, and unfunctional on the segmented land, so that at present, only about 10% of the initial area is used. percent of original area.

strategy-farming economy	The state and cooperative agriculture had precise objectives, with the priority on production growth.The sector represented by population households is mostly ignored, agriculture and animal breeding undergo a process of production means industrialization. In the first part of the analyzed period, massive investments are done and high quality equipment and materials are used. After 1980, the agricultural sector fully felt the impact of Romania's financial effort of to pay foreign debt and support the megalomaniac projects initiated during this period. Investment process is slowed down, ever cheaper unconventional solutions are used, replacing the necessary imports, culture and exploitation technologies are adapted the exponential production growth, to the detriment of production quality and of the animals minimum comfort. The aberrant rural planning is drawn up, due to the critical need to recover more land.	Investments are scarce, the funds allocation was not transparent, based on clear rules, which actually threw those funds into "black holes". Romania has built its own strategy for agriculture development immediately after the decision to implement land reform, in the '90s. Land reform has not been immediately followed by the reform of agricultural production structure, which could contribute to the organization of viable farms, instruments to support agricultural production have not been defined (production subsidies, encouragement of investments and production technologies modernization, proffesional advice for farmers, etc.), no markets agricultural products were organised (marketing rules and standards, the pricing of the producer to consumer chain, ensuring both the consumer price stability and the income for farmers) amd no definition was made of a settlement policy for food imports during the period of domestic agriculture restructuring, modernization and competitiveness increase, so that to avoid unfair competition or blocking its development in a favorable economic climate.
	Agricultural production was exported in a significant proportion, both to the traditional partners (mostly, CAER members) but also to countries in Western Europe or America. Exports were encouraged, sometimes, irrespective of production costs, labor productivity or social or environmental costs.	In the '90s, regulation of world food trade was at the beginning and we could have still benefitted of our own tariff policy.As we have missed that chance, Romania no longer enjoys the freedom of the '90s and has to implement an agricultural policy based on some variables, which are included in the common agricultural policy (CAP) at European level.
Education research	Education and agricultural research system are adapted to the socialist economic system. The Romanian experts initially benefitted of a solid theoretical and practical training. Significant funds are allocated, specific institutions being built or opened. Agricultural education witnesses a great development, experts and workers in agriculture and animal breeding, food industry and adjacent industries are trained. A national network is established of secondary and higher agricultural studies, internationally outstanding teachers are formed and trained, remarkable progresses are made in obtaining highly performant varieties of plants, animal hybrids, plant culture technologies, animal breeding and use. By the end of the period, the international isolation, the imminent radical changes, generated especially a qualitative regression in this field.	Field with the largest regression in the period. In the first years, research is in free fall, the restitution rush, the radical change in farms perspective, the unfortunate association between agriculture and tradition, the need of reparation for the abuses of totalitarian regime on the property and the rural area have caused indecision and inconsistencies in the field. Education reform, the need to train specialists to organize production in the small holdings, with uncertain or improvised technologies,in a competitive environment has initially destabilized agricultural education.Most efforts to restore this field were done to the detriment of research. Introduction of imported final hybrids in livestock husbandry has compensated on a short-term the need for genetic progress but has induced a negative pressure on the Romanian system of genetic improvement, domestic selection and improvement remaining less represented.

social impact	Labour force in agriculture is very heterogeneous, the rural area suffers major conversions, forced planning and industrialization, depopulation, poverty, forced town planning. The otherwise generous rural area becomes an ever less taken option for youth, rural population rush to urban areas nearly depopuletes villages. Intensive agriculture uses paid labour, although the work conditions in agriculture are tough, and most of the times, poorly remunerated.	At present, there are approximately 3.6 million people active in Romania's agriculture, representing 34.7 per cent of the active population. Besides the traditional inhabitants of rural zones, there are also those who are choosing agriculture as a result of the economic restructuring of other economicbranches. The confusion created between tradition and peasant-like holding (the almost involuntary tendency to associate folk costume and music to the work in agriculture and livestock husbandry, customizes the social and psychological problems of the field. It also emphasizes the work in agriculture at family level.

Once the intention to our country was manifest to access to the European Union, Romania has definitely opted for a market, competitive economy, based on modern means of production, and development strategies matching the existing trends worldwide. There are aspects or tools in PAC mandatory for all Member States (as we talk about a common market, without borders or tariff barriers) and other optional ones, of menu type, of which Member States may choose those who are better fit (primarily, the rural development programme financed from European funds). These new rules, which, unfortunately, we became aware at decision-making level only after joining the EU, impose a series of limitations on agriculture modernization and efficiency increase, without tarnishing too much of what is typical national products and modes of production. Starting 2000, the European Union supports EU candidate states from Central and Eastern Europe in their efforts to prepare for accession by three financial instruments: PHARE and ISPA and SAPARD programs.

EUROPEAN PRE-ACCESSION PROGRAM FOR AGRICULTURE

2 The first signs of recovery. The SAPARD programme, financed from pre-accession European funds, was the first large-scale programme of structural policy , which has significantly contributed to agriculture restructuring.

SAPARD represents the third instrument for financial assistance from EU candidate states and future Member States of central and eastern Europe in 2000-2006. The programme supports these countries in their prepation to participate in the common agricultural policy and internal market and in solving specific problems relating to agriculture and sustainable rural development.

The SAPARD was originally created for the 10 candidate states from Central and Eastern Europe. Starting 2004, after 8 of them have become members of the Union, Romania and Bulgaria have also benefited assistance SAPARD. The funds allocated annually for Romania through this program amounted to EURO 162 million. The Program is implemented at national level through a national plan for agriculture and rural development (PNADR) in accordance with the principles used by Member States, which reflects the priorities of each national authority, within the limits set by SAPARD regulation.

2.2 *Eligible activities*. According to SAPARD Regulation, PNADR included the following measures: Investment in agricultural holdings; improvement of production and

marketing of agricultural and fishery products; improving the quality and standards related to vegetal and animal products health; production methods to protect environment and preserve the landscape; development and diversification of economic activities; creating groups of farmers; the establishment of farm support and management services; renovation and development of villages, protection and conservation of rural heritage; land improvement and reparcelling; creation and updating of land registries; the management of water resources; development and improvement of rural infrastructure; forestry measures, including afforestation of 126 agricultural areas, investment in private forestry holdings and processing/marketing forest products; improving professional training, technical assistance, including studies to contribute to the programme preparation and monitoring as well as to information and publicity.
2.3. *Financing fields.* According to PNADR, in the 2000-2006 period, projects have been financed in Romania in the following areas:

Axis 1: improving the competitiveness of processed agricultural and fishery products:
- 1.1 improvement of production and marketing of agricultural products and fisheries;
- 1.2 improve the quality and standards of health products of vegetable and animal;

Axis 2: improvement of infrastructure for rural development and agriculture:
- 2.1 development and improvement of rural infrastructure;
- 2.2 management of water resources;

Axis 3: economic development of rural areas:
- 3.1 investment holdings;
- 3.2 set up groups of farmers;
- 3.3 production methods which have to protect environment and conserving natural environment;
- 3.4 diversifying economic;
- 3.5 forestry measures;

Axis 4: developing human resources:
- 4.1 improve vocational training;
- 4.2 technical assistance, including studies to contribute to the preparation and monitoring programme and the information and publicity.

SAPARD is a pre-accession programme, which co-finances investments, works and services from the field of agriculture and rural development and operates on the principle of REIMBURSEMENT OF EXPENSES made by the beneficiary under the contract. Applied many times in a chaotic manner or, in any case, lacking coherence, duet o the rush for funds absorption at any price, the program has generated the first national agricultural strategy after 1989, financially achievable. National measures were required to set up a framework and the conditions necessary to effectively absorb this support. The legal framework was created to obtain loans for agricultural production, through which current activities of agricultural production were supported, as the credit institutions were reluctant to investment in agriculture, a field in which risk was very high, allowing the successful implementation of development strategies on medium and long term. Due to the lack guarantees, as farmers do not have immovable property of high value, state guarantees proved to be required in their favour and a special law was initiated in this respect, i.e Law No 218/2005 regarding the stimulation of SAPARD, FEADR, FEP and FEGA funds absorption by some Guarantee Funds which take over the credit risk. However, there is a deep deadlock in the European funds uptaking, mainly duet o the impossibility of most recipients to finance projects from their own resources or bank loans, a situation maintained during the first 2-3 years of pre-accession programmes implementation, especially of SAPARD.

It was soon found aut that the absorption of European funds is cumbersome or impossible with the legal and logistical means existing at that moment. During only one year the entire agricultural policy of our country had to be redesigned, clear targets and regulations had to be set out to facilitate the use of EU funds

The financial instrument to make available to beneficiaries pre-accession funds, absolutely necessary co-financing to absorb them, as non-refundable public contribution from European funds is granted only after the project finalization stipulated in the financing contract, in which case, the beneficiary should have the respective amounts, is represented by the „Farmer Program”, the intermediate link between pre-accession programmes and the achievement of investment projects according to them.

FARMER PROGRAM

2. *Farmer program*. The **Farmer Program** was initiated in order to make the agricultural sector attractive to credit institutions and to eliminate the lack of private co-financing to be secured by the potential funds recipients of various development programmes, (approximately 80-85 per cent of potential beneficiaries did not have own resources), and to ensure financing conditions by crediting investments in agriculture. The “Fund for crediting investments in agriculture, forestry, fishing, and the non-agricultural activities” was established and made available to the Ministry of Agriculture and Rural Development, under the Law No 231/2005 regartding investment stimulation in agriculture, food industry, forestry, fisheries, and in non-agricultural activities. The fund is used for granting credits, cover the costs of technical economic documentation, for grants, calculated as a percentage of the loans granted to beneficiaries. Using the Fund amounts practically enabled the accessing and running of national and Community funds, both the pre-accession and the post-accession ones. The Farmer Program was the main instrument in increasing SAPARD funds abruption.

3.1 *The Farmer Program* considered the following:

a) to accelerate absorption of European pre-accession funds, offering tools to pre- and co-financing able to eliminate the existing discrimination between capitalized and beginning investors or without their own financial resources, access to European funds being allowed to all investors who comply with the national and European norms and regulations. The amounts were intended to be accessed and used to credit investments in agriculture, both to co-finance SAPARD projects and to achieve direct investments which are not eligible under SAPARD.

b) the need for turning a higher number of subsistence agricultural households into the family farms with commercial character. The programme mainly addressed those in rural areas who wanted to organize an agricultural farm of a certain profile, directly run and administered by the owner, together with the family members. By offering grants, after loans repayment, similar SAPARD facilities were were offered to non-eligible investments similar to the eligible ones to force up the modernization of Romanian agriculture and countryside.

c) Risk takeover by guarantee funds

3.2 *Legislative package adopted for Farmer Program implementation*. In order to become operational, this financial instrument required a complex legislative package consisting of the 2 basic laws, Law No 231/2005 on stimulating investment in agriculture, food industry, forestry, fishing, and non-agricultural activities, and Law No 218/2005 on stimulating absorption of SAPARD, FEADR, FEP and FEGA funds, by guarantee funds taking over the lending risks, The Methodological Norms for their application, approved by the Government Decision No 934/2005 and GD 876/2005, the Order of the Minister of Agriculture, Forestry and Rural Development approving the list of investments and the maximum ceiling of credits to be granted under the law No 231/2005 on stimulating investment in agriculture, issued annually (No 979/2005; 100/2006; 820/2007; 430/2008 and 102/2009), Government Decision to establish the reduction of repayment amount from the credit granted under the Law No 231/2005 on stimulating investment in agriculture, differentiated by the type of the investment project, periodically approved (No 1645/2006. 495/2009) and the Order of the Minister of Agriculture, Forestry and Rural Development on the guarantee commissions level (annually). In addition to these regulatory documents, approved were in 2008 the Government Emergency Ordinance No. 72/2008 authorizing the Ministry to conclude internal legal commitments within the limit of RON 730 million (farmer 2008) and MO 40/2009 to establish detailed rules for implementing the measures under the National Program of Rural Development 2007-2013 and the Operational fishing program for the application of aids cummulation rule, with all further amendments and supplementations to regulate, on the way, all newly issued aspects (e.g the 2008 topics regarding aids cummulation rule application).

3.*3 Program operation*. The implementation of this package legislative provisions is carried out by a series of steps, as follows:

3.3.1. selection by tender of financial institutions (commercial banks) to run the amounts allocated from the Fund. This stage implies the elaboration of the technical bood and allocation documentation, publishing the offer inquiry, offers selection based on qualification criteria set up in the technical book, announcing the winning offers, setting up the amounts to be run, closing the Working Agreements with the winning Bank(s).

3.3.2. establishing the set of documents required to run the allocated amounts and their circuit between the Bank and the Ministry, the payment way, the accounts through which the allocated amounts are managed.

3.3.3. elaboration by the selected financial institution of the internal lending procedures, according to the provisions of the above mentioned legislative package and of the lending legislation.

3.3.4. the actual running of the allocated amounts. In this stage, the beneficiaries request to the bank the Letter of Comfort necessary to sign the Financing Contracts (in case of SAPARD; for NDR, the proof of co-financing was eliminated). After the contracts signing, they submit to the selected bank their financing requests, specifying they request the guarantee of the Guarantee Funds, if they do not have enough collaterals. The bank analyzes the beneficiary's creditworthiness, both in view of releasing a bank guarantee letter, and to contract the credit.

3.3.5. For the investment projects submitted through PNDR (farmer 2008), the beneficiary has another stage until the credit contracting, the calculation of deduction from the unrefundable contribution of the interest diference regarded as State Aid, according to the aids cummulation rule, made by the Bank based on OM 40/2009, after which an Addendum with APDRP is signed to the Financing Contract.

3.3.6. Signing the credit contract is the moment in which the beneficiary can make payments from the allocated credit. Farmer credit can cover the total value of the investments project. Depending on the investment specific features and its putting into practice, a period of grace is granted of up to 5 years and the maximum repayment period (loan maturity) is of up to 10 years.

3.3.7. The drawings from the Fund (payments) are done when the beneficiary presents to the bank branch the payment documents (invoices, expenses list, etc), the bank issues a drawing request, endorsed by the bank head office and forwards it to MAPDR – General Budget-Finance Division and European Funds. After the endorsement (specialized and by the finacial-accounting division), the Payment Order is issued for the requested amount. The payment is done from MAPDR budget, from the Fund account, established according to Law No.231/2005, which is periodically fed. The Payment Order is issued within maximum 2 working days since the receipt of the drawing request. The banks running the allocated amounts are repaying the credit installments to MAPDR according to the credit contract schedules. The guarantee of the Guarantee Funds is established without any participation from the beneficiary, being made by the commercial banks and guarantee funds with which MAPDR signed Working Agreements based on Law 231/2005 and 218/2005.

The problems occurred during the program were solved quickly and the contracting procedure and payments method were simplified.

3.4. *Concrete results, selected bank, current stage, perspectives***.** The first part of the program was run in 2006 and 2007 and co-financing of SAPARD programs submitted until 31.07.2006, (numerous projects were submitted, the amounts allocated from European funds were insufficient and the EGO 74/2006 regulated the financing of unrefundable contribution from the State Budget – the Romanian SAPARD) and a component to credit direct investments (non-eligible through SAPARD), acquisition of new agricultural tractors, agricultural machinery and equipment, biological material for farms population. The State Budget allocated RON 651 million, contracting 98.75% of allocated funds, with the effective payment during 2006, 2007 and 2008. The selected banks were: BCR; BRD, CARPATICA SIBIU; CEC BANK.

Table 1

Projects sub mitted by measures until 31 06 2006 (project submission deadline)

No.	Measure	Number of submitted projects FARMER PROGRA M	Total eligible value stated in financing application, in EURO	Eligible public value, EURO	TOTAL value in EURO stated in the Letter of Comfort	Value through Farmer Program, EURO, Letter of Comfort
1	1.1	108	163,379,684.04	81,689,842.02	100,292,638.82	53,823,784.74
2	3.1	833	150,952,290.14	75,476,145.07	113,556,276.75	81,787,513.33
3	3.4	76	8,171,995.74	4,085,997.87	6,065,892.14	4,822,191.67
TOTAL MEASURES		1017	322,503,969.92	161,251,984.96	219,914,807.71	140,433,489.73

In the year 2008, the Ministry has allocated RON 760 million to co-finance projects submitted through PNADR. The selected banks to run this amount are BCR; BRD; CEC Bank; Carpatica Sibiu; BANCOPOST. The credit component of non-eligible investments regard only purchases of biological material to populate the animnal breeding farms. The programme is in progress. The allocated amounts can be contracted only until the end of 2009, under the provisions of Romania's Treaty of Accession to the EU. Although the program attractiveness has decreased because of the deduction from public non-reimbursable contribution of the interest difference from the Farmer interest of » 5% up to the EU reference interest + a fixed margin for the loan risk class, this is still an effective instrument for the achievement of investment projects in agriculture.

CONCLUSIONS

For the first time in Romania after 1989, a financial instrument was created to provide a real chance to make an agricultural investment to any beneficiary wishing indeed to work in this field. It also offered the possibility to modernize the farms, to implement new technologies, and it allowed, for the first time, a coherent strategy to modernize the countryside, increased the exigency of SAPARD projects and PNDR selection, has decisively contributed in 2006 to the absorption of SAPARD funds, made the banking sector familiar with the problems of financing investments in agriculture. The banks participating in this program are granting at present, in full economic crisis, loans from their own funds, to the beneficiaries of PNDR projects which cannot apply for the Farmer (the Farmer can be accessed only once), and for other investment projects in the rural area, in better conditions than other banks. Besides the direct effects of this program, worth mentioning are also the long-term ones, generating the modernization or building of more than 1500 investment projects and decisively influenced the achievement of other few thousand. Of those effects, the ones with social impact are significant. The creation of jobs, the need to exploit plants and animals at a high technological level secured by project implementation, persuading individual investors to get authorization for the commercial activities resulting from the use of those investments, encouraging the association of groups of producers, guiding the vegetal or animal production to the achievement of strategical targets (cattle, sheep meat production), development of ancillary branches to agriculture, other related activities (tourism, processing of agricultural products, etc.) and last, but not least, change of mentality regarding the state support for the farmers and development of entrepreneurial spirit. It is a small step, true, but firmly on way to a real modernization of agriculture which Romania needs so much.

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Development FOR THE CONCLUSION OF COMMITMENTS domestic law in 2008 in order to ensure some financial measures to implement provisions of the law No 231/2005 on stimulating investment in agriculture, food industry, forestry, fishing, and in activities nonagricole.
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the emergency decree No 59 Government/2006 to ensure the budget for non-reimbursable public co-financing investment projects in the SAPARD programme, with subsequent amendments
18. *** - Decision No 1644/2006 to approve guidelines for implementing the decree has no 59 Government/2006, with further amendments and additions judgment government no 759/2006 to approve fiches's technical measures 1.1' improved processing and marketing of agricultural products and fish ", 1.2' Improving structures with a view to quality control, veterinary and plant health, quality products

CAGE DENSITY INFLUNCE ON THE EGGS PRODUCTION OF THE "BALOTEŞTI" QUAILS POPULATION

INFLUENȚA DENSITĂȚII ÎN CUŞCĂ A PREPELIȚELOR DIN POPULAȚIA DE "BALOTEŞTI" ASUPRA PRODUCȚIEI DE OUĂ

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Key words: quails, egg production, density

SUMMARY

The research purpose was to establish how the density per cage and per unit of housing surface influences the production performances of the "Baloteşti" eggs – meat quail population in the period of 1 – 35 laying weeks. To accomplish it, the production performances of three quails' batches were studied, batches for which different densities of housing have been used; one lot had a surface of 150 cm^2 cage/ bird (lot I), another with 120 cm^2 cage/ bird (Lot II – control lot) and a lot with 109 cm^2 cage/ bird (Lot III). The average percentage of laying in the period of 1 – 35 weeks for lot I was by 9.79 % bigger than lot II, the differences being distinctly significant, and for lot III it was by 16.73% smaller than for lot I and with 6.94 % smaller than lot II. The differences were very significant between lot I and lot III and significant between lot II and lot III.

Per ensemble, the performances related to egg production, the specific consumption per egg and the keeping percent were superior for lot I of quails that had the largest cage surface of 150 cm2 / bird in comparison to lot II, the control lot and lot III. The density used in the control lot, with a surface of 120 cm^2 cage/ bird, allowed obtaining a superior number of eggs/ m^2 cage by 7.7% in comparison to lot I and close to the results of lot III.

Raising the Japanese quails for eggs and meat production has become more developed in the last decades due to the fact that the quail products have recognized merits first of all for the quality (high nutritive value with good balance, good taste) and on the other hand because of the medical recommendation to consume this products for their therapeutically good effect. Still the technology of quails rising, applied for less time than for other birds, needs still aspects to be improved, including the ones regarding the density that should be used in their housing. The literature recommendations vary a lot on this subject.

1. MATERIALS AND METHODS

The experiment took place in the S.C. Ferma Nova S.R.L Bucharest farm on an initial population of 2900 adult birds from the egg – meat quails „Baloteşti". The duration of the study was of 35 weeks from the laying beginning (6 weeks from hatching). The birds have been maintained in the same space and in the same environment conditions. The 2900 quails in the experiment have been divided in three lots: lot I, that contained 800 females used an initial density of 40 quails per cage, lot II contained 1000 quails – control lot – using an initial density of 50 quails per cage and lot III seated up of 1000 quails with a density of 55 birds per cage.

The total surface of one room in which the quails have been housed was 10.5 m^2, out of the actual occupied surface of the quails' cages was of 2.4 m^2. The surface of one cage is of 0.6 m^2, the same for the 3 analyzed lots. The feed line was of 100 cm, and the watering was of 20 linear cm for each cage. Relating the number of birds in the lots to the surfaces used in the experiment the result is that in case of lot I the density was of 76 capita per m^2 room or 150 cm^2 /capita surface of cage in a quail battery. In the case of lot II, the density was 105 capita per m^2 or 120 cm^2 cage/capita. In the case of lot III, the density was 105 capita per m^2 or 109.1 cm^2 cage/capita.

The water and combined feed have been provided ad libitum, assuring a feed line of 2.5 cm/capita for lot I, 2 for lot II and 1.82 for lot III. Watering line had the following values: 0.5 cm /capita, 0.4 and respective 0.36 cm/capita.

The analyzed data were the individual body weight of the birds, egg production, weight of the egg, the consumption of combined feed and death rate. The differences among the three lots have been tested with the multiple Student test.

2. RESULTS AND DISCUSSIONS

From an average g laying percentage of 5.78 % ± 0.54 for lot I (table 1), of 3.00 % ± 0.12 for lot II and of 4.55 % ± 0.23 for lot III in the first egg laying week, this has grown to reach a maximum level of 88.80 % ± 2.19 for lot II and of 82.33 % ± 2.10 for lot I in the eight week and the level of 76.34 % ± 2.12 for lot III in the ninth week, diminishing then gradually to a level of 63.33 % ± 1.78 for lot I, of 54.23 % ± 2.36 for lot II and to a level of 48.15 % ± 1.36 for lot III by the end of the analyzed period.

As the table also reveals, **the average egg laying percentage** in the period of weeks 1 - 35 of laying for lot I was 75.90 % ± 2.69, for lot II it was 66.11 % ± 2.60, by 9.79 % smaller than lot I, the difference being distinctively significant between lot I and lot II, and for lot III it was 59.17 % ± 2.35, by 16.73 % smaller than lot I and by 6.94 % smaller than lot II, the difference being very significant between lot I and lot III and only significant between lot II and lot III.

The average egg production per capita and per week in the period weeks 1 - 35 of laying for lot I was of 5.31 ± 0.18, for lot II it was 5.96 ± 0.27, by 12.81 % smaller than lot I, the difference being distinctively significant between lot I and lot II, and for lot III it was 4.14 ± 0.17, by 22.93 % smaller than lot I and by 10.38 % smaller than lot II, the difference being very significant between lot I and lot III and only significant between lot II and lot III.

Average production of eggs per capita cumulated in the period of weeks 1 - 35 of laying for lot I was 185.95 eggs /period, for lot II it was 161.98, by 12.89 % smaller than lot I and for lot III it was 144.4, by 22.34 % smaller than lot I and by 10.85 % smaller than lot II.

The average number of housed quails has produced in 35 weeks 11.583 eggs/ m^2 cage in the case of lot I, 12.553 eggs for lot II and 12.316 eggs for lot III, which is by 7.7% less than lot I and 1.89 % less for lot III than lot II, the control lot.

As it can be seen in table 2, **the average feed consumption** in the same period for lot I was of 32.90 g combined feed/capita/day, for lot II it was 33.59 g, while for lot III this was 32.60 g, the differences among the three lots being not statistically assured.

The feed conversion per egg in the period of weeks 1 – 35 of laying for lot I was of 42.96 g combined feed/egg, for lot II it was 50.53 g and for lot III of 55.67 g. Between lot I and lot II the difference is distinctively significant, by 15 %, between lot I and lot III very significant, by 22.83 %, while the difference between lot II and lot III is significant, of 9.23 %.

Table 1

The evolution of egg production for the analyzed quails in the weeks 1 – 35 of laying

Egg laying week	Lot I			Lot II			Lot III		
	$X \pm S_X$								
	% laying	Egg production per capita/week	Cumulated egg production	% laying	Egg production per capita/week	Cumulated egg production	% laying	Egg production per capita/week.	Cumulated egg production
1	5.78 ± 0.54	0.40 ± 0.10	0.40	3.00 ± 0.12	0.21 ± 0.10	0.21	4.55 ± 0.23	0.32 ± 0.17	0.32
2	35.56 ± 2.43	2.49 ± 0.19	2.89	30.23 ± 1.92	2.12 ± 0.29	2.33	29.15 ± 1.93	2.04 ± 0.19	2.36
3	75.56 ± 2.45	5.29 ± 0.22	8.18	55.34 ± 1.33	3.87 ± 0.33	6.19	45.44 ± 1.23	3.18 ± 0.23	5.53
4	78.55 ± 2.48	5.49 ± 0.15	13.68	62.33 ± 2.16	4.36 ± 0.29	10.56	60.15 ± 2.26	4.21 ± 0.19	9.75
5	87.55 ± 1.75	6.13 ± 0.15	19.81	65.66 ± 2.20	4.59 ± 0.33	15.19	62.35 ± 2.20	4.36 ± 0.23	14.11
6	87.88 ± 2.14	6.15 ± 0.16	25.96	73.45 ± 2.32	5.14 ± 0.12	20.30	69.55 ± 2.22	4.86 ± 0.32	18.98
7	88.80 ± 2.19	6.21 ± 0.20	32.17	76.66 ± 2.13	5.36 ± 0.24	25.67	72.33 ± 2.13	5.06 ± 0.34	24.05
8	89.90 ± 1.87	6.29 ± 0.19	38.47	82.33 ± 2.10	5.76 ± 0.25	31.43	75.15 ± 2.20	5.26 ± 0.45	29.31
9	87.33 ± 1.53	6.11 ± 0.17	44.58	81.34 ± 2.12	5.69 ± 0.28	37.12	76.34 ± 2.12	5.34 ± 0.38	34.65
10	87.30 ± 1.16	6.11 ± 0.29	50.69	81.23 ± 1.34	5.68 ± 0.23	42.81	75.75 ± 1.53	5.30 ± 0.23	39.95
11	87.22 ± 1.40	6.10 ± 0.29	56.80	81.00 ± 2.26	5.67 ± 0.36	48.48	75.66 ± 2.13	5.29 ± 0.26	45.25
12	86.45 ± 1.32	6.05 ± 0.23	62.85	81.00 ± 2.20	5.67 ± 0.27	54.15	73.16 ± 1.30	5.12 ± 0.33	50.37
13	86.14 ± 1.23	6.03 ± 0.29	68.88	80.50 ± 2.12	5.63 ± 0.38	59.78	70.55 ± 2.12	4.93 ± 0.21	55.31
14	85.75 ± 2.20	6.00 ± 0.33	74.88	77.57 ± 2.10	5.42 ± 0.21	65.21	70.51 ± 2.33	4.91 ± 0.41	60.21
15	85.75 ± 2.12	5.98 ± 0.22	80.87	77.57 ± 2.12	5.42 ± 0.11	70.64	68.55 ± 2.12	4.79 ± 0.37	65.01
16	84.33 ± 2.22	5.90 ± 0.34	86.77	77.55 ± 2.23	5.26 ± 0.29	75.90	66.78 ± 2.13	4.67 ± 0.27	69.68
17	84.15 ± 2.23	5.89 ± 0.15	92.66	75.15 ± 2.20	5.15 ± 0.23	81.05	66.78 ± 1.20	4.64 ± 0.28	74.33

18	83.44 ± 2.16	5.84 ± 0.28	98.50	73.15 ± 2.12	5.12 ± 0.29	86.17	66.33 ± 3.12	4.43 ± 0.37	78.76
19	80.55 ± 2.26	5.63 ± 0.33	104.14	72.44 ± 2.21	5.07 ± 0.23	91.24	63.33 ± 2.55	4.28 ± 0.27	83.05
20	79.70 ± 2.35	5.57 ± 0.16	109.72	70.15 ± 1.93	4.91 ± 0.32	96.15	61.15 ± 1.43	4.27 ± 0.17	87.31
21	78.50 ± 2.21	5.49 ± 0.38	115.21	70.15 ± 1.16	4.91 ± 0.24	101.06	60.11 ± 1.16	4.21 ± 0.29	91.52
22	76.54 ± 2.26	5.35 ± 0.21	120.57	70.00 ± 2.40	4.90 ± 0.25	105.96	60.11 ± 2.20	4.20 ± 0.23	95.80
23	76.30 ± 2.34	5.34 ± 0.31	125.91	69.55 ± 2.12	4.86 ± 0.28	110.83	60.10 ± 2.12	4.20 ± 0.19	100.01
24	75.45 ± 2.46	5.28 ± 0.29	131.19	67.15 ± 2.13	4.70 ± 0.33	115.53	58.15 ± 2.13	4.07 ± 0.23	104.08
25	75.40 ± 2.36	5.27 ± 0.17	136.47	66.14 ± 2.10	4.63 ± 0.23	120.16	57.55 ± 2.50	4.03 ± 0.19	108.11
26	75.00 ± 2.43	5.25 ± 0.37	141.72	66.25 ± 1.33	4.63 ± 0.25	124.80	56.55 ± 1.97	3.95 ± 0.43	112.06
27	74.00 ± 2.33	5.18 ± 0.27	146.90	64.45 ± 2.16	4.51 ± 0.25	129.31	55.55 ± 2.04	3.88 ± 0.32	115.95
28	73.50 ± 2.24	5.14 ± 0.27	152.05	65.33 ± 2.40	4.57 ± 0.25	133.88	54.55 ± 2.45	3.82 ± 0.24	119.95
29	73.42 ± 2.08	5.13 ± 0.27	157.19	62.55 ± 2.32	4.37 ± 0.22	138.26	53.35 ± 2.15	3.73 ± 0.25	123.51
30	73.23 ± 1.16	5.12 ± 0.22	162.31	60.19 ± 2.23	4.21 ± 0.22	142.47	53.35 ± 2.13	3.73 ± 0.28	127.24
31	70.12 ± 2.09	4.91 ± 0.12	167.22	58.75 ± 2.20	4.11 ± 0.20	146.59	52.88 ± 1.10	3.70 ± 0.25	130.95
32	70.10 ± 1.94	4.90 ± 0.30	172.13	56.15 ± 2.12	3.93 ± 0.19	150.52	52.15 ± 1.12	3.65 ± 0.25	134.59
33	68.56 ± 1.37	4.79 ± 0.23	176.93	55.10 ± 2.13	3.85 ± 0.22	154.37	50.15 ± 2.13	3.51 ± 0.15	138.10
34	65.43 ± 1.64	4.58 ± 0.22	181.51	54.50 ± 2.36	3.81 ± 0.25	158.19	50.00 ± 2.36	3.50 ± 0.32	141.61
35	63.33 ± 1.78	4.43 ± 0.10	185.95	54.23 ± 2.36	3.79 ± 0.26	161.98	48.15 ± 1.36	3.37 ± 0.32	144.97
$X \pm S_X$	***75.90 ± 2.69*** *aa bbb*	***5.31 ± 0.18*** *aa bbb*	***185.95***	***66.11 ± 2.60*** *aa c*	***4.62 ± 0.18*** *aa c*	***161.98***	***59.17 ± 2.35*** *bbb c*	***4.14 ± 0.17*** *bbb c*	***144.97***

Note: the significance of the difference among the values marked with letters is the following: *one letter*– the difference is significant, *two letters* –significant distinct difference and *three letters* – very significant difference.

The average weight of the egg in the research period of laying for lot I have been of 12.08 g, for lot II of 11.79 g, and for lot III of 11.78 ± 0.16 g. The differences among the three quails’ lots are not statistically assured.

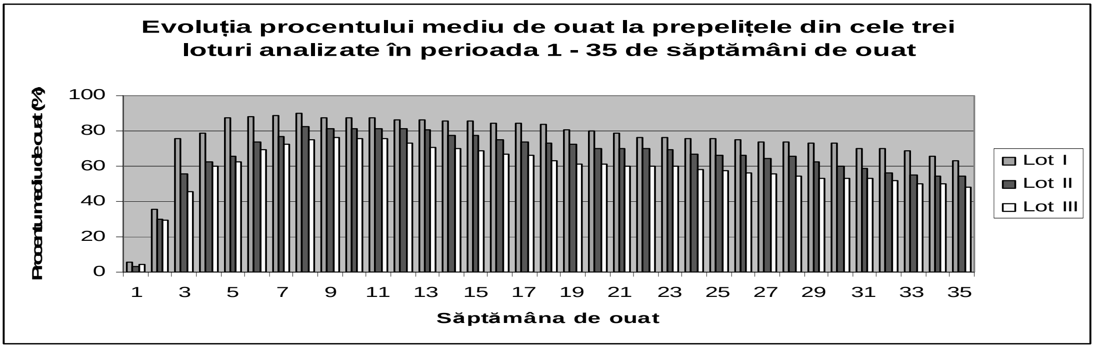

Figure 1: The graphic evolution of the average laying percent in weeks 1 – 35 of laying

Table 2

The average performances of production between the weeks 1 and 35 of laying

Production performance	Lot I	Lot II	Lot III
	X ± S $_X$		
Average feed consumption (g combined feed/capita/day)	32.90 ± 0.65	33.59 ± 0.80	32.60 ± 0.45
Feed conversion (g combined feed /egg)	42.96 ± 1.65 $^{aa\ bbb}$	50.53 ± 2.65 $^{aa\ c}$	55.67 ± 1.93 $^{bbb\ c}$
Average egg weight (g/egg)	12.08 ± 0.13	11.79 ± 0.14	11.78 ± 0.16
Average body weight (g/capita)	232.99 ± 3.21	224.08 ± 3.17	224.37 ± 2.87
Weekly death rate average %	0.15 ± 0.05 $^{aa\ bb}$	0.20 ± 0.06 ^{aa}	0.23 ± 0.08 ^{bb}

Note: the significance of the difference among the values marked with letters is the following: *one letter*– the difference is significant, *two letters* –significant distinct difference and *three letters* – very significant difference.

The average body weight in the period weeks 1 – 35 of laying for lot I was of 232.99 g/capita, for lot II of 224.08 g and for lot III of 224.37 g. The differences among the three lots are insignificant. **The average death rate percentage** in the same period was of 0.15 % for lot I, 0.20 % for lot II and of 0.23 % for lot III, the differences between lot I and II and between lot I and III being distinctively significant and insignificant between lot II and III.

3. CONCLUSIONS

The different density of quails in the cage, ensuring 150 cm^2 /capita for lot I, 120 for lot II (control lot) and 109 cm^2 /capita for lot III, has determined a production of

161,98 egg per bird in the control lot, bigger than 12.9% for lot I and smaller by 10.5% for lot III.

The combined feed consumption, of 50.53 g/egg for lot II, is smaller by 15 % for lot I, the one with small density and by 9.23 % smaller for the lot with higher density. The average weekly death rate is distinctively significant smaller for lot I and distinctively significant bigger for lot III in comparison to the control lot.

Per ensemble, the productive performances regarding the laying percentage, the average egg production and lot maintenance percent were superior for lot I of quails, with smaller density, in comparison to lot II, the control lot, with a medium density and lot III that had the highest density of the study.

The density used in the control lot, that ensures a surface of 150 cm^2 cage/capita, permitted still obtaining a higher number of eggs/ m^2 cage with 7.7% in comparison to lot I and by 1.89 % than lot III, which can be recommended for periods when the egg request and egg prices are high. It can also be recommended that in normal market conditions, in the first part of the egg laying curve a density of 120 cm^2 cage/capita to be used, and in the second part a regrouping of the birds using a density of 150 cm^2 cage/capita, rising thus the rate of profitableness of the space by freeing some cages, where other birds of almost the same age could be inserted.

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STUDY REGARDING SOME ASPECTS OF SHELTER DOGS CHARACTERISTICS AND BEHAVIOR

STUDIU PRIVIND UNELE ASPECTE ALE CARACTERISTICILOR ŞI COMPORTAMENTULUI CÂINILOR DIN ADĂPOSTURI

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Key words: dogs, shelter, characteristics, behaviors, frequency

SUMMARY

In order to apply a right protection for dogs it is necessary to have a thorough knowledge of their welfare needs, starting from their behavior in the shelters. Specialized literature offers little data for this subject, especially in our country. Thus pursuing this purpose in a shelter house from Târgu Jiu, the individual behavior of 15 sterilized dogs has been observed during 10 winter days, 10 hours per day.

They have been housed in two groups of five dogs, both male and female, in a paddock having 8 m^2 that has cages and access to an inner yard and street visibility, which allows for a good socialization of the animals. Two types of observation charts especially created for this study have been used. The primary data have been statistically processed. The characteristics of the observed animals reveal the fact that the males have a better overall situation, than the females, having a bigger stature, weight, life expectancy and health state.

Among the different types of behavior, the most often ones were in recumbency, with the same frequency during the day, followed by abnormal manifestation of behavior, more rare after the hours 15-16 when the animals receive food, thus being replete, they don't externalize boredom induced by the captivity.

The animals have presented in total per day less activity manifestations than the other behavior manifestations. But these have rose in intensity more after being fed. Among the activity manifestations, the most often were the ones of paddock examination (of their life environment) and affection through snout contact (more than one action on an average per animal per hour). Activities and abnormal behaviors had almost the same frequency in both sexes. Aggressiveness of ones over the others (4.9/day for females and 5.1 for males) appeared almost the same for both sexes in the case of cohabitation between males and females.

The strategy of animal protection in our country, that implies problems of preparation, planning and effective implementation, must start from a thorough knowledge of the animals welfare needs, starting from a scientific study of different species of animals for whom the strategy is directed to. One of the species which is in the public opinion headlight related to the necessity and opportunity for protection is the dog species. Unfortunately, besides several numerous deficiencies found in applying it there is also the scientific literature, very poor related to shelter dogs behavior. This literature should be help the projecting and using of the protection strategies even if it would be a temporary solution for homeless dogs.

In our country these types of studies are more than necessary as the maintenance of the common shelters, sustained through public or private funding, represents most often the only solution to this problem of offering the animals a bearable life, as the dog adoptions are still very rare. Knowing the behavior of these dogs and bringing this knowledge towards the specialists who are dealing with this issue (animal rising) and to the public could contribute to a change of the negative image that these animals have, as well as raising the awareness of the necessity of their adoption by humans.

1. MATERIALS AND METHODS

The individual behavior of 15 dogs has been studied, for ten days during winter time in a shelter house managed and financed by the Association for animals' protection Pro Animals from Targu Jiu. The animals have been housed in three groups of five dogs in an 8 m^2 (2 x 4 m) paddock with cages. Each paddock has 2-4 cages, collective type, determined by the number of housed dogs, their sex and their dimension, with water pots, and wet food bowls. The dry food is provided in cages and in front of the cages. The shelter built near the street has an inner court where the animals have access all day long and permits thus an adequate social interaction for the animals. All the dogs had been sterilized, identified through names and well known by the observer. The individual characteristics of each dog have been recorded on specially conceived observation charts. The frequency of different manifestations of the animals has been watched on another observation chart daily and individually for 10 hours per day – three types of behavior have been observed: activity, repose and abnormal behaviors. The primary data has been processed statistically with the use of Microsoft Excel 2003 software program.

2. RESULTS AND DISCUSSIONS

CHARACTERISTICS OF THE STUDIED ANIMALS

Animals' size. The males had a large stature in a proportion of 77.8 % and only 11.1 % medium or small size. None of the females had a large stature, 52.8 % had a medium size and 47.2% a small one. The majority of the males in the studied paddocks had a large stature and most of the females had a medium or a small stature. In total 26.7 % of the animals had a large size, 40 % a medium and 33.3% a small one, so the greatest proportion of 73.3 % is represented by medium and small stature.

The average weight of the males in the studied paddocks was greater than the one of the females, of 35.5 kg while the females had an average of only 17.13 kg, 51.8% lighter.

The average age of the males was of 9.67 years, while the females of 5.43 years, 43.9% smaller. It can be affirmed that the life expectancy of the males is evidently greater than the females. **The evolution of the animals in the shelter** shows that all are stationed in the shelter for a long time: the males in an average of de 6.42 years, and the females 4.56 years. None of the animals has been adopted on an average of 5.49 years.

General behavior. The observed males had a normal general behavior, excessively active and apathetic in equal proportions, of 33.3%. Among the females 44.4 % had a normal behavior, while 22.2% were excessively active, an equal proportion apathetic and one female presented two repetitive behaviors. In total, 40 % of the animals had a normal behavior and 60 % abnormal (excessively active and apathetic 26.7% %). The abnormal behavior seems to be determined by the captivity maintenance conditions.

Health status. The males in the observed paddocks had a good health state in a proportion of 100 %. Only one male presented effects of an old injury. The females had a good health status in a proportion of 66.6%, 44.4 % had antecedent injuries and from those half have after effects that are affecting their health. One of the females was sick and underwent treatment. In total, 80 % of the individuals had a good health state, 26.7 % were injured and they suffer the effects of the wounds.

THE FREQUENCY OF THE BEHAVIOR MANIFESTATIONS OF THE ANIMALS (IN AVERAGE PER HOUR /ANIMAL /DAY)

Analyzing comparatively the types of activity of the studied females and males (table 1) it can be assessed that in total the activity manifestations had an average frequency resembling to both sexes: 0.6 per hour for females and 0.58 for males.

Watering, defecating and urinating were significantly more often occurred in males than in females, relating to the greater food quantity consumed and probably because of the increased territorial instinct.

The activities of own fur cleaning (3.7 activities for females and 3.2 for males in the 10 hours of daily observation) and paddock examination (12 activities for females and 11.1 for males) have had a higher frequency by 13.5 % and respectively 7.5 % for females.

Scratching activity on the contrary (8.1 for males and 6.7 for females), had a higher frequency for males by 17.3 %. Playing activity was manifested more intensely for the females (7.2 daily actions) than the males (5.8 actions).

Related to the aggressiveness manifestations, the females presented 38% more aggressive actions on themselves (7.1 for females in comparison to 4.4 for males) while the aggression on others (4.9 for females and 5.1 for males) had almost the same frequency for both sexes. The aggressiveness on the surrounding environment (2.9 for females and 2.3 for males) was manifested with a higher intensity by 20.7 % for females.

In case of affection behavior (14.4 for females and 15.4 for males) this has been slightly higher for males. The activity of food theft has recorded a double daily frequency for males (3.8 actions) in comparison to females (1.7 actions).

Among the activity manifestations, the most often ones were the paddock examination - of the life environment and the affection through snout contact (over 1 action on an average per animal per hour).

The different repose attitudes were more often for males by 9% than for the females and the most frequent attitude of the animals was standing, related to paddock examination, followed to by the sitting position, as a posture for waiting. Sitting abdominally was the rarest, 0.41 times on an average per animal and per hour.

The males presented a higher number of standing position attitudes by 15.4 % (16.9 activities per day) than the females (14.3 activities), in the case of the laterally sitting position by 9.8% (8.2 for males in comparison to 7.4 for females) and for the attitude of sitting (hinder feet) more than 7 % (8.6 activities for males in comparison to 8 activities for females).

The attitude of abdominally sitting (4.4 activities per day for females and 3.8 activities for males) had a higher frequency by 13.7% for females, while the coiled up position had the relatively same frequency for both sexes (6.8 activities for females and 7 activities for males).

Table 1

Average hourly frequency of the behavior manifestations of the studied animals (per individual and per day)

Type of behavior	Females	Males	Total Animals
I. Activity	**0.60** ± 0.056	**0.58** ± 0.067	**0.59**
Feeding	0.1	0.1	0.1
Watering	0.53 ± 0.07	0.6 ± 0.09	0.57
Defecating	0.24 ± 0.07	0.37 ± 0.09	0.31
Urinating	0.48 ± 0.06	0.62 ± 0.06	0.55
Own fur cleaning	0.37 ± 0.05	0.32 ± 0.06	0.35
Scratching	0.67 ± 0.04	0.81 ± 0.09	0.74
Paddock examination	1.20 ± 0.12	1.11 ± 0.08	1.16
SOCIAL BEHAVIOR Playing	0.72 ± 0.06	0.58 ± 0.04	0.65
Aggressiveness - on himself/ herself	0.71 ± 0.05	0.44 ± 0.05	0.58
- on others	0.49 ± 0.05	0.51 ± 0.06	0.5
-on surrounding environment	0.29 ± 0.05	0.23 ± 0.04	0.26
Fear	0.57 ± 0.07	0.28 ± 0.04	0.43
Affection - snout contact	1 ± 0.07	1.12 ± 0.05	1.06
- fur cleaning congener	0.44 ± 0.04	0.42 ± 0.05	0.43
Food theft	0.17 ± 0.1	0.38 ± 0.20	0.28
II. REPOSE	**0.81** ± 0.06	**0.89** ± 0.07	**0.85**
Standing	1.43 ± 0.05	1.69 ± 0.08	1.56
Sitting (hinder feet)	0.8 ± 0.05	0.86 ± 0.08	0.83
Sitting abdominally	0.44 ± 0.06	0.38 ± 0.05	0.41
Sitting laterally	0.74 ± 0.07	0.82 ± 0.08	0.78
Coiled up position	0.68 ± 0.07	0.70 ± 0.07	0.69
III. ABNORMAL BEHAVIOR	**0.78** ± 0.056	**0.78** ± 0.077	**0.78**
Walking in circles (round the paddock)	1.2 ± 0.06	1.3 ± 0.09	1.25
Spinning in circles	0.7 ± 0.05	0.64 ± 0.08	0.67
Different stereotypes	0.53 ± 0.06	0.53 ± 0.06	0.53

The activities related to abnormal behaviors had almost the same frequency for both sexes, 7.8 times per day (12 manifestations on walking in circles round the paddock for females and 13 for males, 7 actions of spinning in circles for females in comparison to 6.4 for males and 5.3 manifestations of different stereotypes for both sexes).

Related to the average number of actions per groups of behavior manifestations and time spell (table 1, fig. 1) it is found that the animals have recorded a smaller proportion of activity manifestations in comparison to the other types of behavior in each time spell analyzed and thus per observation day, activities that have risen in intensity more in the 15.00 – 16.00 time spell, when the animals received food.

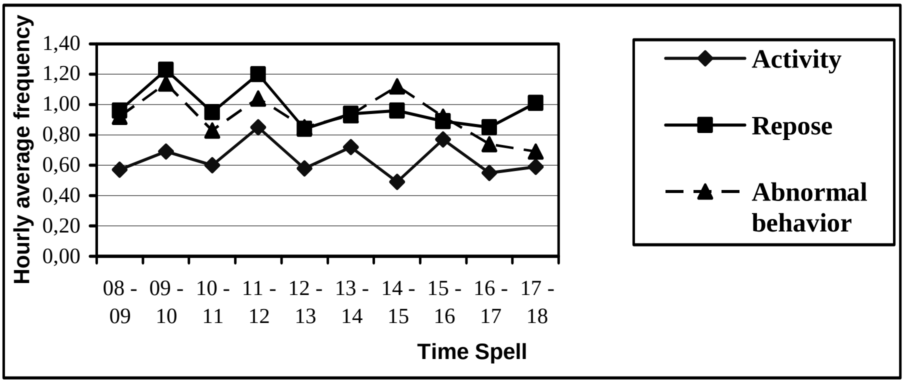

Fig. 1 Average number of activities in groups of behavior manifestations

The repose manifestations had a higher hourly frequency than the activity ones by 35,7% per day of observation and approximately the same during the day long, followed by the category of abnormal behaviors (with a frequency with more than 28.4% than the ones of activity and more reduced in the16.00 – 17.00 and 17.00 – 18.00 time spells and after the food consumption).

3. CONCLUSIONS

1. Related to the animals’ characteristics, the majority of the males in the studied paddocks had a large stature and body weight and most of the females had a medium or a small one. The age and the life expectancy of the males are higher than for the females.
All the animals are stationed in the shelter for a long time: the males in an average of 6.42 years, and the females 4.56 years. Any animal has not been adopted on an average of 5.49 years.

The general behavior indicates that in total 40% of the animals had a normal behavior and 60 % abnormal (excessively active and apathetic 26.7% and with two repetitive behaviors 6,7 %). The abnormal behavior seems to be determined by the captivity maintenance conditions.

All the males had a good health state and the females in a proportion of 66.6 % (with previous injuries, from which half are affecting their health or they are in treatment).

2. The studied animals have presented a smaller proportion of activity manifestation in contrast to other manifestations in each time spell analyzed, actions that have risen in intensity in the time spell 15.00 – 16.00, when the animals received food. The most frequent repose manifestations (with approximately same hourly frequency during the

day), followed by the category of abnormal behavior activities (with a reduced frequency after 16.00) are revealing the fact that satiated animal are no longer externalizing the boredom caused by the maintenance determined by captivity.

In the studied days, the males have done a higher total number of repose behavior manifestations than the females. Regarding the activity actions and abnormal behaviors, those had approximately the same frequency for both sexes.

3. Paddock examination - their life environment - were the most often encountered among the activity manifestations and also affection through snout contact (more than one action on an average per animal per hour).

Watering, defecating and urinating were significantly more often in males than in females, relate to the greater food quantity consumed and probably because of the increased territorial instinct.

Scratching activity had a higher frequency for males by 17.3 %. The activity of food theft has recorded a double daily frequency for males in comparison to females.

The activities of own fur cleaning and paddock examination had a higher frequency with 13.5% and 7.5% for females. Playing activity was manifested more intensely for the females.

Related to the aggressiveness manifestations, the females presented 38 % more aggressive actions on themselves and 20.7 % on the surrounding environment. Actions of aggression on others (4.9 for females and 5.1 for males) had almost the same frequency for both sexes in the case of common housing of males and females.

4. The different repose attitudes were more often for males by 9% than for the females and the most frequent attitude of the animals was of standing related to paddock examination, followed by the sitting position, as a posture for waiting. Sitting abdominally was the rarest in total studied animals and with 13.6% more for females.

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THE RURAL FAIRS OF LOCAL PRODUCERS IN THE CENTURY OF HYPERMARKETS AND THE MALTHUSIAN PERSPECTIVE REGARDING FOOD, IN A WORLD OF FULL DEMOGRAPHIC EXPLOSION

TARGURILE RURALE ALE PRODUCATORILOR LOCALI ÎN SECOLUL HIPERMARKETURILOR ŞI PERSPECTIVA MALTHUSIANĂ A ALIMENTAȚIEI ÎNTR-O LUME ÎN PLINĂ EXPLOZIE DEMOGRAFICĂ

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Cuvinte cheie: explozie demografică, produse locale, dezvoltare rurală
Key words: demographic exploision, local products, rural development

SUMMARY

The merits of Malthus theory, entitled later on malthusianism, are great, the theory being unanimously recognized as a main interdisciplinary approach of demography, by enlarging the statistical basic analysis of this branch, by confronting population with the limited resources and with economy on the whole.

The century of hypermrkets 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 refference 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.

The specific terminology entitles them important products for the preservation of nature, or High Nature Value Products.These are the products that help to mentain the natural landscapes in the rural areas, by the continuos 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.

INTRODUCTION

A close foray in the history regarding dempgraphic conceptions is meant to provide many interesting explanatory and instructing elements.In his famous work entitled *Essay on the priniciple of population*- the effects on the future improvement of society, Thomas Robert Malthus 1766-1834 systematically issued the first demograpnhic theory of overpopulation, in a such a way that the optimistic perspective regarding human progress a,d growth of population was transformed in a, sometimes overreacted sumber perspective.

MALTHUS AND HIS PANCEA ENTITLED „MORAL RESTRAINT"

Mainly, the malthusianism beliefs that the population gorws in geometrical progression, the concrete mass of the means of sustenance in arithmetical progression, and this want, once is being created, involves intervention by obstacles that are regressive for the balance between „population and means of sustenance." Consequently, Malthus notices that the number of human population becomes double at every 25 years.

a) the number of population is objectively and historically limited by the concrete potential of sustenance
b) the number of population grows inevitably where the concrete potential os sustenance grows, except for the situation where demographic growth is restricted by strong obstacles and real protests- prevention or repression;
c) moral restraint defines the only preventive obstacle, and vice and suffering, caused by starvation, outbreaks of infectious diseases, calamities and wars are the main repressive obstacles [2].

As a major consequence Malthus identifies also the universal cure of mankind, which has been there for ages- „the panacea of moral restraint”.Moral restraint is being described by the professor, member of The Accademy of Moral Sciences and Politics in France under different situations- postponing marriage, up to choosing abstinence as situation opposed to marriage.The malthusian moral restraint is the necessity not at all felt of „having under control the instinct of procreation, encountered in low classes in an uncontrolable manner, and having bad effects on our living standards, unless it is being restricted by obstacles.”[3]

A close foray in the history regarding dempgraphic conceptions is meant to provide many interesting explanatory and instructing elements. The merits of his theory, entitled later on malthusianism, are great, the theory being unanimously recognized as a main interdisciplinary approach of demography, by enlarging the statistical basic analysis of this branch, by confronting population with the limited resources and with economy on the whole, one of the first predictions of a matter pardoxically issued, placed at the meeting point of politics, economy, social, biology and other siciences and ways of thinking. Malthus capacity to sinthetize is to be seen in his ability of stating the problem:

„We definitey state that, birthrate- if there is nothing that can stop it- gets doubled at every 25 years, in a geometrical progression.It is hard to indicate, however the food rate and it`s growth.It can be surely be stated that, their growth rate on a limited teritory it `s abosultely different from the growth of birthrate. By the power generated by the growth of birth rate, one hundred million people can become double,as well as one hundred could. Food however cannot multiply so easily as to sustain the same number of people that we were talking about.And if the population would have enough food, it will keep on progressing, and the progress of an era is the basis of a greater development of tne next era, and so on.If in stead of an island we take into consideration the whole land, the exodus will be excluded, and if we assume that the inhabitants of the whole worls are now about one hundred million, the human species will be on increase in a rate of 1, 2, 4, 8, 16, 32, 64, 128, 256, and food in a rate of 1, 2, 3, 4, 5, 6, 7, 8 şi 9,in about two centuries, we will have a population report food to population will be of about 9 to 256, and in three centuries of about 13 to 4097.In two milleniums the difference is enormous, uncalculable.In these assumptions we did not consider any kind of restrictions to the consume of the earth.The consume can grow unrestricted, howerver the power of growth of the population will de bigger in any era, and birthrate of the population cannot be kept in balance with the growth of food, only by applying dramatic laws that can stop it.„ *(Malthus T. R.-„Essay, on the Principle of Population”- 1798).*

The observations made on "Godwin`s speculations, Condorcet`s and of other writers", made quite logically, brought Malthus the approval of the entire society. The relationship between population and economy revealed a much serious connection between powerty and population. As compared to the anglo-saxon conception, the demography revealed by Malthus- science of the studies regarding the population- becomes a science which has had always a difficult and independent position in the conforntation with economy. Malthus`s opinion regarding demography was the most denigrated of all, being declared in the era " a doctrine of despair" because it transformed many adepts of progress in regressionists, and mathusian thinking was considered beyond respect.

These kind of opinions still exist today to overshadow his theory, after more than 2 centuries.The most interseting one is the one stated by Proud'hon, which is: „*Il n'y a qu'un homme de trop sur terre, et c'est Malthus*".

The great merit of Malthus, as the French historian J. Dupâquier, said is to have written more than a simple essay or easy study regarding the human population, better said, a sociology of the population" reffering to the phenomenon of autoadaptation of the population, and among the first ones to shape a realistic theory regarding population.

Malthus tried to create a teoretical bond between his economy and demographic skills, but as they were both in the beginning and quite immature, the plan din not suceed.Malthus`s power of anticipating some demo-economic events was exceptional.

From a simple perspective [4], the demographic conceptions or the theories regarding population according the malthusian essay can be grupped in malthusian-antibirthrate, and antimalthusian - supporting birthrate and population. A critical approach of malthusianism belonging to Karl Marx admits as valid argument only the notion of relative overpopulation , manifested through floating relative overpopulation-as a result of restrainig certain activities- especially industrial ones, latent, as a consequence of the loss of property and agricultural occupation, and stagnant, with refference strictly to house developed activities.

În the same time K. Kautski, objects with regard to malthusianism, and sustains the importance of human fertility, emphasising its social impact on women, his statement according to which " the history of human fertility is the history of women` labour" being accepted in new demographies and confirmed by the new millenium.

Important names are to be encountered in stating opinions and apreciating malthusianism, even in the present, with other remarkable names of sociologues such as: Pitirim A. Sorokin, Ph. M.Hauser, Kingsley Davis, Ronald Freedman, John Caldwell, Judith Blake, J.Bongaarts, P.Glick, Thomas Burch, Louis Roussel, R.Grebenik, J.Hajnal, G.Becker etc. Cultural anthropology, etnology, history, and sociology, contributed as malthusianism to the diversification of theories regarding population, food environment, durable development, etc[5]. The new conception detail and emphasize the importance of the growth of population.

Modern demographic theories have oscilated in sustaining such naturalis, biologycal, socal, cultural, economical particularities, supporting neomalthusianism, but also antineomalthusianism.At the end malthusiansism can only reappear, inexplicably, fataly.

DAILY FOOD AND TRADITIONAL FAIRIES OF LOCAL PRODUCTS

Is food a purely economic or biological problem, or one exclusively of moral or demographic existence, or a simple matter of technology and resources? According to Willard Cochrane`s opinion there is a running way of technology, aplicable to any type of product, but to food in general, where obsesion for reducing costs for food and augmenting the production in the same time is permanent.An exceeding quantity of food is transformed in in overproduction of food, which has hard to imagine collateral effects, form obesity to the destruction of a great quantity of food for optimizing the price, and in the next step , the lack of food or starvation become the opposite poles of the process of human development. A malthusian spiral developes undr our eyes everyday, and this way the overconsume of food leads to loss of apetite of the individual [6], but also small consume can diminish life expectancy and even destroy the human species,as well as it gives birth to the unsustainability and unballace thae interferes in the food offer and demand [7-8]. Paul Roberts, „-End of food-„ a book that reveals food disorders, medical issues, nutritonal aspects- obesity, toxicinfections, and even socio-political aspects, such as the persiatance of starvation and lack of food an water.[9]. Statistics show that about 900 milion people, a sventh of the globe`s population suffers from malnutrition, and a billion people suffer from deficiences that have become chronical diseases.We must not forget that we are what we think, in a philosphical way,what we think say and do in confucianist way, what we wish in a cehovian manner, and last but not least, we are what we drink and eat.What are we going to be in 2050, when we will not be able to feed 9,5 bilion. On long therm, there are two very different demographic assumptions, the first describing a ascendent diminished trendor descendant predominant,the firts describing a positive rhitm of demograpthic glut , but on diminuation, which will lead in 2300 to a world population of 36,4 bilion of people, but also the pesimistic possibility.[10]

Even if for multiple mileniums food has been the reflection fo human society , by the consume that genrated a multitude of ideas, a mechaninsm of progress and regress, our food is for very much time under the impact of market.The importance of the fairies of local producers in the century of hypermarkets and from the perspective of the danger that starvation represents is not to be neglected.

„God has different ways of making us aware of his presence, of helping us preserve the conscience of his presence among us" says Dumitru Staniloae.As a very clever trade based on manual skills of making a thing, handicraft is considered, even forn its debut a simole side of agriculture.As they indivudualy develop and separates gradually from agriculture, handicrafts get individualised as specific activities and generate a new form of collaboration, which does not mean, necessarily, that people have left agricultural activities.

Hanfdicrafts, later on transformed inn jobs or proffesions base of theoretical knowledge and practial abilities gained by aprreticeship, have let the one who own them to transform objects or to help his community The time and space overspread of handicraft have lead to the separation of artisans in guilds and to the foundation of the handicraft cooperation in a contemporary sense.

How the urge of man to make somthing by its own hands appeared? How a small part fo our ancestors have transformed themselves in artisans, in unimitable artists that created true works of culinary art, of put so much soul in their home made products, never forgotten by the memory of taste, of the eye.These questions become more and more difficult with time passing and evolution of humanity.

On Romanian teriritory, the development of rural handicraft was detained by the admixture of feudals i the life and share of the artinsans` products more than in the rest of Europe, in the XI th and XII centuries, which oftenly made the small artisans leave the community of the village and settlle around the vaivodal borough, around some material resources given by the ores deposits, or agricultural and forest resources, or at the encounter of comercial roads.Gradually, appear different types of artisans, according to the territory where they exerted their handicraft – rural artisans, town artisans, feudal artisans, church artisans.Starting with the XVIIth century, the domain handicraft starts to decline while the rural and town handicraft starts to grow and become more and more important, both regarding the extention of products and services.

Among the most well known artisans and recognisez by the cronicles we can mention the cooks, the fruiters and vineyards, etc and the most important towns famous for their artisans are: Brasov, Sibiu, Cluj, Bistrița, Timişoara, Arad, Oradea, Alba Iulia, Sighişoara, Turda, Craiova, Târgovişte, Bucureşti, Bacău, Iaşi, Câmpulung Moldovenesc, Suceava, actually the most important places where the guilds were built in order to defend the professional, economical, religious, political and military interests of their members.The guilds have gained controll for production delivery and sale, „a particular economical and tax regime, which protected their members from the individual contract they had with the state treasury, becomming by these priviledges true Romanian boroughes”.[11].

The guilds were built on solid, rigurous professional principles regarding the training and testing the future artisan, together with the obligation of mentaining a certain level of quality of the products – they were supposed to be guaranteed by the guilds, but also on ferm economical priciples regarding the materials for their handicraft, prices, share of the markets in order to remove the competition, defend the interests of the artisans in front fo the nobles and of the vaivod.

If in Transilvania guilds appeared even frim the XIVth century, in Moldova and Tara Romaneasca, this phenomenon passed through a phase of the „brotherhoods”, which generated the appearence of guilds three centuries later.The number of the artisans in Tara Romaneasca was of about 74 professions in 1831, of about eleven thousand in Moldova in 1854, more that eight thousand artisans that practiced 101 hadicrafts, of which dominated the rural or native artisans, as according to the statistics cited by V. A Urechia in the meeting from The Romanian Academy in March 1887.The guilds were ran by a „staroste”, followed by masters,journeymen apprentices, which by the XVIII th century had a very important economical role which determined the progress of the country and the mentainance of good products and of high quality.

The artisans kept having the monopole of the markets in rural communities, in the first half of the XIXth century they managed to supply all the articles for food, huosekeeping that the rural inhabitants nedeed.A part of the production was also taken for sale to the city, at the fairies, where one could always encounter a great variety of products; from fabrics, to ceramics, wood objects, animals, traditional food.

Starting with the second half of the XIX th century, two major cuases will determin a tendency of reducing the number of rural artisans, followed by a trend of diminishing the volume of made home rural food industry, due to the elimination of guilds from the economical life, by a law that appeared in 1873. The traces left behind by the guilds could be seen in :the churches, bridges, fountains, and fairies, later on transformed in towns, and lasted yntil the World War Two, when in the 9000…comune…of Great Romania one could fiind more than 100000 artisans of the villages.By their legal disappearence in 1873, the guilds left place for the remarkable progress of the manufactures, and of the factory/manufctory.” The lost time is never comming back , neither in the industry leaps can be done, because we need tradition and improvements that request time and patience.” [12]

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 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.

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. These agricultural sistems 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 mentainance 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 multipling and sharing with the following generations the traditons and customs related to the nature, this way of living leading to the preservation of rural landscapes and the protection of natural resources.

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 mentain the natural landscapes in the rural areas, by the continuos 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

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 <u>fanete</u> are dealt with, but also the way in which animals are being used and kept, play an important role in the mentainance of local

cultura, of the landscape, but especially for human health and that of the children. Thus the obtainance and sale of local food products represents an important factor for the mentainance and development of the community, and in the main time a source of sustainable benefits for local economy. A local important product for the preservation of the nature is that, that 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 frendly environment practices; the development of local economy, supporting farmers from semi-sustenance, by mentaining the agricultural activities in farm sistems.
păstrarea patrimonului cultural şi perpetuarea tradițiilor în aceste zone rurale.
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 incommes must return to the farmers and this way the help to support his future activity and the mentainance of farm systems
- preserve and mentain the local cultural treasury and help to the mentainance of the cultural indentity of rural areas, by promoting local traditions and customs, local cellebrations 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 resoruces, due to a reduced involment of human interventions
- help to mentain the agricultural traditional practices
- extensive agriculture, the main type of using the lands and fields
- the use of organic fertilayzer according to the fertilisation requests
- the reduced density of animals, aving 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

The type of products that can be considered local and of having high local value are: milk, diary, cheese, meat products: stock, sausages,smoke dried salt meat, marmalade, jam and tinned fruits, honey and products of honey; medicinal herbs ,wine and nautral juices, plum brandy.

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THE ROLE OF ECOTOURISM IN SUSTAINABLE RURAL DEVELOPMENT

ROLUL ECOTURISMULUI ÎN DEZVOTAREA RURALĂ DURABILĂ

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Cuvinte cheie: ecoturism,turism durabil, principiile ecoturismului
Key words: ecotourism, sustainable tourism, ecotourist principles

SUMMARY

The study presents the ecotourism as a part of the sustainable tourism, setting the strong and the weak points of the romanian ecotourism, off. We carried a SWOT analysis out, resulting the elements which may transform the romanian ecotourism market in a reference market for the tourists.

We also present the first ecotourism associations in Romania, as well as The Ecotourism Association Romania, the one which elaborated the basic principles of the present and future ecotourism.

Rural areas are very rich as regards the ecological and cultural diversity. Their dimensions and complexity make difficult a generalization of the problems or values, even if some common characteristics exist.

The sustainable development concept is related to an economic growth, meeting the needs of the society – prosperity, on short, medium and especially on long terms. This concept stands on the following reason: the development must be faced with the present needs without endangering the future needs[1].

The sustainable tourism includes all the types and activities of the hospitality industry, as well as the conventional mass tourism, the ecotourism, the cultural tourism, the business tourism, the rural tourism, the cruise tourism, the religious and sport tourism, the urban tourism. The orientation towards the sustainable development is a process which requires the coordination of the governmental authorities and needs to be sustained by the local authorities.

The sustainability in tourism as well as other industries, includes three aspects: economic, social-cultural and environmental. The sustainable development concerns permanence, it means that the sustainable tourism must use optimal the resources (including also the biological diversity), has to minimize the negative economic, social, cultural and environmental impact and to maximize the benefits of the local communities, the national economies and of the nature conservation. As a normal result, the

[1] Nistoreanu P., Bobe Magdalena, Stroia A., Negrea M. – „Contribuția ecoturismului la dezvoltarea durabilă a comunităților locale rurale românești", Turismul rural românesc. Actualitate şi perspective, Editura Performantica, Iaşi, 2008, p 53-61

sustainability concerns also the managerial structures, necessary to achieve these purposes.

The attainment of the sustainable tourism has to be part of the national and regional development plans. These actions may have economic targets (to increase the incomes, to diversify and integrate activities, to control, drive and distribute the development), social aims (to ameliorate poorness and the unequal distribution of the incomes, to protect the social and cultural indigenous patrimony, the participation and involvement of local communities) or ecological purposes (to protect the functions of ecotourism, to preserve and use in a sustainable way the biodiversity). Some experts prefer to speak about a sustainable development of the tourism, rather than a sustainable tourism. The first includes all the aspects of the development, the second only some aspects and components of the tourism – like aerial transport at large distance, that can't be sustainable, taking into account the actual technological conditions, even using the best practices[2].

The implementation of the politics and tourist plans represents a responsibility of the govern but also of the private sector. The private sector is responsible for fixing the strategy, the planning and research, the fulfillment of the basic infrastructure, the development of some tourist attractions, for fixing and administration of rules in offering facilities and services, for introducing measures in order to administrate and capitalize a region and to preserve the environment, for fixing the professional standards in tourism specific vocational training, for maintaining the public health and security.

The private sector is responsible for the development of the accommodation services, the tourist agencies, the activity of the firms specialized in tourism and is based on infrastructure, on the development of tourist attractions and on the way they are promoted within the field of marketing.

The political engagement regarding the development of the sustainable tourism is very important, as well as the implication of different non-governmental organizations, more and more involved in the development of the tourism.

Several methods of implementation are used. The logical mounting and the development projects programming are also very important. Within this domain they must exist efficient organizations in the public sector and in the private one, organizations able to assure the protection of the environment as well as the facilities standards for the tourists.

The development of human resources in tourism has to be a priority, these must be able to offer high quality services, expected on the tourism market and needs to be approached in a systematic manner (to lay out the demand on human resources and to fix the modality these persons are going to be trained) in order to provide qualified people in the public and private sectors. If national or regional institutions specialized in these kinds of vocational training are not able to provide the demanded people, then a local institution must be established.

[2] Glăvan Vasile – Turism rural. Agroturism. Turism durabil. Ecoturism, Editura Economică, Bucureşti, 2003.

Also very important is the usage of marketing methods and know-how: to set up the objectives and marketing strategies and to achieve a promotional program.

The deployment of marketing activities has to take place in the governmental tourism offices, at the local tourism office and in the private sector, the development of a positive image of the new tourism sector is very important.

The Law nr.5/2000 regarding the Development Project of the National Territory - section III Preserved Areas – named 17 sits as natural protected areas. These areas of national interest represent “reservations of biosphere, national or natural parks”, with a surface of 1132175 ha, including 134 natural reservations or natural monument, on 129643 ha.

Beginning with 2007, in Romania 17% of the country surface are natural protected areas: the Biosphere Reservation of Danube Delta on 580000 ha, 13 national parks on 315000 ha and 13 natural parks on 756000 ha. The National Forest Administration ROMSILVA manages 12 national parks (307000 ha, 10 natural parks (540000 ha), more than 200 reservations and natural monuments on 33000 ha[3].

According to the actual laws and settlements in this field of the protected areas (OUG 236/2000, L 462/2001, HG 230/2003, Ord.850/2003) ROMSILVA applies for the management of the backwoods national and natural parks, ensuring the necessary resources for a sustainable and maintaining management of these areas, according to the management plans approved by the environmental central public authority.

The management of the national parks ensures the maintaining of geographic and natural conditions, the protection of the ecosystems, the conservation of genetic resources and biological diversity under conditions of ecological stability, preventing and excluding every kind of natural resource exploitation and land using, incompatible with the prescribed purpose[4].

In the last years most of these areas were included in the ecotourist round trips. They exist independent administrations for the Biosphere Reservation of Danube Delta, National Park Piatra Craiului (a protected area since 1938), National Park Cozia, National Park Retezat (the first in Romania, since 1935), National Park Domogled – Valea Cernei, National Park Rodnei Mountains, National Park Calimani, National Park Ceahlau, National Park Bicazului - Hasmas Canyon, National Park Macinului Mountains[5], National Park Buila – Vanturarita. Most of them dispose of economic capitalization and tourist programs.

Generally they exists three groups of managerial targets in these parks:

Main targets (conservation of biodiversity, maintaining of ecological functions, tourism and leisure)

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[3] Toader Tudor, Dumitru Ion, coordonatori – Pădurile României vol. 1, Parcuri Naționale şi Parcuri Naturale, Regia Națională a Pădurilor – ROMSILVA, Editura Tipografia Intact Bucureşti, 2004

[4] Blaj Robert, coordonator – Ariile naturale protejate din Județul Sibiu, Editura Constant, Sibiu, 2005.

[5] Toader Tudor, Dumitru Ion, coordonatori. Pădurile României. Parcuri naționale şi parcuri naturale, Regia Națională a Pădurilor Romsilva, Editura Tipografia Intact, Bucureşti, 2004.

Secondary targets (wildlife protection, protection of natural and cultural sights, ecological public education and scientific research)

Potential applicable targets (the sustainable usage of natural ecosystems resources in buffer areas without negative effects on biodiversity).

The custodians, administrators and guides have to operate without tracking while visiting cultural, historical and architectural sights or while crossing woods or other natural areas.

ROMANIAN ECOTOURISM

Strong points:

- Diversity of natural tourist resources
- The rich fauna and flora, including unique species
- The presence of wild areas, unharmed by man
- An undeveloped infrastructure for accessing the protected areas
- The existence of a legal frame, which delimits the natural parks and the protected areas and fixes the rules and conditions for the management of these

Weak points:

- The extending of built up areas near or inside the protected area, the aim is in these cases the development of resorts
- The overexploitation of natural resources, the excessive pasture, illegal woodcuttings, wild trespass or uncontrolled tourism
- The deficient administration of the existing tourist facilities, generating big quantities of wastes
- The deficient abidance by protecting rules, because of the absence of land demarcations, in buffer areas to
- The absence, in some protected areas, of administrations able to run an efficient management

One of Romanias competitive advantage to well known tourist destinations is the maintaining and presence of an unharmed environment. Inside natural reservations there exist a lot of species, stated as natural monuments or endemic species. In Romania we can find regions with flora and fauna species, disappeared in other countries or found out in captivity. Because of the weak development of the classic tourism in some regions, good conditions for the development of ecotourism were created. This means that Romania is able to become an important destination for this kind of tourism.

SWOFT Analysis

Strong points:

- The rich natural patrimony inside national and natural parks
- The rich number of sights included on the UNESCO patrimony list, which are located in parks
- The permanent development of the protected area system
- The existence of the necessary legal frame which allows this development

Weak points:

- The marketing of national/natural parks is reduced especially on regional/local field, that means the ignorance of these sights
- Insufficient market studies
- The low vocational training level (for guides, people who manages these activities)
- The low accommodation capacity inside the protected areas
- Reduced services and leisure offer
- The incapacity of the managers and local communities to understand that this kind of tourism may bring incomes
- The absence of ecological education
- The big wood cuttings and the waste disposal in the areas
- A chaotic buildings layout
- The absence of other types of fuel so that the wood is cut uncontrolled
- The pollution of creeks in regions where there is no drainage

Opportunities

- the increasing number of tourists and demand
- the diversification of the offer by including representative natural sights - Danube Delta, Rodnei Mountains or Retezat Mountains
- to promote natural events from the “ Calendar of the Nature” (the call of the stag, the blossom of the snow rose)
- to offer facilities to investors interested in this kind of tourism

Threats

- the international competition
- the superior waste management in other countries
- the urbanization of the country people and the wastage of the cultural patrimony
- the income decrease in this regions as a result of the restraint system of different economic activities
- the development of other tourism types near these protected areas

The first ecotourism associations[6] were set up in Romania in the XIX – th century: The Transylvanian Carpathians Tourism Society (SKV), The Tripper Circle, The Tripper Guesthouse, The Touring Club Romania, The Academic Tourism Society Romania, The National Tourism Office.

In the presence in Romania exists the Ecotourism Association Romania(AER), based on two international models:

- The Trusted Program on Nature and Ecotourism developed in Australia
- Nature’s Best, the certification system of the Ecotourism Association in Sweden

AER elaborated the following principles to be applied by those who offer ecotourist products and who plans the development of an area based on ecotourism[7]:

[6] Trască Doru, Primele Asociații Ecoturistice din România, 2007

[7] Matei Elena – Ecoturism, Editura Top Form, Bucureşti, 2006.

1. The ecotourism occurs in the nature and is based on the direct and personal experience of the tourists in the nature.
2. The ecotourism has a large contribution for a better understanding and assessment of traditional nature for the tourists but also for the local communities.
3. The ecotourism offers the best practices for a sustainable development and for the nature conservation.
4. The ecotourism concurs in a positive manner with the natural areas protection. The ecotourism offers practical methods for an efficient management and for the natural area protection (may offer financial support for rehabilitation actions or contributions for the conservation organizations).
5. The ecotourism offers sustainable contributions in order to develop the local communities. The local benefits derive by using the local guides, consumer purchase or usage of local facilities.
6. The ecotourism needs to reduce the negative impact on the local visited community but also to conserve local culture and traditions. Ecotourist activities offer also contributions on long terms for the local community.
7. The ecotourism must be able to face with all the tourist expectations. The potential tourist is usually high-bred, that's why the satisfying level of his demands is high.
8. The ecotourism marketing has to offer complete and responsible information, able to concern the tourist about preserving the culture and environment.

Our country disposes of the legal frame necessary for the development of ecotourism. This means to capitalize the protected area but also to practice a type of tourism based on ecological principles, adapted to a sustainable development.

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RESEARCH REGARDING THE IMPROVEMENT OF THE AGRO-TOURISTIC SERVICES IN BRAN - MOECIU REGION

STUDIU PRIVIND IMBUNATATIREA SERVICIILOR AGROTURISTICE IN REGIUNEA BRAN – MOECIU

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Cuvinte cheie: regiune agroturistică, servicii agroturistice, analiza SWOT, potențial turistic
Key words: agro-touristic region, agro-touristic services, SWOT analysis, touristic potentialities

SUMMARY

Romania, as ``the garden of Virgin Mary``, concerning the beauty of the natural landscape, is considered a country that may offer a wide range of different touristic activities for all purposes: cultural, business, ecological, ecumenical, sport and SPA tourism, etc.

From the seaside with beautiful Black Sea coast, where there is a chain of SPA resorts offering to their guests many types of health treatments, psamotherapy, thalasotherapy, heliotherapy, acupuncture, relaxation and fun, swimming and nautical sports, up to the highest tops of the Carpathian Mountains with one of the best conserved fauna and flora from all the mountains in Europe, with very good slopes for winter sports and amazing landscapes, and going down to the hills, cultivated with vineyards, reach in old and beautiful monasteries and lovely villages with reach ethnography and folklore, where the Romanian peasants are managing their small or bigger farms, making agro – tourism, everything `breaths by the lungs`of the well-known Romanian hospitality.

Due to the fact that Bran – Moeciu region is one of the first Romanian opened region to this kind of tourism, the rural tourism, with its important branch, the agro-tourism, it is important to bring into discussion some features of the agro-tourism in this region, how they started there and which was the evolution in the last decade.

The idea is to see what was already very well done after 1990, with the commitement of ANTREC (The National Association of Rural, Ecological and Cultural Tourism), after 1994, to give a good example to other Romanian regions with agro – touristic potentialities, which are the weaknesses in the field and what new strategies may arise to improve the quality of the existing agro – touristic services in the region.

To determine how it is possible to improve the agro – touristic services in Bran – Moeciu region, for the future, it is necessary first to know which are the rural touristic accommodation structures and capacities in the region, how their number increased between 2002 and 2007, to make a SWOT analysis on the nowadays agro-touristic services provided by the rural touristic accommodation structures and the people involved in this field of work, to see which are the touristic potentialities of the region.

The natural and economic potentialities of the Bran – Moeciu region are connected to the following co-ordinates: favorable natural –geographic and demographic conditions, the regional specific transhumance, the production structures in the small agricultural exploitations and animal breeding farms, the anthropological turistic structures existing in the region.

1. MATERIALS AND METHODS

Touristic services, as a system of utilities, have the general characteristics of services and due to their spatial specificity and their diversity they outline relations that are integrated in the rural socio – economic dynamism. These are the reasons why at the national level there is the necessity of knowing touristic potentialities through the concepts of global product, such as territorial surface area, touristic patrimony, touristic potentialities, etc.

The components of the development possibilities of national and regional tourism are given by potentialities that can be considered capital sources having the following structure: natural, historical, economic, ethnographic and human activities with an agro-touristic function.

Reception structures and capacities include components that are integrated through: reception structures with the function of accommodation (even if the increased number of rural touristic pensions is now decreasing), touristic accommodation capacities (the number of touristic beds and their functionalities in rural pensions), arrivals and nights in rural accommodation structures, the utilization of rural capacities and the rural territorial infrastructure that has to be a support to Romania's touristic potential, as it facilitates the access of the tourist in the area.

The attraction and the functionality of the rural touristic region are rendered by the appreciation of the landscape which both represents a patrimony of the community living in a particular region and has an identity value.

Business opportunities (necessity, conditioning and expansion), motivation for creating an agro-touristic unit and locating criteria are considered methodological elements as there exist specific conditions in rural tourism activities.

Adaptabilities in rural tourism activity may also be revealed by means of the SWOT analysis that highlights main problems in this field of activity. This analysis shows strengths, weaknesses, opportunities and threats. Projecting agro-touristic activities in an agricultural and animal breeding exploitation offers the possibility to highlight elements such as: accurately learning about the real state of affairs, projecting and determining the level of investment, and finally diversifying agro-touristic activities.

Table 1

The use of SWOT analysis in projecting the agro – touristic activities in an agricultural exploitation

SWOT analysis	Internal Medium	Agro-touristic activities	External Medium	SWOT analysis
Strengths	Hospitality Favorable Conditions	Accommodation	Desire Of Knowing The Local Traditions	Opportunities
Weaknesses	Limited Capacity And Modernization	Accommodation	Competition With Seaside And Mountain Resorts With Tourist Tradition	Threats
Strengths	Local Traditional Food At Very Good Prices	Restoration Services	The Use Of Local And Unique Ecological Products	Opportunities
Weaknesses	Hygienic Culinary Conditions Not Permanently Respected	Restoration Services	The Existence In Preparing Of Food Of Some Components Not Desired By Tourists	Threats
Strengths	The Existence Of The Natural Beautiful Environment That Can Satisfy Different Activities At Very Good Prices	Spare time activities (Entertainment)	The Receptivity Of The Local Community And The People from The Place In Developing All Kind Of Agro-touristic Activities	Opportunities
Weaknesses	Lack Of Some Fitting Outs And Specific Endowments	Spare time activities (Entertainment)	Some Inadequate Concerning The Demands For Physical And Psychical Relaxation	Threats

By means of the SWOT method we determine the degree of attraction of the agro-touristic offer (the criteria of assessment are supplemented by the development degree of the economic, social and ecologic sectors).

The characteristics of rural tourism defined through the service sector imply knowledge on its evolution determined by the nature and the characteristics of rural space services having several specific sides: the goals and the evolution of the unfolding of types of services in Bran – Moeciu region; the validity of these services (given by intangibility, inseparability, variability and perishability); the specialization and the diversity of rural services in Bran- Moeciu region; the specific forms of competition rapports between the service market and the goods market in the rural space; the personnel rendering the services in the rural environment; the role and the behavior of the consumer, etc.

2. RESULTS AND DISCUSSIONS

Out of the ideas state above it arises that the rural touristic pension is characterized by a functional specific of agro-touristic services, hence the relations and the chain politics of rural agro-touristic services are based on the identification of agro-touristic chain (products/ services, itineraries, economic agents, operations, waves etc.) and the analysis of the regulating mechanisms within the chain in the aggregate of the integrating system and environment of the rural space (the structure and the way markets function, state intervention).

For this reason the agro-touristic chain must be integrated into a global chain strategy out of which advantages for agricultural production and rural services may arise. Normative acts establish both the rural tourism structural classification and the service rendering and they are referred to when it comes to motivating and constituting rural touristic pensions and to asking for the financial support given by the state. The legal framework also delineates specific functionality aspects.

In promoting the rural touristic pension there can be delineated three stages: establishing the aims to be accomplished within the promoting politics, determining the budget and the promoting mix. The forms of organizing, associating and integrating into agro-tourism must be supported by amplifying the measures meant to form groups of producers/ deliverers of services in the ``touristic village`` area or in the adjacent area (through the mechanism offered by national professional organizations and by those performing activities of rural development), as the one existing in the Bran -Moeciu region, ANTREC.

The existence and the delineation of natural – geographic and anthropologic touristic potentialities in the agro-touristic Bran – Moeciu region implies an analytical examination of: the structure of the land fund, utility and recreational potentialities of agricultural units, rural demography, surfaces used for recreational activities in the land fund structure of the Bran – Moeciu region, potentialities of non – agricultural activities, systems of production capitalization etc.

The potentialities of relief, of natural conditions, of agro – touristic or anthropological nature (traditional cuisine and folkloric tradition) constitute exquisite attractions within the development of Bran – Moeciu region. The rural territorial infrastructure of this region has a direct influence on the intensity of touristic activity; the territorial structures of rural tourism and their growth 2002 – 2007 are presented below. (table 2).

Table 2

Rural touristic accommodation structures and the capacities in Bran –Moeciu agro-touristic region

Specification	2002	2003	2004	2005	2006	2007
Total accommodation structures from Bran agro-touristic region	114	202	292	373	410	494
Rural touristic pensions	113	201	289	368	406	487
Touristic Inns	1	1	2	4	3	6
Holiday villages	0	0	1	1	1	1
Total accommodation structures from Moeciu agro-touristic region	108	227	312	395	412	465
Rural touristic pensions	106	222	306	389	403	456
Touristic Inns	2	4	6	5	8	9
Holiday villages	0	1	0	1	1	0
Total accommodation structures from Bran -Moeciu agro-touristic region	222	424	604	768	822	959
Total touristic accommodation capacity (touristic beds) from Bran	1138	1712	2340	4586	5982	6234
Rural touristic pensions	1114	1688	2216	4416	5820	6002
Touristic Inns	24	24	36	82	74	144
Holiday villages	0	0	88	88	88	88
Total touristic accommodation capacity (touristic beds) from Moeciu	1274	1984	3966	5060	6660	7346
Rural touristic pensions	1234	1846	3860	4890	6440	7200
Touristic Inns	40	78	106	88	138	146
Holiday villages	0	60	0	82	82	0
Total touristic accommodation capacity (touristic beds) from Bran-Moeciu agrotouristic region	2412	3696	6306	9646	12642	13580

As it can be noticed the agro-touristic activities within this region are well represented.

The methodological characteristics of the SWOT analysis permitted the drawing up of strategies adapted to the specificity of the development of Bran – Moeciu region (table 1):

- S – O (Strengths – Opportunities): pursuing opportunities of regional rural tourism services that are most suited to strengths;
- W – O (Weaknesses – Opportunities): overcoming weakness that appear in rural tourism activities and pursuing opportunities;
- S – T (Strengths – Threats): identifying ways of taking advantage of strengths in the rural tourism activity in order to diminish external threats;
- W- T (Weakness – Threats): establishing a defensive plan in order to prevent a

situation in which weakness occurring in rural tourism activities becomes extremely vulnerable to external threats.

The Strengths presented as: the good geographic position of Romania, a territory placed at the crossing roads of the main European acces roads, North – South, East – West, important for the bussines tourism, the beauty of the landscapes, the favorable conditions for accommodation and the traditional Romanian hospitality and creativity, the Romanian rich ethnography and folklore, the Romanian typical dishes, all these offer good Opportunities to develop a quality agro – touristic services.

The Weaknesses in the field are revealed by a lack of capacity and modernisation in some agro – touristic units, the fact that the hygienic conditions are not always strictly respected, and the small number of specific endowments for the entertainment.

The Threats are given by the facts that the Romanian infrastructure is still not so good and the public roads have a significant role in the development of tourism. Concernng the agro – tourism, there is always a big concurence with the other types of tourism, at the seaside or in the mountains, types of tourism that have already an old tradition in Romania, etc.

The Opportunities are given by the Strenghts and also by the investments that can be made in agro – tourism, by the possibility of creation of new association to sustain the development and the improvement of agro – tourism, a better publicity at national and international level of this kind of tourism, etc.

The indicators showing the economic agents` activity in rural tourism are the demand, the offer, the touristic circulation, the quality of the rendered activity in the rural space, expenses and value results.

The surface area for the recreational activities within the structure of the land belonging to the Bran – Moeciu region supplements the potential priorities of the region's rural tourism. The potentialities given by the relief, natural conditions (flora and fauna, climate, natural reservations and natural monuments), anthropology (social- economic potential, the village and its touristic potentialities, handcraft traditions), historical vestiges and architecture (the structure of the settlement), the presence in the field of a legendary spirit of an important Romania historic figure, Dracula or Vlad the Impaler at Bran Castle, knew as Dracula `s Castle, a place the attracts lots of tourists and give a good publicity to the region and to the entire country; the existence in the region of two old churches dating from the 18th century, an ethnographic museum, many memorial houses of different important Romanian personalities, etc. All these aspects constitute basic touristic attraction elements for the Bran – Moeciu region.

The rural territorial infrastructure within Bran – Moeciu region conditions the intensity of touristic activity, an important role belonging to public roads, dwelling capacities, technical – architectural infrastructure etc.

The territorial structures of the rural tourism in Bran – Moeciu region are characterized by an increasing pace within the dynamics of the period 2002 – 2007. The number of rural touristic reception units, the accommodation capacity both the existent one and the one in service, etc. are very significant. Within the activities structure there may be delineated a cultural tourism, activities for the youth etc.

3. CONCLUSIONS

3.1. The statistics show that the accommodation structures and capacities for the agro – touristic Bran – Moeciu region are well represented, but there is still enough place for the development and the improvement of the existing infrastructure and the quality of services.

3.2. The SWOT analysis proved that the steps made in the romanian agro-tourism and especially in Bran – Moeciu region, are big steps towards a reliable agro – tourism, that are still some threats and weaknesses that had to be corrected, but there is a very optimist view towards the big opportunities that we still have and we need to apply.

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MORPHOLOGICAL FEATURES IN SUINA POPULATIONS OF BAZNA BREED, GROWN IN FARMSTEADS FROM CLUJ COUNTY INCIDENCE

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Key words: multiparous sows, morphological indices

SUMMARY

As thought to help those interested in the suina selection work and to bring more scientific information concerning some morphological features' knowledge in multiparous sow populations of Bazna breed, the present work paper tackles some aspects bound up with the average values of some body sizes, which depending on these body region interdependence can offer the possibility to estimate on the basis of some conformation indices the female biological material destined to reproduction.

INTRODUCTION

Although the present tendency of pig meat consumers are oriented to products with a low fat content and even to ecological products, the native suina breeds and populations from Romania can be permanently sources of genes favorable to obtain hybrids able to offer qualitative superior carcasses.

1. MATERIALS AND METHODS

The researches were effected at random on a number of 65 heads of multiparous sows bred in farmsteads from Cluj County incidence.

în the first phase, the primary data in absolute values were obtained by direct measurements with tools used in the biometry works specific for suina: the body weight, the height at withers, the height at croup, the body length, the trunk length, the thoracic perimeter and the whistle perimeter.

In the second phase, the obtained data were statistically processed on the basis of acknowledged techniques, and through them were established some indices of body conformation.

2. RESULTS AND DISCUSSIONS

As concerning the average values and the body size variability measures registered for 65 multiparous sows, all are presented in *Table 1*.

So the average value of body weight was 157.15 ± 0.63 kg, value that is in the limits of requirements imposed by the breed standard.

The average values of height at withers and croup were 71.07 ± 0.48 cm, respectively 70.81 ±0.52 cm.

Table 1

The average value and the body size variability measures in multiparous sows

Features	U.M.	n(heads)	X ± s x	s	V%
Body weight	kg	65	157.15 ±0.69	3.70	2.36
Height at withers	cm	65	71.07 ±0.48	2.61	3.54
Height at croup	cm	65	70.81 ±0.52	2.04	3.17
Body length	cm	65	136.54 ±0.59	3.27	2.39
Trunk length	cm	65	106.46 ±0.45	2.47	2.32
Thoracic perimeter	cm	65	131.22± 0.51	2.84	2.16
Whistle perimeter	cm	65	14.36 ±0.04	0.25	1.62

From the same table data comes out that the body length and the croup one presented average values of 136.54 ± 0.59 cm, respectively 106.46 ± 0.45 cm.

As concerning the average values of measured perimeters (thoracic and of whistle), they were 131.22 ± 0.51 cm, respectively 14.36 ± 0.04 cm.

The calculation of some frame morphological indices (the lateral body frame index), organic ones (the compactness or robustness index and the productive type one) and for the volume (the massiveness index) was put into evidence the values presented in Table 2.

Table 2

Morphological indices registered in the studied multiparous sows

Indices	Values (%)
Lateral body frame index	149.79
Compactness index	96.10
Productive type index	104.05
Massiveness index	184.63

So, as concerning the lateral body frame index, this one presented the average value of 149.79%; the compactness index presented an average value of 96.10%; the productive type index presented an average value of 104.05.13% and the massiveness one 184.63%.

3. CONCLUSIONS

After this effected study and with the obtained results, can be formulated the subsequent conclusions:

- the average values and the registered variability measures were influenced in a large measure by the sows' age, the majority of them being at the 3rd and the 4th parturition;
- the studied morphological indices presented relative values influenced by the sows' age, but are typical for the suina populations of Bazna breed, grown in Transylvania.

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RESEARCHES ON PERFORMANCES OF RAISING FREE-RANGE CHICKENS

CERCETĂRI PRIVIND PERFORMANȚELE DE CREŞTERE ALE PUILOR DE GĂINĂ DE TIP „FREE-RANGE”

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Cuvinte cheie: free-range, spor mediu săptămânal, consum specific, viabilitate
Key words: free-range, weekly medium weight gain, specific consumption, viability

SUMMARY

The eco-agriculture represents a system meant to obtain agri-food products without using synthetic chemical products according to specific regulations of eco-production; this system has been widely expanding in the last 20 years all over the world.

Our researches were performed at SDE Avicola Moara Domnească farm during a 56 days' period, on 150 birds (Barred Plymouth Rock). The birds were distributed in three treatment groups according to three nutritive values of the mixed fodder (FM, F1, F2). Pursuant the results processing, we found that the best weight gain was recorded in FM group (a daily average gain of 36.83±0,78 g). The lowest value for the specific consumption was recorded in F1 group (very significant differences between the groups) and the highest viability was recorded in FM one.

The important demand for non-pollutant eco-agri-food products, with a reduced level of harmful influence over the human beings' health, requires increasing concern for the production, management and marketing of agricultural products (poultry included), obtained under ecological conditions.

The researches presented in this paper are also related to this context both by settling the qualitative and quantitative features of eco-chickens and a likely decrease of production costs by varying the values of energy and protein within the mixed fodder structure used for these chickens.

1. MATERIAL AND METHOD

The experiment was organized at S.D.E. Avicola Moara Domnească farm, the bio-basis of the University of Agricultural Sciences and Veterinary Medicine, Bucharest, on free range broilers, distributed in three uniform experimental variants, according to the individual body weight and to the sex ratio. The block experimental plan was used. Barred Plymouth Rock chickens were selected for this experiment.

The raising was performed according to the standard technology, under the same conditions; food and water available *ad libitum*.

Three treatments, on each experimental group, were performed in order to determine the qualitative and quantitative features. All experiments were conducted in the same period of time, on the same biological material and in the same unit.

The experimental chart (one for each experimental poultry group) was as follows:

- Treatment I (FM): constant energetic level and constant protein level;
- Treatment II (F1): variable protein level and constant energetic level;
- Treatment III (F2): constant protein level and variable energetic level.

The experiment was carried out on five groups of 10 birds for each treatment. (see Table 1).

The experimental period was of 56 days using biphasic feeding technology.

The mixed fodder used in experiments was produced in I.B.N.A.-Baloteşti, according to the nutritional requirements of the poultry, on the basis of the experimental chart.

During the experiment, there were settled and weekly recorded the following performance values for each poultry type, treatment and group: live weight, feed consumption and viability.

Table 1

Experimental schedule for „free - range” poultry

No/ no	Specification	Units	Phase					
			Growth			Finishing		
			T_1	T_2	T_3	T_1	T_2	T_3
1	Duration	days	28	28	28	28	28	28
2	Stock	Birds	50	50	50	50	50	50
3	Groups	No	5	5	5	5	5	5
4	Metab. energ.	MJ/kg	100	100	93.46	100	100	93.37
5	Protein	%	100	95.36	100	100	95.12	100

The obtained data were recorded and statistically processed. Multiple Student Test was used for interpreting the significance of differences between groups.

2. RESULTS AND DISCUSSIONS

Weekly results obtained in raising free-range poultry are shown in Tables 2-5.

As regards the body weight (see Table 2), the best performances were recorded in FM group (constant energetic level and constant protein level – 2096.14 g per 8 weeks); the lowest performances were recorded in F2 group (variable energetic level – 1964.08 g at the same age).

The weekly growth gain (see Table 3), increasing up to the age of six weeks, is generally higher – as in the case of weight – for the FM variant and with a variable hierarchy for the other two variants.

The weekly mixed fodder consumption (see Table 4) is generally on top in FM group and at lowermost in F1. In the eighth week of growth, the food consumption is lower at F1 with 11.9 per cent in comparison with FM and with 8.8 per cent in comparison with F2.

The weekly mortality rate in free-range poultry (see Table 5) is quite high in the first week, especially in FM and F2 groups; later on it occurs at odd intervals at different variants and it is present at a greater level at the total percentage at F2.

Table 2

Evolution of body weight in Free-range Poultry (grams)

Specification		Group					
		F M		F 1		F 2	
		X	S_X	X	S_X	X	S_X
Week	1	98.12	1.33	107.78	1.27	109.85	1.25
	2	240.64	3.89	235.34	3.55	233.94	3.07
	3	473.89	7.98	428.20	6.70	426.31	7.27
	4	747.71	13.47	654.91	12.82	610.42	11.98
	5	1031.96	19.51	965.09	17.97	914.33	19.62
	6	1409.97	28.99	1360.14	32.08	1312.26	30.95
	7	1763.24	35.34	1700.11	42.48	1651.95	41.65
	8	2096.14	43.91	2012.19	46.14	1964.08	55.59

Table 3

Evolution of weekly gain in Free-range Poultry (grams)

Specification		Group					
		F M		F 1		F 2	
		X	S_X	X	S_X	X	S_X
Week	1	64.34	1.10	73.20	1.82	76.27	1.53
	2	142.52	2.67	127.56	2.64	124.09	2.36
	3	233.25	4.95	192.86	3.21	192.37	4.91
	4	273.82	5.98	226.71	6.14	184.11	6.17
	5	284.25	6.44	310.18	8.36	303.91	8.90
	6	378.01	11.96	395.05	15.02	397.93	14.36
	7	353.27	7.51	339.97	12.20	339.69	12.35
	8	332.90	11.02	312.08	13.06	312.12	12.07

Table 4

Evolution of the weekly mixed fodder consumption in Free-range Poultry (grams)

Specification		Group					
		F M		F 1		F 2	
		X	S_X	X	S_X	X	S_X
Week	1	140.20	1.28	154.20	1.28	149.43	1.08
	2	256.42	4.81	228.88	4.85	235.05	4.56
	3	466.51	9.91	385.72	6.41	403.94	10.32
	4	629.79	13.74	498.87	13.51	411.27	14.92
	5	710.52	16.10	744.42	20.06	727.47	21.43
	6	1058.51	33.49	1027.14	39.04	1034.44	37.33
	7	1095.25	23.27	951.91	34.17	979.31	36.24
	8	1098.37	36.38	967.41	40.49	1061.06	41.03

Table 5

Evolution of mortality rate in Free-range Poultry (percentage)

Specification		Group					
		F M		F 1		F 2	
		X	S_X	X	S_X	X	S_X
Week	1	4	0,78	2	0,63	4	0,78
	2	0	0	2	0,64	2	0,64
	3	0	0	0	0	0	0
	4	2	0,64	0	0	0	0
	5	0	0	2,2	0,70	2	0,63
	6	0	0	0	0	0	0
	7	2	0,65	2,2	0,70	0	0
	8	0	0	0	0	2,2	0,72

Final production performances are shown in Table 6 and Figure 1.

Free-range poultry (see Table 6 and Figure 15) can reach an average live weight value ranging between 2096.14 g at FM and 1964.8 g at F2. The average daily growth gain follows a hierarchy similar to the variants – that is 36.83 g at FM and 34.47 g at F2; still, the differences between variants are not statistically ensured.

The best specific consumption is achieved by F1 group (2.51), followed by F2 (2.58), and FM has the lowest level for the feed valuation (2.64). Differences between all variants are very significant. Viability is better at FM (8% mortality rate) and F1 (8.4% mortality rate) in comparison with F2 (10.2% mortality rate), yet without a statistical evidence.

As a conclusion, for the free-range poultry, the best results are obtained in groups with variable energy or protein level, which presents a significantly better food valuation.

Table 6

Final production performances in Free-range Poultry

No/ No	Specification	unit	Group					
			F M		F 1		F 2	
			X	S_X	X	S_X	X	S_X
1	**Live weight**	g	2096.14	43.91	2012.19	46.14	1964.08	50.59
2	**Student Test**	-	FM-F1=0.929		F1-F2=0.496		F2-FM=1.393	
3	**Daily average gain**	g	36.83	0.78	35.31	0.83	34.47	0.91
4	**Student Test**	-	FM-F1=0.938		F1-F2=0.481		F2-FM=1.392	
5	**Specific consumption**	kg	2.64	0.01	2.51	0.01	2.58	0.01
6	**Student Test**	-	FM-F1=19.326		F1-F2=11.150		F2-FM=10.292	
7	**Cummul. Mortality rate**	%	8.00	0.65	8.40	1.69	10.20	1.15
8	**Student Test**	-	FM-F1=0.058		F1-F2=0.212		F2-FM=0.412	

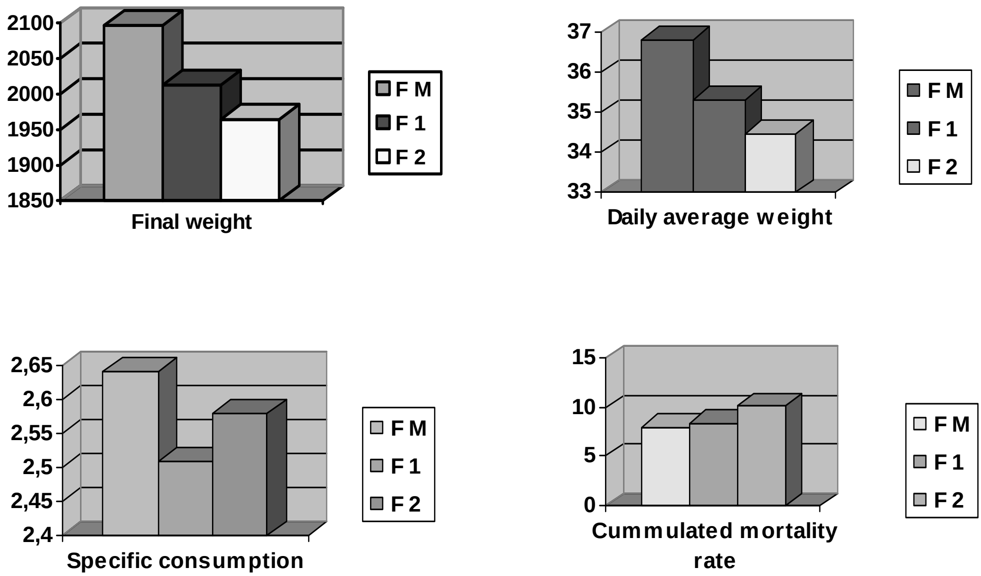

Figure. 1 **Free-range poultry: Final production performances**

3. CONCLUSIONS

Following the experiment, the recorded final performances for the ecological free-range poultry are as follows:

- The live weight values vary in between 1964.08 ± 50.59 g at F2 şi 2096.14 ± 43.91 g at FM;
- The average daily gain reached its highest level at FM (36.83 ± 0.78 g) and the lowest at F2 (34.47 ± 0.91);
- The specific consumption varied between 2.51 ± 0.01 at F1 and 2.64 ± 0.01 at FM;
- The cummulated mortality rate values range between 8.00 ± 0.65 percent at FM and 10.20 ± 1.15 percent at F2;
- There are significant differences in the specific consumption (FM – F1, FM – F2 and F1 – F2).

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RESEARCHES ON GROWTH PERFORMANCES IN BIO-POULTRY

CERCETĂRI PRIVIND PERFORMANȚELE DE CREŞTERE ALE PUILOR DE GĂINĂ DE TIP „BIO”

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Cuvinte cheie: bio, spor mediu săptămânal, consum specific, viabilitate
Key words: bio, weekly average gain, specific consumption, viability

SUMMARY

The important demand for non-pollutant eco-agri-food products, with a reduced level of harmful influence over the human beings’ health requires an increasing concern for the production, management and marketing of agricultural products (poultry included), obtained under ecological conditions.

Our researches were conducted at SDE Avicola Moara Domnească farm on 150 bio-birds (Barred Plymouth Rock). The birds were distributed in three treatment groups according to three nutritive values of the mixed fodder (EM, E1, E2). The experimental period was of 84 days, according to the ecological broilers’ growth technology. Pursuant the results processing, we found that the best weight gain was recorded in E1 group (a daily average gain of 29.23±0.82 g). The lowest value for the specific consumption was recorded in EM group (distinctly significant differences between the groups – EM / E1 and very significant differences – E1/ E2 and E2 / EM). The highest viability was recorded in EM group (92.8 per cent).

The poultry meat production estimated average growth rate is of 2.2 per cent annually, until 2014, due to an increasing demand. Considering this point of view, the expectations for aviculture are quite good. Within this context, a development of the ecological aviculture subsector is also expected, since it is estimated that until 2013, the market rate for ecological poultry meat should reach 4-5 per cent for all three categories: Certified, Bio and Free-range. And yet, the production growth shall also lead to an increase of the costs paid by the breeders, including the need of a lower cost in order to economically compete on the global market (increasingly competitive nowadays), costs for poultry comfort and food security standards, costs for disease control and for the bio-security conditions.

The authors of this research aim to analyse the qualitative and quantitative features of eco-broiler chickens and to find a way of production cost decrease by varying the values of energy and protein within the mixed fodder structure used for the poultry.

1. MATERIALS AND METHODS

The experiment was organized at S.D.E. Avicola Moara Domnească farm, the bio-basis of the University of Agricultural Sciences and Veterinary Medicine, Bucharest, on bio-broilers (Barred Plymouth Rock), distributed in three uniform experimental variants, according to the individual body weight and to the sex ratio. The block experimental plan was used.

The raising was conducted according to the standard technology for bio-poultry, under the same raising conditions; food and water available *ad libitum*.

Three treatments, on each experimental group, were performed in order to determine the qualitative and quantitative features. All experiments were performed in the same period of time, on the same biological material and in the same unit, using 5 groups (10 birds each per treatment) – See Table 1.

The experimental chart was as follows:

- Treatment I (M): constant energetic level and constant protein level;
- Treatment II (E1): variable protein level and constant energetic level;
- Treatment III (E2): constant protein level and variable energetic level.

The experimental period was of 84 days using the biphasic feeding technology.

During the experiment, the following performance values were found and recorded weekly: live weight, feed consumption and viability.

Table 1

Experimental schedule for bio poultry

No/ no	Specification	Units	Phase					
			Growth			Finishing		
			T_1	T_2	T_3	T_1	T_2	T_3
1	Duration	zile	28	28	28	56	56	56
2	Stock	cap.	50	50	50	50	50	50
3	Groups	nr.	5	5	5	5	5	5
4	Metab. Energ.	MJ/kg	100	100	93.46	100	100	92.90
5	Protein	%	100	95.00	100	100	94.51	100

The weekly specific and cummulated consumption values were calculated using the data on average gain and mixed fodder consumption values.
Outputs due to mortality were daily recorded; thus the mortality rate percentage could be calculated both weekly and for the entire growth period (cummulated).

The obtained data were recorded and statistically processed. Multiple Student Test was used for for interpreting the significance of differences between groups.

2. RESULTS AND DISCUSSIONS

The weekly results obtained during the experiment for bio-broiler production are shown in Tables no/no 2 – 5. Table 2 shows the weekly average body gain, during the entire growth period (that is of 12 weeks).

It is noticeable that the weight increases with age; the maximum difference between the experimental groups increases from 7.3 g (at the age of 1 week) between groups EM and E2, to 26.90 g (at the age of 7 weeks) between E1 and E2 and to 56.30 (at the age of 12 weeks) between groups E1 and E2.

Yet, proportionally, the differences decrease, generally with age, between the same groups, from 10 per cent (at the age of 1 week) to approx. 2 per cent (at the age between 7 to 12 weeks).

Obviously, the experimental variants have no statistic insurance for none of the possible ages for broiler marketing.

Table 2

Evolution of body weight in Bio-Poultry (grams)

Specification		Group					
		E M		E 1		E2	
		X	S_X	X	S_X	X	S_X
Week	1	72.79	0.75	68.51	0.92	65.48	1.12
	2	169.40	2.46	160.06	2.26	159.82	2.34
	3	317.72	4.55	304.96	4.50	309.94	4.55
	4	518.54	9.83	496.80	7.76	513.16	7.56
	5	734.29	13.31	702.20	12.42	729.82	12.29
	6	976.82	18.14	934.11	17.33	975.26	18.11
	7	1221.00	23.69	1196.62	24.80	1223.52	26.41
	8	1466.03	42.26	1430.86	31.56	1473.11	32.29
	9	1712.60	42.62	1720.38	40.26	1717.45	39.32
	10	1960.51	40.37	1999.16	48.58	1957.67	44.92
	11	2209.15	52.93	2254.16	57.02	2197.65	49.23
	12	2456.00	62.02	2496.14	69.12	2439.84	55.28

The dynamics of the weekly gain in bio-poultry is shown in Table 3. According to calculations, the gain increases with age for all experimental groups, up to the age of six weeks. Poultry in all groups have the average gain values very close to one another, up to the age of three weeks.

Starting the age of 4 weeks and up to the age of 6 weeks, the E1 group (with variable protein) recorded lower values in comparison with the other variants; afterwards, the position in the result heirachy varies, exceeding the other groups between weeks 9 and 11, ceasing the growth with small differences (21 per cent), statistically not ensured.

Table 4 shows the evolution of the weekly feed consumption for bio-poultry. As shown by the results, the consumption values in different experimental groups are quite similar – E1 group excepted, which at the age of 9 and 10 weeks, has the mixed fodder consumption greater with 15.5 per cent in comparison with EM and with 9.47 per cent in comparison with E2, and also with the exception of E2, which, at the age of 8 weeks, consumes more than the other two groups with 13.1 – 10.9 per cent. In the last growth week, the consumption exceeds 1 kg and its values are quite similar, as the maximum differences between the group average is of 1.8 per cent.

The weekly viability in bio-poultry (see Table 5) is quite high; an equal mortality rate (2 per cent) is recorded for all groups; later on it occurs at odd intervals at different variants, E2 group excepted as it recorded serious loss (4.2 per cent) in the third week of the experiment.

Table 3

Evolution of weekly gain in Bio-Poultry (grams)

Specification		Group					
		E M		E1		E2	
		X	S_X	X	S_X	X	S_X
Week	1	38.10	0.76	35.06	0.71	31.90	0.95
	2	96.62	2.63	91.55	1.55	94.34	1.41
	3	148.32	6.99	144.90	2.83	150.12	2.84
	4	200.81	8.19	191.84	4.13	203.22	3.84
	5	215.76	5.11	205.41	5.91	216.66	5.02
	6	242.53	8.68	231.92	5.43	245.44	7.32
	7	244.18	7.01	262.51	7.96	248.26	9.83
	8	245.23	9.43	234.26	8.36	249.59	8.45
	9	246.60	12.75	289.52	11.87	244.34	9.19
	10	247.41	10.14	278.78	10.06	240.22	6.87
	11	249.12	13.27	255.13	9.80	239.98	7.77
	12	247.15	10.91	241.98	15.07	242.19	7.89

Table 4

Evolution of the weekly mixed fodder consumption in Bio-Poultry (grams)

Specification		Group					
		E M		E1		E2	
		X	S_X	X	S_X	X	S_X
Week	1	134.40	0.93	150.22	1.28	114.4	0.93
	2	235.19	6.34	221.23	3.98	237.75	4.09
	3	353.16	16.87	362.75	7.10	390.31	7.39
	4	521.04	21.29	498.54	10.74	548.67	10.38
	5	604.24	14.32	595.76	17.15	628.25	14.54
	6	730.80	25.68	718.85	16.84	760.76	22.68
	7	791.52	18.51	827.12	28.71	844.04	33.43
	8	822.80	27.31	810.08	31.78	923.50	31.26
	9	881.16	45.28	1042.19	42.74	952.79	35.82
	10	956.72	32.45	1087.22	39.22	984.89	28.16
	11	970.30	51.73	1045.40	40.19	1007.90	32.62
	12	1084.21	47.89	1064.55	66.33	1089.86	35.50

Table 5

Evolution of mortality rate in Bio-Poultry (percentage)

Specification		Group					
		E M		E 1		E2	
		X	S_X	X	S_X	X	S_X
Week	1	2	0.63	2	0.63	2	0.63
	2	0	0	2	0.64	4.2	0.82
	3	0	0	0	0	0	0
	4	2	0.64	0	0	2	0.65
	5	0	0	0	0	0	0
	6	0	0	2.2	0.70	0	0
	7	0	0	0	0	0	0
	8	2.2	0.71	0	0	0	0
	9	0	0	2.2	0.70	0	0
	10	0	0	0	0	2.2	0.72
	11	0	0	0	0	0	0
	12	0	0	0	0	0	0

Final production performances for bio-poultry are shown in Table 6 and Figure 1.

Bio-poultry can reach an average live weight value ranging between 2496.14 g at F1 and 2439.84 g at F2; the protein or energetic variation has no influence over the results which show no statistically ensured differences.

The average daily growth gain varies in the same way, the values range between 29.32 g at E1 şi 28.65 g at E2. The specific consumption is most favourable in EM group with constant protein and energetic levels and least favourable at E2 with variable energetic level (3.34 – 3.52).

All differences between groups are statistically ensured. Poultry viability is better at EM group (6.2 per cent mortality rate); the worst level is at E2 (10.4 per cent mortality rate); yet differences between variants are not statistically ensured.

As a conclusion, for the bio-poultry, the best results are obtained in group EM, where the specific consumption is very significantly lower, in comparison with the other variants.

Table 6

Final production performances in Bio-Poultry

No/ no	Specification	Units	Group					
			E M		E 1		E 2	
			X	S_X	X	S_X	X	S_X
1	**Live weight**	g	2456.00	62.02	2496.14	69.12	2439.84	55.28
2	**Student Test**	-	EM-E1=0.305		E1-E2=0.451		E2-EM=0.137	
3	**Daily average gain**	g	28.83	0.74	29.32	0.82	28.65	0.67
4	**Student Test**	-	EM-E1=0.312		E1-E2=0.453		E2-EM=0.128	
5	**Specific consumption**	kg	3.34	0.01	3.42	0.01	3.52	0.01
6	**Student Test**	-	EM-E1=6.86		E1-E2=11.15		E2-EM=20.07	
7	**Cummul. Mortality rate**	%	6.20	1.36	8.20	1.18	10.40	1.56
8	**Student Test**	-	EM-E1=0.247		E1-E2=0.269		E2-EM=0.472	

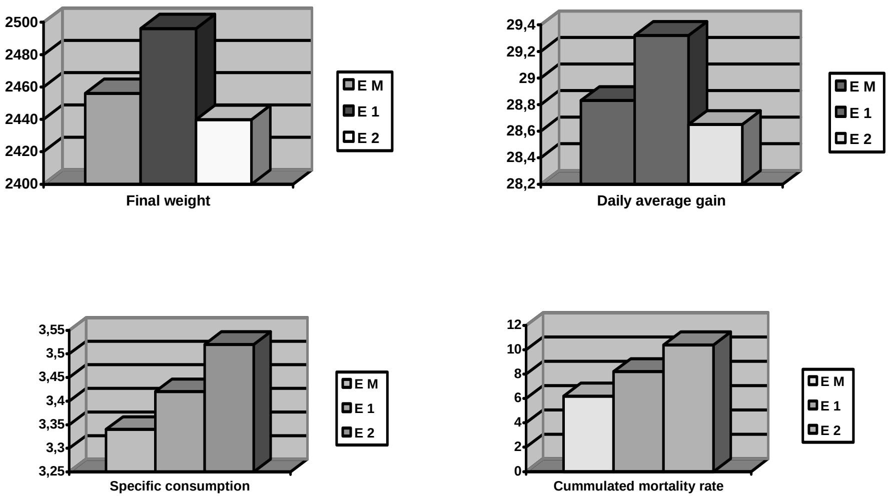

Figure. 1 Bio poultry: Final production performances

3. CONCLUSIONS

Following the experiment, the recorded final performances for the ecological bio poultry are as follow:

- The live weight values vary in between 2439.84 ± 55.28 g, at E2 and 2496.14 ± 69.12 g, at E1;
- The average daily gain reached the highest level at E1 group (29.32 ± 0.82 g) and the lowest at E2 group (28.65 ± 0.67);
- The specific consumption varies between 3.34 ± 0.01 at EM and 3.52 ± 0.01 at E2;
- The cummulated mortality rate values range between 6.20 ± 1.36 percent at EM and 10.40 ± 1.56 percent at E2;
- in the specific consumption there are distinctively significant differences (EM – E1) and very significant, (E1 – E2 and E2 – EM).

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5. TECHNOLOGIES OF THE AGRO FOOD PRODUCTS PROCESSING

MICROSATELLITE ANALYSIS – FOR THE STUDY OF BIODIVERSITY AND TRACEABILITY TO ANIMALS

ANALIZA MICROSATELITILOR - PENTRU STUDIUL BIODIVERSITATII SI TRASABILITATII LA ANIMALE

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SUMMARY

Traceability of animals and animal products has a priority for governments of the European countries. The great development reached by the molecular genetic in last decades, has determined a high knowledge of the genome of the different species. The Deoxyribonucleic Acid (DNA) of each animal is different (with the exceptions of monozygotic twins and clones). Since the genome of each animal contains approximately three billion DNA units, the range for variation among the DNA sequences of animals is enormous, consequently DNA markers analysis allows assuring a traceability of 100% in the meat industry. A methodology using 17 ISAG (International Society for Animal Genetics) DNA microsatellite markers is proposed for meat traceability.. Principal methods used to reveal DNA polymorphism are described as their applicability in species identification and meat traceability.

INTRODUCTION

The analytical methods used for species identification and authenticity of foods rely mainly on protein and DNA analysis. The protein-based methods include immunological assays electrophoretical and chromatographic techniques. More recently, DNA molecules have been the target compounds for species identification due to the high stability compared with the proteins, and also to their presence in most biological tissues, making them the molecules of choice for differentiation and identification of components in foods, and a good alternative to protein analysis. Most DNA-based methods for species identification in foods consist on the highly specific amplification of one or more DNA fragments by means of polymerase chain reaction (PCR).

Objectiv

· Meat quality: analysis/genotyping of several markers for marbling and tenderness of meat.

- Proof of identity, e.g. forensics or food quality control
- Diagnosis of in herited diseases
- *PRNP*-genotyping (“stress and F18+ E. coli -resistance” test)
- QTL analyses
    ↓ identification of QTLs
    ↓ marker assisted selection with bottom-up design

1. MATERIALS AND METHODS

- Tissue samples were collected from sheep of the test station and herds at the Bayerische Landesanstalt (Grub, Germany) using Typifix system
- About 1200 DNA-samples were prepared for long-term storage
- 9 microsatellites were amplified in multiplex reactions and analysed on ABI310 genetic analyser
-

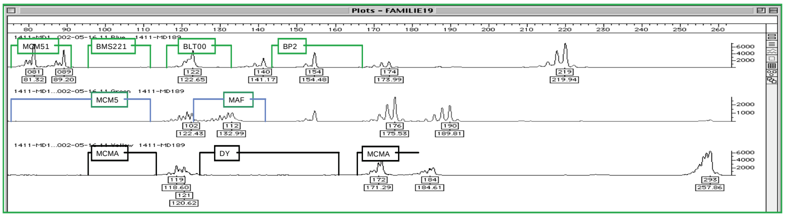
1. Tissue collection with TypiFixTM –System

The TypiFix™ ear tag system is a combination of a conventional ear tag with a simultaneous tissue sampling technology. By ear tagging the farm animals, the tissue samples are automatically collected and sealed in the TypiFix™ sample containers, where the tissue samples are preserved at ambient temperature and can be used for protein or DNA based assays. The sample container is connected to the eartag by a plug and socket and is easily removed after the eartag has been affixed and the tissue sample simultaneously collected. If desired, the sample container can also be used without the eartag

2. DNA purification with DNA *FIX* columns an extremely simplified and shortened one-step high-throughput separation procedure of genomic DNA from TypiFix™ samples. The sorbents retain protein and other contaminants, while the DNA passes the column in the exclusion volume.

2. RESULTS AND DISCUSSIONS

- Microsatellite amplification was successful from all but 5 samples



Gel electrophoresis of NCC™ purified DNA from 88 TypiFix™ eartag samples

5 µl (total elution volume: 240 µL) of each sample were loaded on a 1% agarose/ EtBr gel. The DNA concentration is about 10 ng/µl or greater,n = negative control

Ranked list of recommended markers by species:

Cattle	Buffalo	Yak	Goat	Sheep	Pig	Horse	Donkey	Chicken	Camelids
INRA063	CSSM033	AGLA293	SRCRSP5	MAF65	S0026	HMS07	HMS07	ADL0268	CMS9
INRA005	CSSM038	BM1824	MAF065	OarFCB193	S0155	HMS06	HMS06	MCW0206	CMS13
ETH225	CSSM043	BM2113	MAF70	OarJMP29	S0005	HTG07	HTG07	LEI0166	CMS15
ILSTS005	CSSM047	CSSM066	SRCRSP23	OarJMP58	Sw2410	AHT05	AHT05	MCW0295	CMS17
HEL5	CSSM036	ETH152	OarFCB48	OarFCB304	Sw830	HTG04	HMS03	MCW0081	CMS18
HEL1	CSSM019	ETH225	INRA023	BM8125	S0355	HMS02	HMS02	MCW0014	CMS25
INRA035	CSRM060	HEL1	SRCRSP9	OarFCB128	Sw24	ASB02	HTG06	MCW0183	CMS32
ETH152	CSSM029	HEL5	OarAE54	OarCP34	Sw632	HMS03	HTG10	ADL0278	CMS50
INRA023	CSSM041	HEL13	SRCRSP8	OarVH72	Swr1941	HTG06	AHT04	MCW0067	CMS121
ETH10	CSSM057	ILSTS008	SPS113	OarHH47	Sw936	HTG10	ASB17	MCW0104	CVRL01
HEL9	BRN	ILSTS028	INRABERN172	DYMS1	S0218	AHT04	ASB23	MCW0123	CVRL02
CSSM66	CSSM032	INRA005	OarFCB20	SRCRSP1	S0228	VHL20	LEX33	MCW0330	CVRL05
INRA032	CSSM008	MGTG4B	CSRD247	SRCRSP9	Sw122	ASB17	LEX34	MCW0165	CVRL06
ETH3	CSSM045	MGTG7	McM527	MCM140	Sw857	ASB23	SGCV28	MCW0069	CVRL07
BM2113	CSSM022	TGLA53	ILSTS087	MAF33	S0097	LEX33	LEX68	MCW0248	LCA66
BM1824	CSSM046	TGLA57	INRA063	MAF209	Sw240	UCDEQ425	COR058	MCW0111	VOLP03
HEL13	CSSM013	TGLA73	ILSTS011	INRA063	IGF1	LEX34	COR069	MCW0020	VOLP08
INRA037	ETH003	TGLA122	SRCRSP7	OarFCB20	Sw2406	SGCV28	VHL209	MCW0034	VOLP10
BM1818	CSSM061	TGLA126	ILSTS005	BM1329	Sw72	COR058	ASB02	LEI0234	VOLP32
ILSTS006	BMC1013	TGLA227	SRCRSP15	MAF214	S0226	COR069	HMS20	MCW0103	VOLP67
MM12	DRB3	ETH185	SRCRSP3	ILSTS11	S0090	VHL209	COR007	MCW0222	YWLL 08
CSRM60	CSSM062	ILSTS013	ILSTS029	OarFCB226	Sw2008	COR007	LEX54	MCW0016	YWLL 09
ETH185	CSSME070	ILSTS050	TGLA53	ILSTS28	Sw1067	LEX54	LEX73	MCW0037	
HAUT24	ETH121	SPS115	ETH10	MAF70	S0101	LEX73	COR022	MCW0098	
HAUT27	ILSTS033	BM861	MAF209	BM1824	Sw1828	COR022	LEX63	LEI0094	
TGLA227	ILSTS005	BYM-1	INRABERN185	HUJ616	S0143	LEX63	COR018	MCW0284	
TGLA126	ILSTS030	INRA189	BM6444	OarCP38	S0068	COR018	COR071	MCW0078	
TGLA122	ILSTS008		P19 (DYA)	ILSTS5	S0178	COR071	HMS45	LEI0192	
TGLA53	RM099		TCRVB6	OarAE129	Sw911	HMS45	NVHEQ054	ADL0112	
SPS115	HMH1R		DRBP1	SRCRSP5	S0002	COR082	COR082	MCW0216	
				MCM527					

for Scrapie-genotyping of sheep

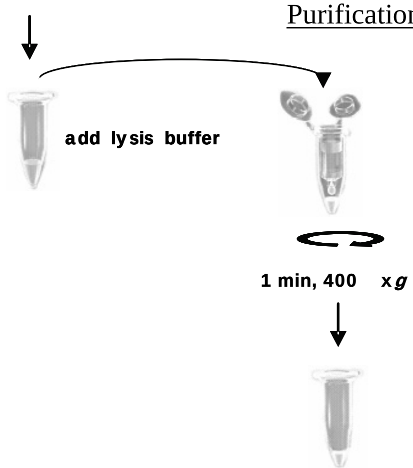
Sample collection

of small tissue probes with the TypiFix™ system

Sample aquisition

error-free sample processing in the lab by automatic aquisition of the sample ID and transcription into the data base

Purification of nucleic acids more than 5 x faster

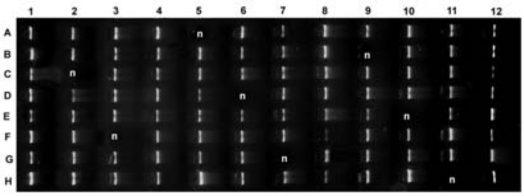


DNA purification with dna*FIX* columns

an extremly simplified and shortened one-step

high-throughput separation procedure of genomic DNA from TypiFix™ samples. The sorbents retain protein and other contaminantes, while the DNA passes the column in the exclusion volume

Reproducible DNA yield and quality

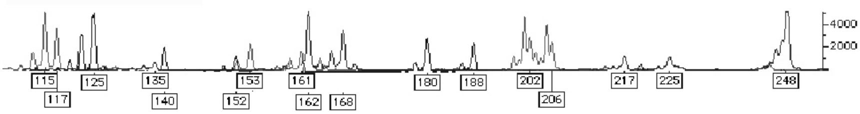


Gel electrophoresis of dnaFix purified DNA from 88 TypiFix™ samples

5 µl (total elution volume: 240 µL) of each sample were loaded on a 1% agarose/ EtBr gel. The DNA concentration is about 5 ng/µl or greater, n = negative control

Moleculargenetic analysis

PCR



Scrapie-Genotyping

DNA profile of pig samples obtained by analysis of 10 microsatellite markers and results of identity control

Sample informations					
Lab no.	**Typifix no.**	**Animal ID**	**Sample**		**Sex**
US080007	1	1	animal	Peris	
US080008	51	51	animal	Peris	
US080014	57	57	meat	Peris	
US080009	52	52	animal	Peris	
US080015	58	58	meat	Peris	
US080010	53	53	animal	Peris	
US080017	60	60	meat	Peris	
US080011	54	54	animal	Peris	
US080016	59	59	meat	Peris	
US080012	55	55	animal	Peris	
US080018	61	61	meat	Peris	
US080013	56	56	animal	Peris	
US080019	62	62	meat	Peris	
US080039	94	RO3072556672	animal	Rusetu	m
US080040	95	RO3074328144	animal	Rusetu	m
US080041	96	RO3072977509	animal	Rusetu	w

Microsatellite markers																			
S0005		**S0090**		**S0101**		**S0155**		**S0355**		**S0386**		**SW24**		**SW240**		**SW857**		**SW951**	
231	235	242		211		158	160	245	273	174	176	101	107	93	105	143	149	120	
239		242	246	211		160	162	245		174		107	113	95	111	147	149	120	122
239		242	246	211		160	162	245		174		107	113	95	111	147	149	120	122
239		242	246	195	213	156	158	245	259	174		93	101	91	107	139	151	120	
239		242	246	195	213	156	158	245	259	174		93	101	91	107	139	151	120	
201	219	244	250	211	213	160	162	245	249	174		93	101	93	107	139	149	120	
201	219	244	250	211	213	160	162	245	249	174		93	101	93	107	139	149	120	
227	239	242		209	211	156	158	245	249	174	176	99	117	95		149	151	120	122
227	239	242		209	211	156	158	245	249	174	176	99	117	95		149	151	120	122
215	229	240	246	209		158	160	245	273	174	176	113		95		139	149	120	
215	229	240	246	209		158	160	245	273			113		95		139	149	120	
219	239	242	246	209	213	148	158	245	259			101		93	95	147	155	120	
239	245	240	250	209	211	160		245	249	174	176	107	113	91	111	139	143	120	
219	245	240	244	207	209	158	160	245	259	176	184	93	107	95	105	149		120	
221	245	244	246	195	209	158	160	245	259	168	176	113		95	105	149		128	

No.	Lab no.	Typifix no.	animal ID		Sex	Stress resistance	E.coli resistance
1	US080007	1	1	Peris		MM	BB
2	US080008	51	51	Peris		MM	BA
3	US080009	52	52	Peris		LM	BA
4	US080010	53	53	Peris		LM	BB
5	US080011	54	54	Peris		MM	BB
6	US080012	55	55	Peris		MM	BB
7	US080013	56	56	Peris		failed	failed
8	US080014	57	57	Peris		MM	BA
9	US080015	58	58	Peris		LM	BA
10	US080016	59	59	Peris		MM	BB
11	US080017	60	60	Peris		LM	BB
12	US080018	61	61	Peris		MM	BB
13	US080019	62	62	Peris		LM	BB
14	US080039	94	RO3072556672	Rusetu	m	MM	AA
15	US080040	95	RO3074328144	Rusetu	m	MM	BA
16	US080041	96	RO3072977509	Rusetu	w	MM	BB

MM = stress resistant, LM = stress resistant but genetic carrier, LL = not stress resistant

AA = E.coli resitant, BA = not resistant but genetic carrier, BB = not resistant

Stress resistance and F18+E.coli resistance of pigs

DNA profile of sheep samples obtained by analysis of 11 microsatellite markers

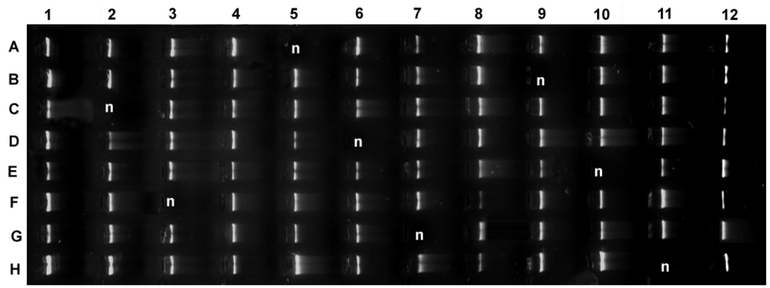
Sample Information				
Lab no.	**Typifix no.**	**Animal ID**		**Sex**
US080042	0080	RO1072726994	Rusetu	m
US080043	0081	RO1072353152	Rusetu	m
US080044	0082	RO1072353154	Rusetu	m
US080045	0083	RO1074538405	Rusetu	m
US080046	0084	RO1074538440	Rusetu	m
US080047	0085	RO1072726972	Rusetu	f
US080048	0086	RO1072726973	Rusetu	f
US080049	0087	RO1072727018	Rusetu	f
US080050	0088	RO1072726932	Rusetu	f
US080051	0089	RO1072726928	Rusetu	m
US080052	0090	RO1074538450	Rusetu	m
US080053	0091	RO1074538450	Rusetu	m
US080054	0092	RO1074538447	Rusetu	m
US080055	0093	RO1074538404	Rusetu	f

Microsatellite markers																					
HSC		INRA063		MAF214		OarAE129		OarCP49		OarFCB11		INRA005		INRA23		MAF65		McM527		SPS113	
263	269	170	182	189	191	135	145	82	84	133		142	146	201	205	127		171	173	134	142
275	277	176		189	191	135	149	80	98	121	125	132	144	201	205	127	135	167	169	134	142
273	275	170	204	191	259	145		80	106	123	133	136	142	199		125	129	171	173	134	142
269	271	168	178	189	191	145	147	80	82	133		136	144	201	207	127	133	165	167	136	142
271	277	168	176	191	223	145		98	122	133	135	128	136	205	217	127	133	165		134	142
269		168	170	187	191	145		90		123		132	148	199	215	127	129	167	169	132	146
267	277	170	184	187	257	145		82	100	121	143	126	136	201	211	125	129	167	171	134	142
271	275	178	202	187	257	145		82		135	143	134		201	211	137		169	171	134	142
269	271	190	194	187	189	135	145	96	100	121	125	114	142	199	201	127	129	167	171	142	
277		176	178	187	189	145		82	90	121	143	134	142	199	207	127	129	169	171	134	142
271	283	176	198	187	191	145		96	98	123	125	132	136	217		133	135	165	169	136	142
271	275	168	176	191	221	145		88	98	133	135	136		201	217	125	133	165	169	134	142
269	271	168	176	189		135	145	80	96	123	133	136	146	201	213	133	135	165	167		
271	277	168	178	191	257	145		80	90	133	143	128	136	201	217	119	127	165	171	134	

DNA profile of cattle samples obtained by analysis of 10 microsatellite markers

Sample Information Microsatellite markers

Lab no.	Typifix no.	Animal ID	Breed		Sex	BM1824 BM2113 ETH10 ETH225 ETH3 INRA23 SPS115 TGLA122 TGLA126 TGLA227 TGLA53
US080035	0076	0582	Simmental	Sercia	m	178 132 136 214 134 114 122 204 212 242 254 150 116 79 97 165
US080036	0077	0642	Simmental	Sercia	m	180 182 128 130 214 216 134 144 114 116 204 208 242 250 142 116 124 81 97 163 181
US080037	0078 169 173	0169	Simmental	Sercia	m	180 128 130 216 220 114 122 204 206 242 150 118 124 81 97
US080038	0079	0116	Simmental	Sercia	f	180 182 128 132 214 140 144 122 124 198 212 242 250 142 150 116 118 91 97 169 171



STUDIES CONCERNING THE INFLUENCE OF PIGS CARCASE QUALITY OVER TECHNOLOGICAL PROCESSES AT THE FILET OBTAIN

STUDII PRIVIND INFLUENȚA CALITĂȚII CARCASEI DE PORCINE ASUPRA PROCESELOR TEHNOLOGICE LA OBȚINEREA MUŞCHIULUI FILE

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Cuvinte cheie: porcine, carcasă, clasificare, EUROP, procesarea cărnii, muşchi file.
Key words: pigs, carcase, grading, EUROP, meat processing, muscle filet.

SUMMARY

The pork meat with products and preparations obtained from this occupies a special place in human nutrition. Swine production has direct implications on human food security given the growing on farms, the exceptional productivity and nutritional quality, sensory and technological of meat and meat products.

The meat quality has a particular importance, being closely correlated with yield in processing, also influencing industrialization technology and economic results obtained.

Quality of pig meat is influenced by a number of factors, booth pre and post-slaughter, the carcass grade expressed by the percentage of lean meat content being one of the most important.

In Romania, the pigs carcase grading is make in the basis of the regulations established through Order 457/2004 of MAFRD in the moment of weighing, on warm carcase (max. 45 min. from slaughtering). The commercial value of the carcase is determined through the muscle tissue estimated content (ratio between weight of the red muscle ensemble and the weight of the carcase), considering the weight of the carcase.

INTRODUCTION

The file muscle is a pork meat product with special organoleptic properties and high economic efficiency, being one of the most appreciates pork special products.

From the many factors with influence over the economic and technologic results, one of the main is the quality of the lean meat. In turn this is dependent on a number of factors involved before slaughter: race, individuality, growth and maintenance system, weight gain status, age at slaughter etc. these factors influencing both the quantity and quality of raw material production. The carcase grading is the actually method used to determine the results of slaughter and implicitly of the raw material for muscle file obtaining.

Grading is the quality carcase evaluation operation, considering the 3 majors components of this: meat, fat and bones.

EU was establishing a common procedure for to evaluate the carcase quality, respective the EUROP system which is enacted through the CEE 3220/1984 Regulation which is defined from the same parameters on all member states.

In Romania, the effective grading of the pigs carcases was started in 2006, taking into account the Order 457/2004 of the Ministry of Agriculture and Rural Development which transpose in the national legislation the provisions of the CEE 3220/1984 Regulation. The national commission including representatives of the private operators which activate in the

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meat domain: producers, processors, traders together with the representatives of the authorities. In this kind, the neutrality and the objectivity of the commission is guarantee.

1. MATERIALS AND METHODS

The present study was performed at the meat processing plant of SC SPAR SRL - Potcoava, Olt. The SPAR company develops growth, slaughter and meat processing activities in their own units in compliance with all legal provisions in force. SPAR SRL is the single unit in Olt county controlled by the European Union inspectors within the mission of DG SANCO on animal health and veterinary health, getting favourable sales advice in 2008.

The study period was January – February 2009.

The purpose of the study is to determine if exist a correlation between the slaughtered carcases grade and the final results of muscle file obtaining.

The measurements was performed on two lots slaughtered, one originate on to a pigs farm named of SPAR SRL and the second being compose from animals acquisite from the nearby small farms. The slaughtered animals was PIC crossbreed with intensive-industrial growth system for the first lot and pigs with unknown genetics and growing system (considerate as extensive system) purchased from different farmers for the second lot.

The both lots were contain pigs weighing between 85 and 130 kg/head in the same time the obtained carcasses having 67-100 kg/piece.

The animals were subject of general slaughtering technology recommended procedures concerning the slaughtering preparation and the slaughtering.

After slaughter, carcasses were classified according to the authorised automatic method OptigradePro using the device OGP A7524 having Siemens components and specialized software for to process the obtained dates.

Table 1

Quality grades for pigs carcases applyed in EUROP system in Romania (O. 457/2004)

Percent of muscle tissue from carcase weight	Grade
55% and over	E
50% or more but less than 55%	U
45% or more but less than 50%	R
40% or more but less than 45%	O
below 40%	P

Following determinations, the carcases are graded in one of the 5 quality grades (Table 1).

Determinations was performed on warm carcase using the OGP optical tester and the results were interpreted through „OptigradePro" method (authorised for national use starting 2005 on units where was scarified over 200 pigs weekly in the past year).

The lean meat percent of a carcase is calculated on the basis of the next formula:

$\boxed{Y = 61,21920-0,77665 \text{ x } X1+ 0,15239 \text{ x } X2}$, where:

Y: the estimated percent of lean meat in carcase;

X1: thickness of the bacon (including rind) between third and fourth last rib at 7 cm from the median line;

X2: thickness of the *Longissimus dorsi* muscle between the third and the fourth last rib at 7 cm from the median line.

The both carcases lots were studied on groups of weight of 5 kg each.

From the graded carcasses were detached spinal muscles between vertebrae D5-6 and L4-5 which were subjected to technological operations described in Fig. 1 in order to obtain the muscle file.

One of the most important operations on muscle file obtaining is the brining which consists in 2 injections of the raw material with salting solution (Table 2) using a machine with multiple needle, pressure and belt speed control. Operating mode of the injecting machine was following: salting mixture pressure 1,8 atmospheres and band speed I.

In order to improve product quality (tenderness) and to complete the salting operation, after the salting mixture injection the meat was thumblerized (mixed under vacuum with or without brine) using following program:

- 2 h continuous mixing at -0,15 atm. and speed of 4 rpm;
- 12 h discontinuous operation (10 min. mixing/10 min. break) on same parameters.

The target of brining treatment is to add 50% weight to the raw meat (spinal muscles).

Heat treatment has 5 stages:

1. reddish product - 30 min. to 60^{o}C
2. drying - 1 h and 40 min. to 70^{o}C
3. boiling to 74^{o}C (68^{o}C in product centre)
4. boiling to 76^{o}C (71^{o}C in the product centre)
5. cooling - 12 hours and storage in special rooms up to delivery.

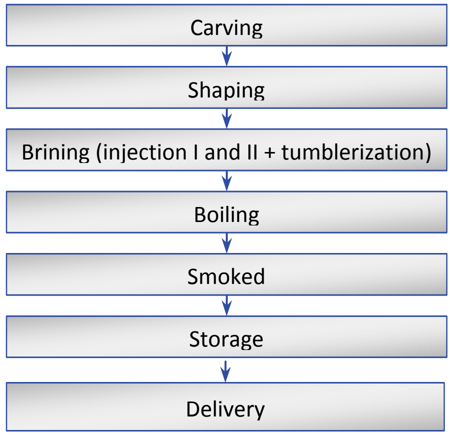


Fig. 1 – Technological flow operation for obtaining muscle file at SPAR SRL

Table 2

Quantities used to obtain 100 kg of brine mixed

Crt. no.	Specification	Quantity (kg)
1.	Inject mix nr. 1 ROL	8,250
2.	Salt (NaCl)	4,500
3.	PConsal 6	0,500
4.	Water + ice	86,750
Total		**100,000**

2. RESULTS AND DISCUSSIONS

Following the analyse of the weight values recorded before and after slaughtering, the average efficiency at slaughtering was 78,3% for the booth lots (Tables 3 and 4).

On the framework of the first lot which was growing intensive-industrial system, the minimum weight/head was 93,23 kg and the maximum was 126,44 kg. Considering that, the carcass lot was split in 6 weight groups.

The meat percent in carcase have values over 59% and vary very few, the variation amplitude being only 1,46%.

The carcass from this lot have a great uniformity of quality carcasses (97,5% are of class E), hardships of animals slaughtered and of carcasses and a great percentage of meat in carcass (average 59,95%).

Table 3

The results of slaughter animals in group I

Carcass weight range (kg)	Average of weight/head (kg)	Average carcases weight (kg)	Meat average (%)	Carcases					
				Total		Class E		Class U	
				Nr.	% of lot	Nr.	% of range	Nr.	% of range
70-75	93,23	73,00	60,80	2,00	2,50	2,00	100,00		
75-80	98,85	77,40	60,54	5,00	6,25	5,00	100,00		
80-85	105,15	82,33	59,83	15,00	18,75	15,00	100,00		
85-90	110,69	86,67	60,16	15,00	18,75	15,00	100,00		
90-95	116,95	91,57	59,34	14,00	17,50	13,00	92,86	1,00	7,14
95-100	124,54	97,52	60,04	29,00	36,25	28,00	96,55	1,00	3,45
Total	**114,59**	**89,73**	**59,95**	**80,00**	**100,00**	**78,00**	**97,50**	**2,00**	**2,50**

Table 4

The carcases weight and meat percent in carcase at the second lot

Carcass weight range (kg)	Average of weight/head (kg)	Average carcases weight (kg)	Meat average (%)	Carcases							
				Total		Class E		Class U		Class R	
				Nr.	% of lot	Nr.	% of range	Nr.	% of range	Nr.	% of range
65-70	86,63	67,83	56,67	6,00	7,50	5,00	83,33	1,00	16,67		
70-75	91,42	71,58	56,81	12,00	15,00	10,00	83,33	2,00	16,67		
75-80	98,68	77,26	56,11	19,00	23,75	13,00	68,42	5,00	26,32	1,00	5,26
80-85	105,33	82,47	57,95	17,00	21,25	13,00	76,47	3,00	17,65	1,00	5,88
85-90	110,63	86,63	57,89	16,00	20,00	13,00	81,25	3,00	18,75		
90-95	116,22	91,00	56,15	6,00	7,50	3,00	50,00	2,00	33,33	1,00	16,67
95-100	123,72	97,25	56,53	4,00	5,00	2,00	50,00	2,00	50,00		
Total	**103,06**	**80,71**	**57,03**	**80,00**	**100,00**	**59,00**	**73,75**	**18,00**	**22,50**	**3,00**	**3,75**

The animals from the second lot was less weight, only 37,6% having over 100 kg, the corporals weight limits being 85,57 - 124,5 kg.

Carcases from this lot were split in 7 weight groups.

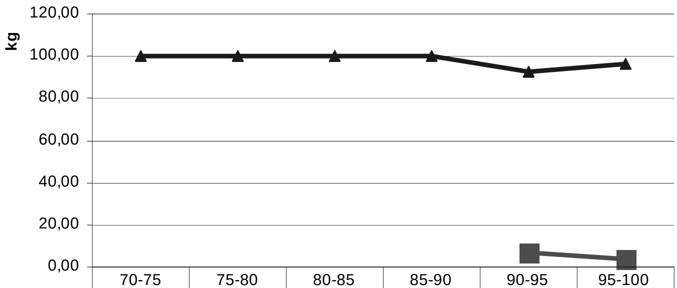
The average of meat percent is also more reduce than the anterior lot having values between 55,7 and 58,92%, with an amplitude of 2,59% which is 2,92% greather than first lot.

On all weight ranges we meet carcases class U in percents between 16,67% and 50% and also, carcases class R was obtained on 3 ranges, only 59% of the lot providing carcases class E, which means that carcases of this lot is economically disadvantageous both for producers and for processor due financial and technological aspects involved.

The grading reports according with EUROP system is presented in Fig. 2 and 3.

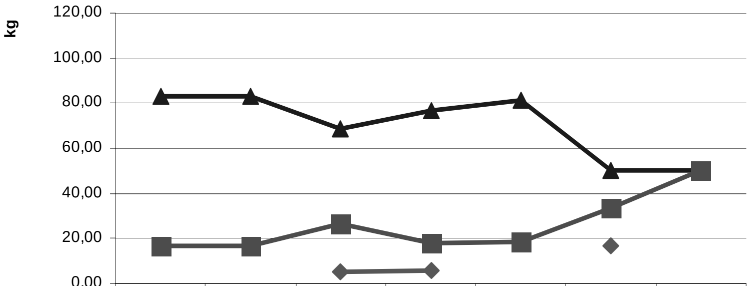
On the lot 1 originated on one specialized pigs farm was obtained homogenous carcase from qualitative point of view, with a big content of meat in carcase 2,50% of total carcases lot corresponding for U grade.

On graphical obtained results obtained on the lot 2 of carcases, heterogeneous from point of view of provenance, genetics, nourishment system, growing conditions and ages of the animals, we observe a large variation of the obtained carcases quality. The maximum percent of „E” grade carcases was obtained groups with small carcases weight (83,34%).



	70-75	75-80	80-85	85-90	90-95	95-100
% grade E	100,00	100,00	100,00	100,00	92,86	96,55
% grade U					7,14	3,45

Figure 2 – The distribution of the carcases quality grades obtained on the first lot

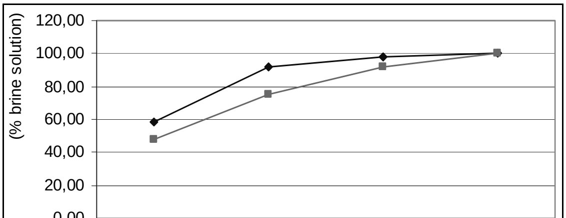


	65-70	70-75	75-80	80-85	85-90	90-95	95-100
% grade E	83,34	83,34	68,43	76,48	81,25	50,01	50,00
% grade U	16,66	16,66	26,31	17,64	18,75	33,33	50,00
% grade R			5,26	5,88		16,66	

Figure 3 – The distribution of the carcases quality grades obtained on the second lot

On the last lots was recorded a big percent of „U" grade carcases, having 33,33% and 50,00% values. Also, on this lot was obtained 3 groups were present carcases „R" grade, which was paid at a lower price, on percents between 5,26% on the 75-80 kg group and 16,66% on the 90-95 kg.

Spinal muscles from carcasses belonging to 2 groups were detached and trimmed, resulting in the following quantities of raw material: lot I - 174 kg and lot II - 128 kg, with a yield of 2,43% in the first group compared with 1,98% in the second from the total carcases mass. The weight report between the spinal muscles obtained is 26,43% in favor of the first lot.



	injection 1	injection 2	thumblerization	theoretic
Lot 1	58,62	91,95	98,28	100,00
Lot 2	47,97	75,31	92,19	100,00

Fig. 4 – Graphical representation of file muscle brine results

In the salting operation, the raw material coming from the 2 groups behaved differently (Fig. 4), the spinal muscles from second lot incorporating less brine solution both than first lot and than theoretic value on all operation stages. For the lot 2, the negative difference recorded was 6% between lots and almost 8% comparative with theoretical percent of salt solution incorporated. This is because fat cells can integrate smaller quantities of salt compared to muscle tissue cells.

After salting were obtained 259 kg muscles from the first lot and 192 kg for second. These amounts were subjected to thermal treatment resulting 228 kg, respective 162 kg of final product. The yield finally getting on the 2 lots reported to the quantity of spinal muscle was 131,04% for the first lot and 126,56% for the second. Due the big commercial value of the final product, these difference of 4,48% can be considered high.

3. CONCLUSIONS

As noted in the analysis of data obtained in this research, carcass quality has a great influence on the processing products obtained by processing, both in terms of efficiency of production of raw materials and of the final product and also in terms of processing technology (brine difficulty in fat tissue).

In the case of lower quality carcasses, having low percentage of meat, negative impact is translated into great financial loss whereas all links involved in the production chain and procurement muscle register loss:

- Farmers are losing a part of the delivery or even can not sell the meat, due decline of processors;
- Efficiency of obtaining the raw materials (muscles, chops etc.) allowing the production of superior products is low;
- Appears difficulties generating quantitative and qualitative losses in processing raw materials (salting problems, loss of thermal treatments, impairment of final product quality etc.);
- Efficiency of production of the final products is lower.

Analyzing data from slaughter, it may be noted that the lot of animals and maintain the industrial system have greater uniformity of quality carcasses, higher weights of animals slaughtered and of carcasses and higher percentage of carcass meat comparative with the extensive lot.

The uniformity of animal weight and carcass quality is probably due to the uniform genetic fund and especially the growth and maintenance technology applied in farming.

The first lot had a superior behaviour in all links of technology for obtaining the muscle file this being clear especially during the salting operation, but also during thermal treatment. Technological difficulties and lower yield recorded in the context of the second lot is due to higher percentage of fat and is translated in financial loses.

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MEAT QUALITY DETERMINATION OF MANGALITA BREED

DETERMINAREA CALITĂȚII CĂRNII LA RASA MANGALIȚA

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Key words: meat quality, back fat, intramuscular fat, crude protein, fatty acids, Mangalita
Cuvinte cheie: calitatea cărnii, slănină, grăsime intramusculară, proteină, acizi graşi, Mangalița

SUMMARY

The limited and decreasing worldwide public funding on animal and meat science and limited private financial of research in this field has left the meat production sector lagging behind other sectors of life science (Garnier et el., 2003). The aim of this study was to establish the quality of Mangalita pork, based on the carcass characteristics and biochemical composition of different tissues. The main parameters were dry matter, intramuscular fat, crude protein and fatty acid level of meat and back fat. The results indicated a good quality of Mangalita meat and fat, having lower level of intramuscular fat and higher level of unsaturated fatty acids.

The Mangalita pig, a typical fat type breed was developed in the 19th century in the Charpathian basine. Red Mangalita derived from the crossing of Salonta pig with Blond Mangalita. The importance of this breed is emphasizing by genetic, social and economic aspects. Because the meat and fat of the Mangalita have extremely low cholesterol, are considered healthier diets for human consumption. The composition of phospholipids influences quality, nutritive value and sensory characteristics of meat. The fat of Mangalita contains 12-16% less saturated fatty acids and 8-10% more unsaturated fatty acids than modern pig breeds (Szabo et al., 2006). Moreover, concentration of copper, iron, zinc and vitamin B were higher in the meat of Mangalita than in hybrid pigs (Lugasi et al., 2006).

1. MATERIALS AND METHODS

Red Mangalita pigs kept in indoor rearing system at Suinprod Roman farm were used in this study for meat and fat quality determination. To each one of 20 castrated male pigs was established the live weights and hot carcass after slaughtered. We also calculated the weights of fat by adding the weight of back fat and lard of each carcass and determinate the back fat thickness measured on the 11th thoracic rib.

For the biochemical analysis the samples of muscle tissues were taken from Boston butt, loin side, spareribs and ham, while for the fat tissues were taken from back fat and lard. The standard methods were used for biochemical analysis. In samples of muscle and fat tissue the percentage of dry matter (drying method at temperature of 105^{o}C to constant mass), protein (total proteins per Kjeldahl) and lipid (extraction with ether per Soxlhet) were determined.

For the fatty acid determination the samples of ham, back fat and lard were analyzed by gas chromatography. Peak areas of identified fatty acids were used to determine the relative percentage fatty acid composition of the total fatty acids. The percentage of saturated fatty acids (SFA - C12:0, C14:0, C16:0, C18:0 and C20:0) and unsaturated fatty acids (UFA - C16:1, C18:1, C18:2, C18:3, C20:4, C20:5 and C22:6) were calculated.

The results were statistically analyzed using ANOVA with one way. When ANOVA presented considerable differences, we used Tukey-Kramer Multiple Comparisons Test. All statistic analyses were made by using GraphPad InStat.

2. RESULTS AND DISCUSSIONS

Live and carcass weights and some technologies characteristics of carcass of Mangalita pig breed are shown in table 1. In comparison with the results of Petrovic et al. (2007) these results indicated that slaughter at smaller weight (under 100 kg) reduced the fat weight per carcass and the thickness of back fat.

Table 1

Carcass quality properties of Mangalita

Carcass traits	Mean ± sem
Live weight, kg	96.00 ± 1.38
Carcass weight, kg	76.95 ± 1.29
Fat weight, kg	15.09 ± 0.21
Back fat, mm	42.80 ± 1.87
Lard weight, kg	2.40 ± 0.13

The results of biochemical analysis showed higher value of dry matter on the different meat products of Mangalita than in the case of other breeds: *Belgium Landrace* 25.87% (Ender et al., 2002); *Large White/Landrace* and *Pietrain* crosses 26.30% (Segula et al., 2007). In comparison with the results obtained by other Mangalita breed researchers, our values are similar with those (for example 26.06 – 26.80% at *musculus semimemranousus* (Hollo et al., 2003)).

A higher percent of intramuscular fat was observed in Boston butt, side and spareribs, while in loin and ham was under the 5% but with a better content of crude protein. Anyway, a higher content of intramuscular fat and a good dispersion lead to improve the flavour, juiciness and tenderness. The values obtained were significant from statistically point of view (table 2). In comparison with the results obtained by other researchers, our values are lower both on intramuscular fat (9.9 - 10.3% (Lugasi, 2006), and crude protein (21.9% - 23.87% (Csapo et al., 1999)). In the case of comparison the date of Mangalita meat quality from the literature, the differences are due to different feeding systems on one hand and the other hand to slaughter age (weight).

Table 2

Biochemical composition of different meat products of Mangalita

	Constituent, % (Mean ± SEM)		
	Dry matter	**Intramuscular fat**	**Crude protein**
Boston Butt	28.36 ± 0.36^{a}	8.33 ± 0.35^{a}	17.74 ± 0.32^{a}
Loin (LD)*	28.97 ± 0.25^{ab}	4.73 ± 0.38^{b}	19.12 ± 0.28^{b}
Side	28.81 ± 0.34^{a}	6.58 ± 0.35^{c}	18.71 ± 0.27^{ab}
Spareribs	28.82 ± 0.23^{a}	6.92 ± 0.42^{c}	17.85 ± 0.28^{a}
Ham (SM)*	29.94 ± 0.19^{b}	4.19 ± 0.27^{b}	20.27 ± 0.22^{c}

* LD – *Longissimus dorsi;* SM - *Semimembranosus*

The quality of meat and fat are influenced both by intramuscular fat percentage and the fatty acid composition. From this point of view, the proportions of saturated and unsaturated fatty acids are very important. In our study we established the fatty acids compositions of back fat, lard and ham (fig. 1). Our results indicated similar distribution with that reported by Szabo and Farkas (2005) at back fat of Red Mangalita (UFA: 61.33% vs. 63.01%). The value observed by these researchers was the highest from the seven purebreds and three crossbreds.

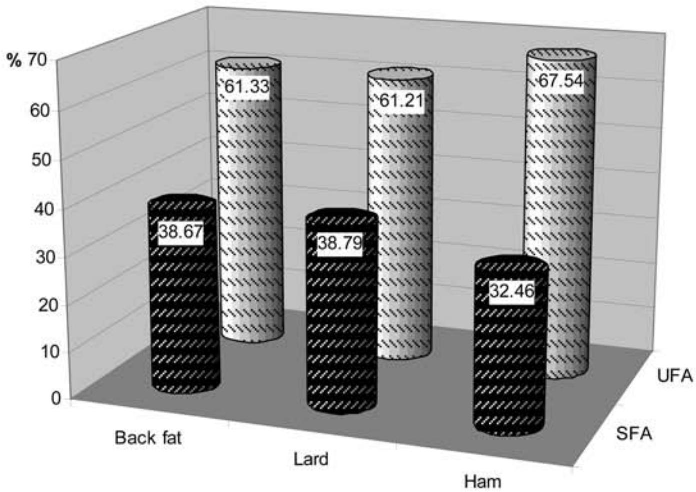

Fig. 1. Fatty acid composition on Mangalita carcass

In the case of meat quality, in this study we found a higher level of UFA in ham than that found by Fernandez et al. (2007) in five varieties of Spanish ham (57.41 - 59.06% in Serrano and Teruel hams and 64.60 - 65.01% in Iberian hams). Otherwise, percentage of UFA was similar with that found by Hollo et al. (2003) at *semimembranosus* muscle of Mangalita (67.58%). The results also indicate a significant difference between the level of UFA in ham in comparison with back fat and lard from statistic point of view.

3. CONCLUSIONS

These results indicated that slaughtering Mangalita at 96 kg leads to a good quality of carcass (with thickness of back fat) and meat (lower percentage of intramuscular fat). The meat and fat also contain higher level of UFA which is considered healthier diets for human consumption.

ACKNOWLEDGEMENT

This research was financially supported by National Center for the Programs Management, project contract no. 51-081/2007.

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THE SITUATION OF PRODUCTION, IMPORT AND CONSUMPTION OF MAIN FOOD PRODUCTS IN 2008

SITUATIA PRODUCTIEI, IMPORTULUI SI CONSUMULUI LA PRINCIPALELE PRODUSE ALIMENTARE IN ANUL 2008

IULIU GABRIEL MALOS, GABRIELA MALOS

Key words: statistic data, milk and milk products, wine, spirits
Cuvinte cheie: date statistice, lapte si productia de lapte, vin, spirt

SUMMARY

This study was created to present "The situation of production, import and consumption of main food products in 2008".

1. MATERIALS AND METHODS

Research were conducted by collecting operative data from DADR and statistic data from INS.

After collecting, these data were processed as average (average productions) and total rates , for the national production of the main products; import; export; consumption between main products; consumption per capita /2008; consumption per capita /2007; the difference of national consumption in 2008 and 2007; share of main products consumption per capita/2008/2007; import share in national consumption.

The collected data were analyzed on each of the four trimesters of 2008.

The average production of milk consumption was established based on the collected operative data from county DADR, for export and import of milk consumption, data were taken from data presented by INS, and the average data regarding milk consumption per country and per capita was established based on the operative and statistic data from INS, applying mathematical formulas.

The study period was for the four trimesters of 2008.

2. RESULTS AND DISCUSSIONS

Analysing the statistic data, the production of milk and milk products has increased starting with first semester form an average production of 10239.1 thousands hl– first semester, to 46536.3 thousands hl. – fourth semester ; milk import is also increasing – in the first semester were imported 1074.2 mii hl, up to a maximum quantity of 4705.9 thousands hl in fourth semester, in comparison with 2007, we obtained a production of -2.1 difference, and the import in national consumption represented 8 %. Milk consumption per capita in the first semester was 51.6 l and in the fourth semester it reached a rate of 232.3 l.

Eggs have a positive evolution, increasing from the first semester to the forth semester ; the production for the first semester increased from 1259.2 million pieces to 5956.7 million pieces, the import presented an increase from 40.4 million eggs in the first semester, to a rate of 275.1 million pieces, with a drop in the average egg consumption per capita compared with last year of -6.1, the import share in national consumption being of 4.45 %.

The butter production in first semester was about 1575 t, and in the fourth semester it achieved a rate of 7072 t, with an import of 1856 t in first semester. In fourth semester, the import decreased at 885 t , with an import share in national consumption of 11.18%.

The domestic production of preserved vegetables at 01.01.2008 was of 14269 t, at 31.12.2008 achieving a production of 46374 t, with a consumption of 1,29 g per capita in first semester, increasing in fourth semester to 2.4 kg per capita, the maximum rate registered in the third semester, at 3.7 kg per capita.

The average production of spirits in first semester was 10723 hl, at the end of the year increasing to 431042hl, with a consumption per capita of 1.9 l at the end of the year, and a consumption share per capita of 106.32% in 2008 in comparison with 2007, the import in national consumption being 1.91%.

3. CONCLUSIONS

As we noticed, the national production, the import, export, national consumption and the share import in national consumption have increased from the first semester until the end of 2008.

Consumption per capita in the year 2008 was reduced in 2008 comparing with 2007, marked out in the tabel from section « difference +/- » and % 2008/2007.
Af all main products we studied, the largest consumption was registered for the spirits.

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Tabel 1

NR. CRT.	SITUATION OF PRODUCTION, IMPORT, EXPORT AND CONSUMPTION OF MAIN FOOD PRODUCTS01.01. - 31.03.2008											
	PRODUCT	U.M.	NATIONAL PRODUCTION TONNES (STATISTIC)	IMPORT TONNES	EXPORT TONNES	NATIONAL CONSUMPTION TONNES	CONSUMPTION PER CAPITA 2008 (KG, L, PCS.)	CONSUMPTION PER CAPITA 2007 (KG, L, PCS.)	CONSUMPTION PER CAPITA 2006 (KG, L, PCS.)	DIFFERENCE + -	% 2008/ 2007	% IMPORT IN NATIONAL CONSUMPTION
2.	MILK AND MILK PRODUCTS	THOUSANSD HL	10239,1	1074,2	177,3	11136	51,6	233,9	229,2	-182.3	141.75	9.64
3.	EGGS **	MIL.PCS	1259,2	40,4	16,7	1282,9	59,4	287,2	277	-122.87	29.26	3.14
8.	BUTTER	TON	1575	1856	0,885	10149,1	0,47	0,6	0,5	-0.13	78,33	18.28
12.	PRESERVED VEGETABLES - TOTAL	TON	14269	14669	174,5	60187,5	1,29	3,7	5,8	-2.41	34,86	24.37
13.	- MUSHROOMS		0	1434	3,941	1429,76	0,07	0,2	0,6	-0.13	35	100.29
14.	- OTHER PRESERVED VEGETALBES (PEAS, BEANS, CUCUMBERS ETC.)	TON	11280	5000	16,62	38396,2	0,75	2,3	3,5	-1.55	32,60	13.02
15.	-TOMATOES (JUICE, PASTES, TOMATO SAUCE, KETCHUP ETC.)	TON	2989	8235	154	20357	0,48	1,2	1,7	-0.72	40	40.45
16.	PRESERVED FRUITS (JAM, MARMALADE, ETC.)		1697	397,5	29,2	7071,3	0,1	0,4	0,5	-0.3	25	5.62
17.	WINE	TON	C	837	1048	29038	-	21,4	21,1	-		2.88
18.	SPIRITS	HL	107231	2502	286,2	435339	5,02	1,8	1,9	3.22	278,88	0.57

Tabel 2

NR. CRT.	SITUATION OF PRODUCTION, IMPORT, EXPORT AND CONSUMPTION OF MAIN FOOD PRODUCTS 01.01. - 31.12.2008										
	PRODUCT	U.M.	NATIONAL PRODUCTION TONNES (STATISTIC)	IMPORT TONNES	EXPORT TONNES	NATIONAL CONSUMPTION TONNES	CONSUMPTION PER CAPITA 2008 (KG, L, PCS.)	CONSUMPTION PER CAPITA 2007 (KG, L, PCS.)	DIFFERENCE + -	% 2008/ 2007	% IMPORT IN NATIONAL CONSUMPTION
2.	Milk and milk products	THOUSANDS HL	46536,3	4705,9	1328	49913,2	232,3	242,4	-10,1	95,83	9,43
3.	Eggs	MIL.PCS	5956,7	275,1	44,7	6187,1	287,8	294,3	-6,1	97,79	4.45
7.	Butter	TON	7072	885	4	7,917	0,36	0.6	-0,24	60	11,18
11.	Preserved vegetables - total	TON	46,374	2,59	0,043	48,921	2,25	3.7	-1,45	60,81	5,29
12.	- Mushrooms		0	0,355	0	0,355	0,015	0.6	-0,58	2,5	0
13.	- Other preserved vegetables (peas, beans, cucumbers etc.)	TON	46,374	2,235	0,043	48,921	2,25	3.5	-1,25	64,28	4,57
14.	Tomatoes (juice, pastes, tomato sauce, ketchup etc.)	TON	0	4,593	0,303	4,29	0,2	1.7	-1,5	11.76	107,06
15.	Preserved fruits (jam, marmalade etc.)		2,58	0,079	0,002	2,657	0,12	0.5	-0,38	24	2,97
16.	Wine	HL	3139,3	388,38	143,75	3527,68	16.25	21.1	-4,85	77.01	11,01
17.	Spirits	HL	431,042	8,383	1,244	438,181	2,02	1.9	0.12	106,32	1,91

RESEARCHES REGARDING THE EFFECT OF THE HUSKS ADDING ON THE PHYSICAL-CHEMICAL CHARACTERISTICS OF BREAD

CERCETĂRI PRIVIND EFECTUL ADAOSULUI DE TĂRÂȚE ASUPRA UNOR CARACTERISTICI FIZICO-CHIMICE ALE PÂINII

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Key words: bread, husk, porosity, volume, elasticity.
Cuvinte cheie: pâine, tărâțe, porozitate, volum, elasticitate

SUMMARY

In the present work we have investigated the influence of husk adding on certain parameters of the dough and bread quality. Thus, in the experiments there were investigated samples with different quantity of husk adding and it were determined the humidity, elasticity, porosity and volume of each sample. The results confirmed the literature, as the bread with added fiber has a decrease of porosity and elasticity and also a poor volume. But these parameters are important especially from sensorial aspect; the nutritional improvement of the fiber introduction is also demonstrated by a lot of scientific studies.

INTRODUCTION

White flour and bread are good sources of sugars with a good caloric index. In the meantime, by the extraction and refining process, an important amount of vitamins and minerals are lost, due to the fact that they are located mostly in the external layers of wheat grain and are removed in the milling process. The nutritionists recommend the reducing of white bread consumption and increasing the fiber content of the bread. This can be done by using integral flour or by adding husk in certain specialties if bread, which determines good health benefits on digestive and cardiovascular diseases. But, from the technological point of view, the adding of husk determines some negative influence on certain parameters (volume, elasticity, porosity) and the aim of this study is to determine this influence.

1. MATERIALS AND METHODS

The experiments were conducted on white 650 type wheat flour and husk from Rahova mill.

BREAD SAMPLE PREPARATION

Sample 1 with 7% husk was obtained from wheat flour (5 kg), yeast (0,14 kg), salt (0,07 kg), husk (0,350 kg), additive (0,028 kg), propionate (0,014 kg).

The dough was mixed, divided, fermented (60°C and 55 minutes), reposed (30,8-30,9°C/5-7 minutes), shaped in 390-392 g pieces and cooked (240°C in the first half of the oven and 226°C for 22 minutes).

Sample 2 with 12% husk was obtained from wheat flour (4.775 kg), yeast (0,14 kg), salt (0,07 kg), husk (0,575 kg), additive (0,028 kg), propionate (0,014 kg). The dough was process similar with sample 1.

Sample 3 with 18% husk was obtained from wheat flour (4,535 kg), yeast (0,14 kg), salt (0,07 kg), husk (0,815 kg), additive (0,028 kg), propionate (0,014 kg). The quantity of the water used for dough preparation is higher then that used for sample 1 and 2 because of the high level of fiber, which absorbs bigger water content. The dough was process similar with sample 1, except that cooking was 32 minute (due to the higher water content of the dough that needs to be vaporized).

Control sample was obtained from wheat flour (5 kg), yeast (0,14 kg), salt (0,07 kg), husk (0,815 kg), additive (0,02 kg), propionate (0,014 kg). The dough was process similar with sample 1, the time for cooking was 18 minutes.

The chemical investigations (humidity, elasticity, porosity, volume) were developed in Libertatea factory laboratory after two hours from cooking using standard methods (Vâță, 1993, Bahaciu, 2003).

2. RESULTS AND DISCUSSIONS

In the present work we have investigated the influence of husk adding on certain parameters of the dough and bread quality. Thus, for the experimental samples it was determined humidity, elasticity, porosity and volume. The results are shown in table 1.

Table 1

Physical-chemical characteristics of bread samples from experiments

Parameter	Control sample	Sample 1 7% husk	Sample 2 12% husk	Sample 3 18% husk
Humidity, %	43,2	43.9	44	45,4
Porosity, %	84,8	83,2	79,2	65,9
Elasticity, %	98,4	94,7	83,8	75,3
Volume, cm^3/100 g	453,8	422,5	398,4	350,9

The presence of the husk in bread determines important changes in several parameters and the level of this compound exerts a different influence on the physical-chemical parameters as investigated in the experiment.

Regarding the humidity of the bread samples, it can be observed from figure 1 that the sample 3, with the highest amount of husk added, have an increased level of humidity, with 5% higher then the control sample. This might be due to the fact that the fibers have a good capacity of water absorption. Thus, the more fiber is added, the more water is absorbed and need to be vaporized in the cooking process.

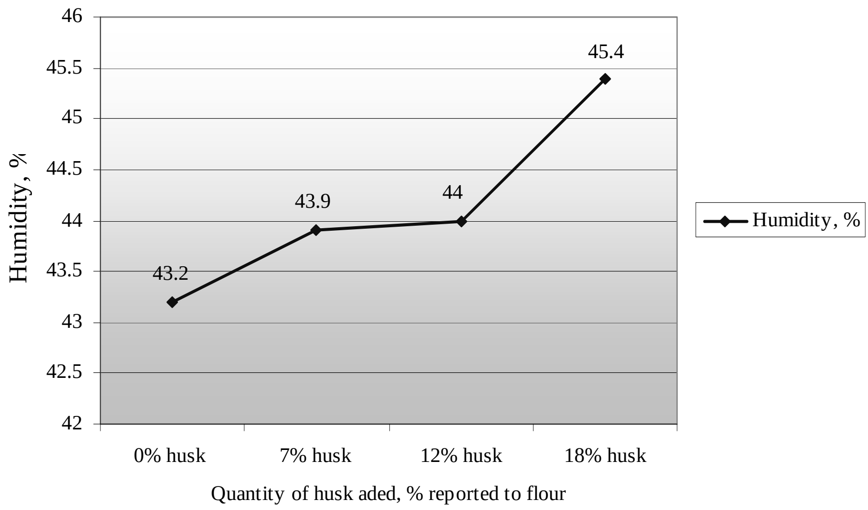

Figure 1. The influence of husk adding on bread humidity

Another parameter investigated in the present work is bread porosity. As it can be observed in figure 2, the porosity decreases with the increasing of the quantity of husk added: sample 1 (with 7% husk added) has a porosity with 1,88% smaller then the control sample and the porosity decreases for sample 3 (18% husk added) with 22,29%, compared to control sample porosity.

As a consequence of the replacing some amount of flour to husk, the gluten and starch quantities diminished, the glutenic net is weakened, it cannot retain gases resulted from fermentation. In the meantime, the starch level is also decreasing by replacing some flour quantities with husk, so the fermentation is poor, the CO_2 resulted from fermentation is in smaller amount, which affects negatively the bread porosity.

The elasticity is an important characteristic of bread quality and represents the capacity of bread to revert after exerting a pressure on it. By adding husk in the dough composition, the elasticity decreases with 3,76% (sample 1 compared to control sample), and up to 23,47% in sample 3 compared to control sample.

This decreasing in bread elasticity is also related with the replacing of wheat flour with husk, which affects the quality and quantity of gluten and also the fermentation process that is slowed down.

But the main effect, and visible one, of aging husk in dough composition is the reducing of the bread volume. The results are shown in figure 4.

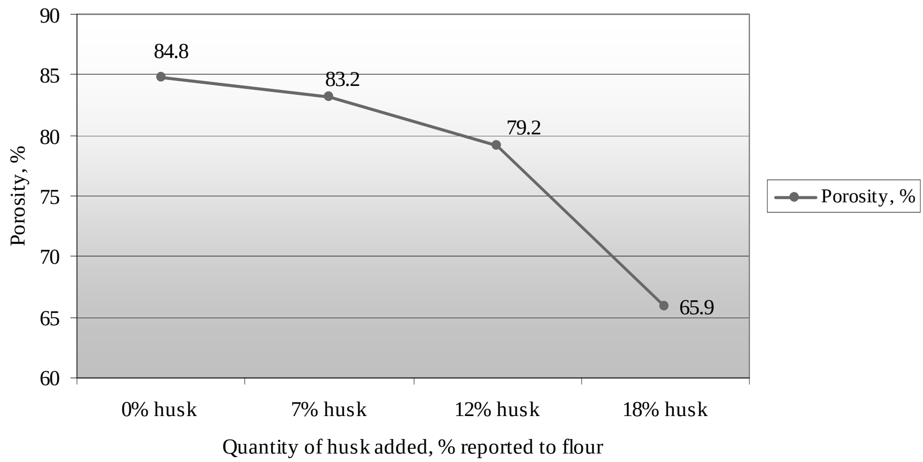

Figure 2. The influence of husk adding on bread porosity.

The bread elasticity is another parameter included in the experiments and the results are represented in figure 3.

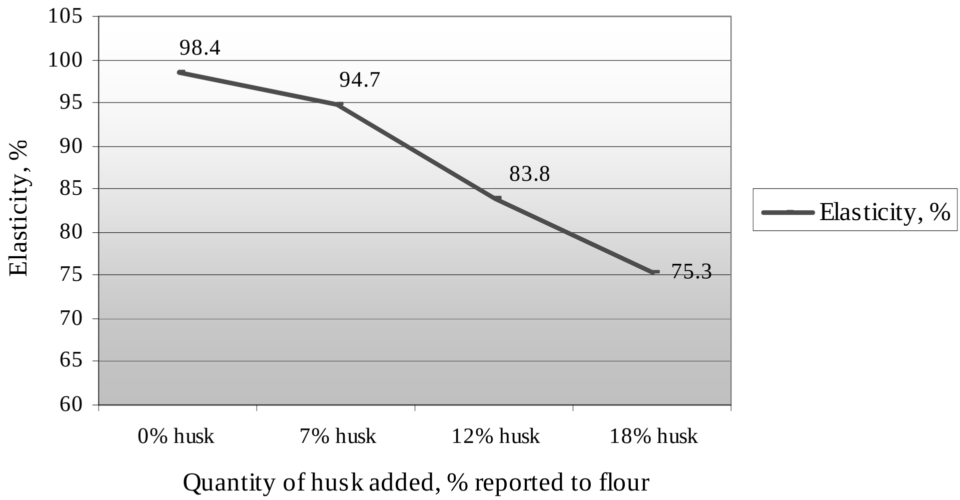

Figure 3. The influence of added husk on bread elasticity

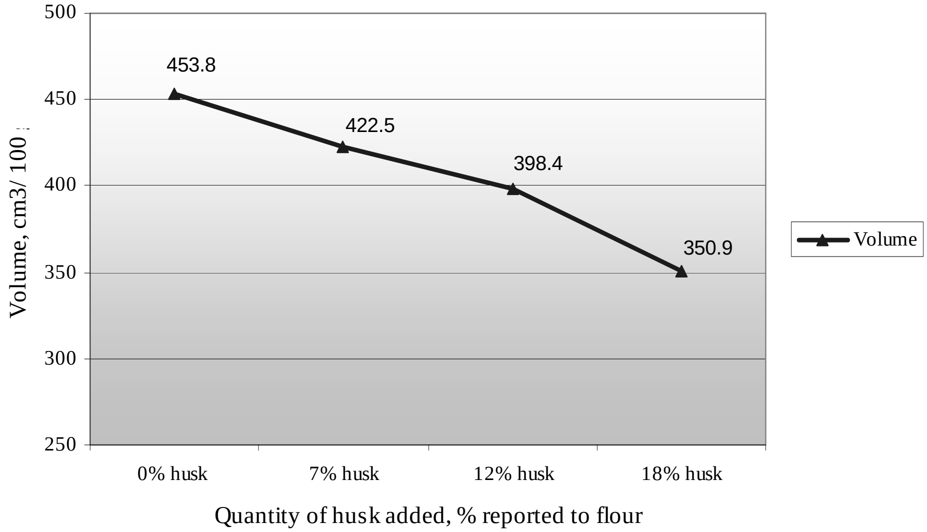

Figure 4. The influence of husk adding on bread volume

The volume decreases with the increasing of the quantity of husk added: by adding 18% husks in dough composition, the bread volume decreased with 22.67%. The explanation is the same influence on gluten quantity and quality, on glutenic net. By replacing certain amount of flour with husk, containing fibers, the amount of starch decreases, the fermentation is slower and the gas production is decreased, and as a consequence, the volume is decreasing.

3. CONCLUSIONS

Using the husk for increasing bread fiber content and for improvement of nutritional characteristics of white bread conduce to some negative sensorial changes in bread samples.

Thus, the bread porosity decreases with 22,29% by adding 18% husk in dough composition, due to the gluten changes in quantity and a consequently alteration of glutenic net (which do not retain efficiently the gases from fermentation).

In the meantime, the starch level is also decreasing by replacing some flour quantities with husk, so the fermentation is poor, the CO_2 resulted from fermentation is in smaller amount, which affects negatively the bread porosity and elasticity: by adding husk in the dough composition, the elasticity decreases with 3,76% (sample 1 compared to control sample), and up to 23,47% in sample 3 compared to control sample.

The bread volume decreases with the increasing of the quantity of husk added: by adding 18% husks in dough composition, the bread volume decreased with 22.67% compared to the control sample (with no addition of husk).

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RESEARCHES REGARDING THE INFLUENCE OF THE ADDITIVES ADDING ON THE PHYSICAL-CHEMICAL CHARACTERISTICS OF WHITE BREAD

CERCETĂRI PRIVIND INFLUENȚA ADAOSULUI DE ADITIVI ASUPRA UNOR CARACTERISTICI FIZICO-CHIMICI AI PÂINII ALBE

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Cuvinte cheie: pâine, aditivi, reologie, porozitate, volum, elasticitate
Key words: bread, additives, rheology, porosity, volume, elasticity.

SUMMARY

The present work was focused on the determination of the influence of the baking additive on certain technological parameters of wheat white flour and bread in order to determine the efficiency of their utilization in bread making. Thus, by using a complex additive (Gamma B_3) it was obtained bread samples with a better volume, elasticity and porosity compared to those obtained with control flour (with no additive introduced in the recipe).

1. MATERIALS AND METHODS

The experiments were conducted on white 650 type wheat flour from Rahova mill and bread using an additive Gamma $B_3$from S.C. Zeelandia S.R.L.

BREAD SAMPLES PREPARATION

Sample 1 obtained from wheat flour, water, yeast, salt, leaven, 0,2% additive Gamma B_3 (reported to 100 kg flour) and cystein. The sample was fermented for 83 minutes and cooked for 23 minutes (at 250°C in the first area of the oven and 190°C in the last area of the oven). The dough has 30,3°C and initial acidity 2,7 grade.

Sample 2 obtained from wheat flour, water, yeast, salt, leaven, 0,3% additive Gamma B_3 (reported to 100 kg flour) and cystein. The sample was fermented and cooked in the same conditions as sample 1. The dough has 30,7°C and initial acidity 2,5 grade.

Sample 3 obtained from wheat flour, water, yeast, salt, leaven, 0,5% additive Gamma B_3 (reported to 100 kg flour) and cystein. The sample was fermented and cooked in the same conditions as sample 1. The dough has 30,5°C, initial acidity 2,6 grade and final acidity 3.8 grade.

Control sample obtained from wheat flour, water, yeast, salt, leaven. It was fermented for 86 minutes; the dough temperature was 30,4°C, initial acidity of the dough was 2,2 grade and final acidity 3,5 grade.

For the control and experimental samples (flour and bread) it was determined the following physical-chemical characteristics: humidity, gluten content (Vâță, 1993), as well as certain functional proprieties as gluten deformation index, porosity and elasticity of the dough (Bahaciu, 2003).

2. RESULTS AND DISCUSSIONS

In order to justify the utilization of the additive in the bread technology process we have investigated the quality control parameters of the flour used as a raw material in Libertatea factory. In table 1 it is shown the chemical characteristics of the flour used in samples preparation, as obtained from the experiments.

Table 1

Chemical characteristics of the flour used in samples preparation

Characteristics	Values obtained in experiments	According to STAS
Humidity, %	15,1	14,5
Acidity, grade	3,2	2,8
Wet gluten content, %	24	26-28
Gluten deformation index, mm	2,6	5-12

According to the data shown in table 1 we can conclude that the flour 650 type used for bread sample preparation is different from the standard one The acidity is higher then the standard one, the flour is less gluten and the quality of gluten is not so good, accordingly to the standard parameters.

So, it is obvious that the technologists must find a way to improve the flour quality in order to obtain good quality bread. This can be done by adding an additive and Gamma B_3 is used in the factory of Libertatea, Bucuresti.

The bread samples were also investigated accordingly with the methods described above and the results are shown in table 2.

Table 2

The bread characteristics as obtained in experimental analysis

Characteristics	Value as obtained from experiments				Admissibility conditions
	Control	Sample1	Sample 2	Sample 3	
Humidity, %, max.	43,6	44,2	44	43,8	45
Porosity, %, min.	76,2	86	89	89,4	85
Elasticity, %, min.	95	98,3	98,3	96,7	95
Volume, cm^3/100 g, min.	328	486	557	577	450
NaCl, %, max.	0,95	0,95	0,94	0,96	0,97

Table 2 shows that the sample 3 has the lowest **humidity** compared to sample 1 with the highest level of water in bread. The humidity of samples decreases with the increasing level of added additives. This can be explained by an easier water evaporation process in baking operation, which can be due to the improved rheological characteristics of the dough by additive using in the recipes.

Regarding the **bread porosity**, the data are shown in figure 1.

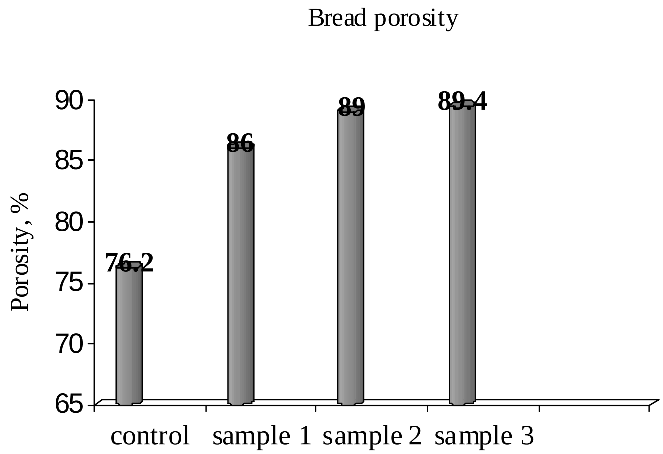

Figure 1. The bread porosity for the experimental samples

As it can be observed from figure 1, the bread porosity increases with the level of the additive used in dough preparation. So, the porosity of the sample 3 (with 0,5% additive) is with 17,32% higher then the porosity of the control sample (with no added additive).

This is due to the presence of the enzyme complex (α-amylase, lipase and glucosoxidase) and also ascorbic acid (contained by Gamma B_3 additive). The ascorbic acid is also contributing to the mechanism of gluten strengthening (formation of disulfhydric bonds).

The **elasticity** is also influenced by adding the Gamma B_3 additive in dough. In table 1 is shown that the control sample has a poor elasticity level compared to samples 1 and 2, which have similar elasticity level (98,3%). It is interesting that sample 3, with the highest level of added Gamma B_3 registered a lower elasticity level. This can be explained by the presence in excess of α-amylase in dough which can produce an intense hydrolysis of starch and a consequently a sticky dough with lower elasticity.

From figure 1 it can be concluded that the bread **volume** increases with the level of added Gamma B_3 additive. For sample 3 (with 0.5% additive), the volume increases with 75.91%, compared to the control sample and with 18,72% higher compared to sample 1 volume. The quantity of the additive is also important: the volume of the sample 1 (with only 0,2% additive) is with 48,17% higher then the control sample, and only with 14.61% smaller then the volume of sample 2 (with 0,3% additive).

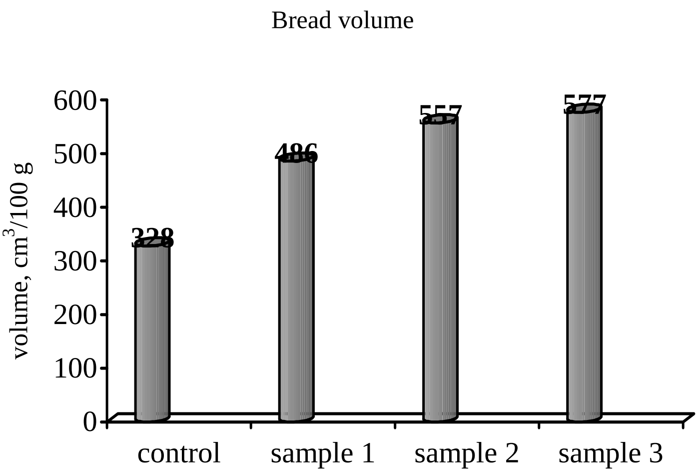

Figure 2. The bread volume for the experimental samples

The increasing of the volume with the level of additive utilization in dough can be explained by the activity of α-amylase (from additive composition) which hydrolyzes the starch into maltose that can sustain a continuous fermentation and a good retention of CO_2 in dough. Due to the increasing of the fermentescibile sugars in dough, it is stimulated the developing and the activity of yeasts and bacteria and the bread volume also increases.

The emulsifying agent, E472c contained by the Gamma B_3 additive contribute to the improvement of the bread volume by its capacity of binding the glutenic proteins which increases the capacity of the dough to retain gases as CO_2 and increasing its resistance which determine a good volume and a better structure of the bread.

3. CONCLUSIONS

The experiments focused on 650 type flour obtained from Rahova mill have shown that the characteristics of wheat flour need to be improved in order to obtain good quality bread.

The **humidity** of samples decreases with the increasing level of added additives, so by adding the additive, the baking process is optimized and the water is evaporated more efficiently.

The bread **porosity** increases with the level of the additive used in dough preparation. So, the porosity of the sample 3 (with 0,5% additive) is with 17,32% higher then the porosity of the control sample (with no added additive).

The **elasticity** is also influenced by adding the Gamma B_3 additive in dough. In table 1 is shown that the control sample has a poor elasticity level compared to samples 1 and 2, which have similar elasticity level (98,3%). It is interesting that sample 3, with the highest level of added Gamma B_3 registered a lower elasticity level.

The bread **volume** increases with the level of added Gamma B_3 additive. For sample 3 (with 0.5% additive), the volume increases with 75.91%, compared to the control sample and with 18,72% higher compared to sample 1 volume. The quantity of the additive is also important: the volume of the sample 1 (with only 0,2% additive) is with 48,17% higher then the control sample, and only with 14.61% smaller then the volume of sample 2 (with 0,3% additive).

Thus, it can be concluded by using a complex additive, Gamma B_3, purchased from Zeelandia Romania the main technological parameters of flour and bread were improved.

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EVOLUTION OF MILK AND MILK PRODUCTS SECTION DURING 2000 – 2008

EVOLUTIA SECTORULUI LAPTE CONSUM IN PERIOADA 2000 – 2008

GABRIELA MALOŞ, GABRIEL IULIU MALOŞ

Key words: statistic data, milk and milk products
Cuvinte cheie: date statistice, lapte si productia de lapte

SUMMARY

This study was created to present "The evolution of milk consumption production, import of milk consumption**,** export of milk consumption and evolution of national milk consumption during 2000 - 2008.

Milk is the most complex and vital food through its beneficial action to all consumers and especially for children, youth, pregnant women and nursing women, old people and workers in the underground or working in toxic environments.

In terms of chemical composition, milk nutrients are found in optimal proportions, so milk is assimilated by the body better than any other food, and can be consummed both fresh and in different forms of dairy products.

RESULTS AND DISCUSSIONS

Table 1

Evolution of milk consumption production during 2000 - 2008

Nr. crt.	1	2	3	4	5	6	7	8	9
Study year	2000	2001	2002	2003	2004	2005	2006	2007	2008 Sem. 3
U.M.	To	To	To	To	To	To	To	To	To
Productions	43.558	44.715	46.430	48.888	50.063	47.350	46.240,60	48818	36.275
Total production	412.333								

Table data and graphics show a constant increase in milk production since 2000 with a production of 43,558 tonnes, reaching a maximum rate in 2004 of 50,063 tonnes, followed by a decreased production of milk to 46,240.60 tonnes in 2006 and a return to 48,818 tonnes in 2007.

This fluctuation in milk production occurs at the expense of growth and decline in livestock but also because of adverse climatic conditions.

From a total production of 412,333 tonnes, calculated on years of study from 2000 to 2008 it can be seen that the smallest production (43,558 tonnes) was recorded in 2000, with a maximum production registered in 2004 (50,063 tonnes), followed by a fluctuation, so that in the third semester of 2008 it reached a rate of 36,275 tonnes.

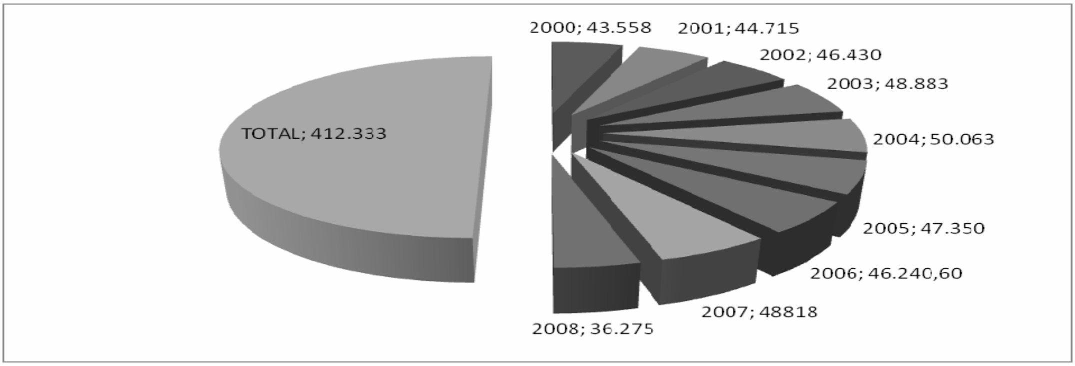
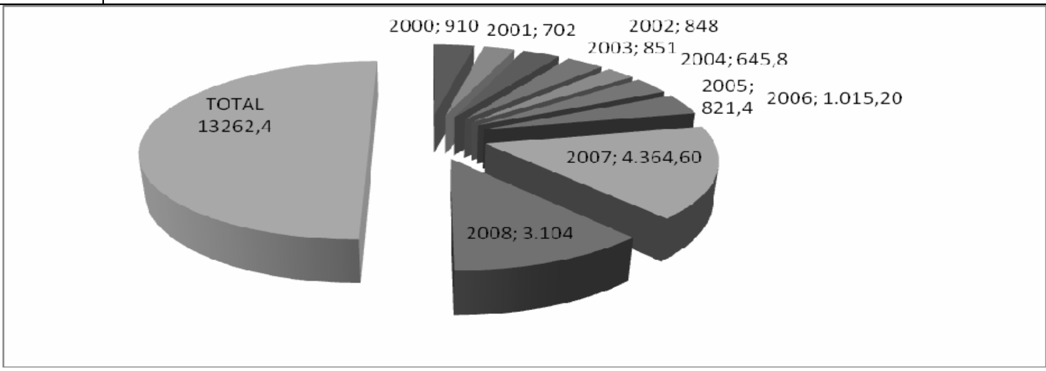


Table 2

Evolution in the import of milk consumption during 2000 - 2008

Nr. Crt.	1	2	3	4	5	6	7	8	9
Study year	2000	2001	2002	2003	2004	2005	2006	2007	2008
U.M.	To	To	To	To	To	To	To	To	To
Import	910	702	848	851	645,8	821,4	1.015,20	4.364,60	3.104
imported quantity/ period	13262,4								

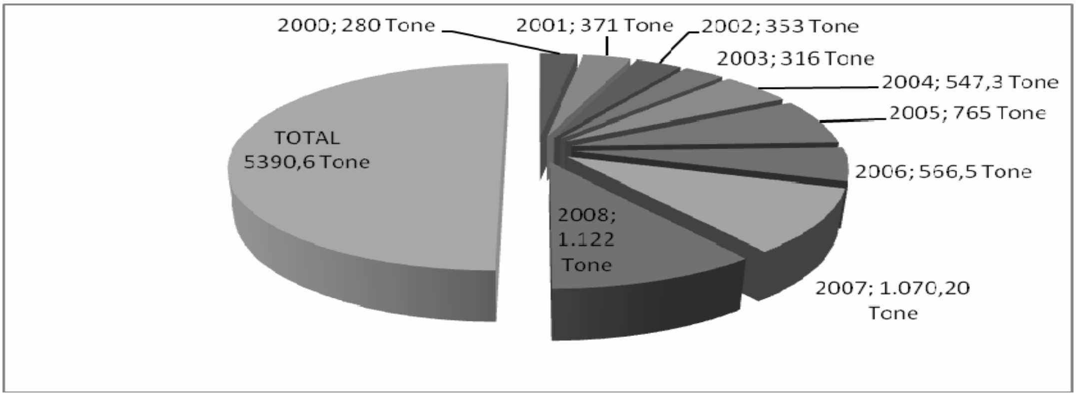


In the graphical representation it can be seen that imports of milk until 2005 had a turnover ranging in limits from 702 to 910 tons, and since 2006 has been an explosive increase reaching its threshold of 4364.6 tonnes in 2007, as in 2008 - 3 half to ensure a quantity of 3104 tons from import.

Table 3

Evolution in the export of milk consumption during 2000-2008

Nr. Crt.	1	2	3	4	5	6	7	8	9
Study year	2000	2001	2002	2003	2004	2005	2006	2007	2008
U.M.	To	To	To	To	To	To	To	To	To
Export	280	371	353	316	547,3	765	566,5	1.070,20	1.122
Exported quantity/ period	5390,6								



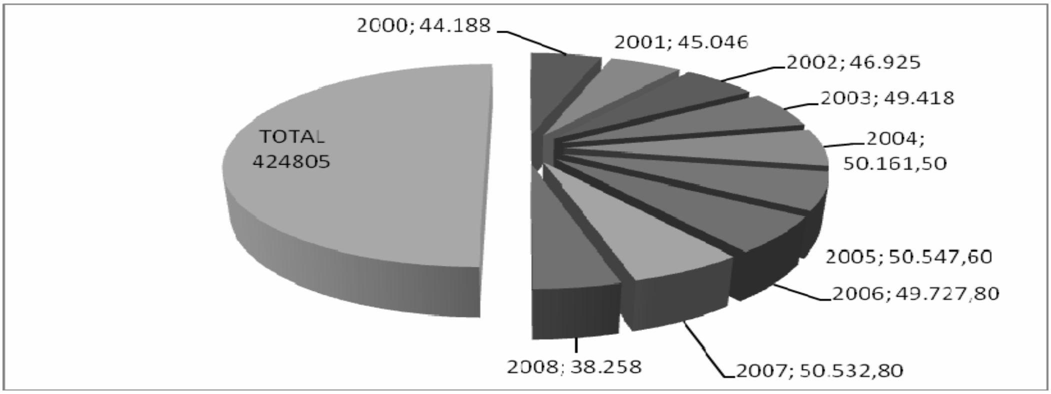
In Table 3 is the evolution of milk export during those 9 years of study.

From the data displayed, export presents an upward curve starting a rate of 280 tonnes in 2000 and a maximum rate of 1122 tonnes registered in 2008 - semester 3, but with small fluctuations in 2002 and 2003.

Table 4

Evolution of national milk consumption during 2000 - 2008

Nr. Crt.	1	2	3	4	5	6	7	8	9
Study years	2000	2001	2002	2003	2004	2005	2006	2007	2008
U.M.	To	To	To	To	To	To	To	To	To
National consumption	44.188	45.046	46.925	49.418	50.161,5	50.547,6	49.727,8	50.532,80	38.258
Total national consumption/ period	424.805								



The graphic representation shows an increase of milk consumption between 2000 -2004, followed by a plateau maintenance until 2007.

From a total milk consumption (424,805 tons), the highest share of milk consumption were registered during 2004 - 2007, so that in 2008 - 3 sem it reached a rate of 38,258 tonnes.

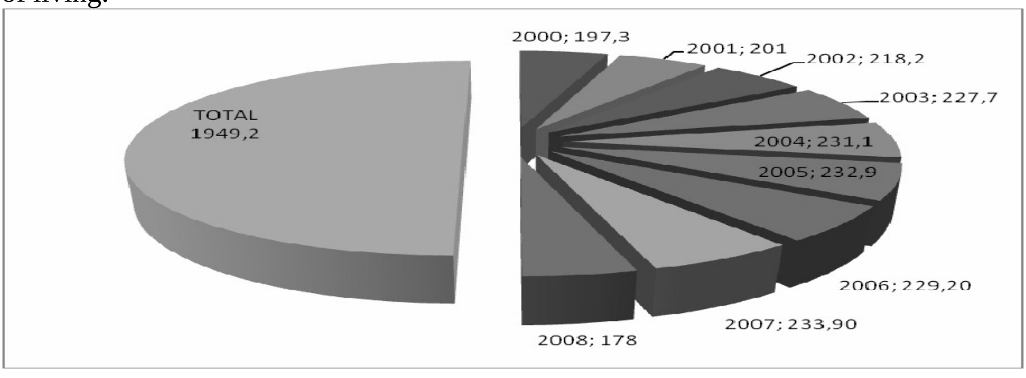
Table 5

Evolution of national consumption per capita of milk during 2000 - 2008

Nr. Crt.	1	2	3	4	5	6	7	8	9
Study years	2000	2001	2002	2003	2004	2005	2006	2007	2008
U.M.	To	To	To	To	To	To	To	To	To
Consumption per capita	197,3	201	218,2	227,7	231,1	232,9	229,20	233,90	178
Total consumption per capita /period	1949,2								

From table data we observe an increase in milk consumption per capita during 2000 - 2008 from 197.3 litri/2000 to 178 liters (quarter 3) with a maximum peak of 233.90 liters consumption in 2007.

This increase of milk consumption may be an indication of improving standards of living.



CONCLUSIONS

As we noticed, "The evolution of milk consumption production, import of milk consumption**,** export of milk consumption and evolution of national milk consumption during 2000 – 2008" were positive.

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INFLUENCE OF STARCH AND PROTEIN ADDITIONS ON SOME OF RHEOLOGIC PROPERTIES OF PORK MEAT EMULSIONS

INFLUENȚA ADAOSURILOR PROTEICE ŞI AMILACEE ASUPRA UNOR PROPRIETĂȚI REOLOGICE ALE EMULSIILOR PE BAZĂ DE CARNE DE PORC

IANIȚCHI DANIELA, IONESCU AURELIA, BANU CONSTANTIN

Key words: composition of meat, pork, rheological properties
Cuvinte-cheie: compoziții de carne, porc, proprietăți reologice

SUMMARY

Processing of animal raw materials is directly influenced by their physicochemical characteristics, characteristics that influence by default their flow properties. The various states and combinations where you can find the raw materials used, determine the specific behavior that may influence final product quality, performance and construction of processing equipment. Study on rheological properties of the composition assessment of meat, depending on the components added and temperature, showed that the addition of vegetable protein (soy, chickpeas and lupine) improve strength of meat gels, while addition of sodium caseinate and starch reduced strength jelly network structure.

INTRODUCTION

To study the behavior of meat, when external forces acts on it, is important to know its original structure. Physical structure of the meat is predominantly aggregated and presented in a solid phase and a liquid phase. Solid phase consists of proteins that form the skeleton of muscle fibers and muscle bundles and liquid phase consists of juice cell, they are forming a multi-phase system poly-dispersed.

The solid-liquid meat is not stable as it is influenced by external conditions and additions used to produce emulsions. Such low temperature water freezes meat, the meat takes on the characteristics of conditions of a solid body. The grinding is transformed into a colloidal system which macroscopically behaves partly as a liquid.

Proteins of plant origin (flours, concentrates, isolates) are used in the meat products to increase protein content, their functional properties such as capacity thickeners, emulsifying capacity and water retention properties influencing heat-treated products (Liu, 2000). Ability to bind proteins of various components of the food is very important in creating products, this property affects the ability of adhesion, formation of films and fibers but also viscosity. Ability to bind lipid protein is important in the production of meat substitutes that will improve retention of flavor and food smoothness respectively (Banu, 2000). After Leconte et al, 1993, Chowdhury et al, 1994, the use of soy proteins in processed meat products is desirable because of their acceptability by consumers, and Dass (2006) reported an improvement in the flavor of meat products beef or goat, plus soybeans.

Starch is a hydrocolloid with high water retention ability that improves the sensory characteristics, texture and stability of emulsions. Starch losses in heat treatment and storage reduces (Dexter, 1993).

1. MATERIALS AND METHODS

In achieving the study, has been used emulsions from pulp of freeze pork, lard, water, salt, sodium nitrite and polyphosphates. The emulsion base material 2% of meat was replaced with soy protein isolate, chickpea flour, lupine concentrate, sodium caseinate and starch in the same percentage, to which were added water of hydration. Telltale consisted of: 70% muscular tissue, 30% fat, 15% water, 2.0% salt and 0.5% polyphosphates, 0.16% sodium nitrite.

Meat, fat, cooled water, aids and supplements of protein and starch were subjected to shred fine at 3000 rpm.

Rheological parameters studied were: storage module (G') and relax module (G), trends were appreciated by Rheometer TA. Rheological properties were measured at the shear stress of 0.5968 Pa, frequency 0.05 Hz, with a range of temperature 5-70^{0}C. When meat compositions are subjected to voltage distortion, a part of the energy received is stored and processed, the material (raw pulp or meat emulsion) giving an elastic response and part is dissipated as heat, the corresponding internal friction or viscosity sample. G' and G" are components that give rheological relations of the elasticity and viscosity of the gels. After the experiments it has been found different behavior of rheological properties of meat emulsions studied.

2. RESULTS AND DISCUSSIONS

Rheological transformations in the composition of meat with added protein and starch induced by heat and pressure, measured by changing the storage module, are presented graphically in Figures 1.1-1.6.

Rheograms for the storage module (= storage modulus) (G' the indicator for the material elasticity), obtained by scanning the temperature range (5-70^{0}C), for all compositions made no point of intersection with the relaxation modulus (G" the indicator for the viscosity of the material). This shows that there is a network structure formed from mixtures grounded meat even before the rheological tests, meat emulsions made by, presented a strong elastic response than a viscous response, the values of (G) is lower than the values of (G').

The rheograms obtained for compositions of pork with soy protein isolate, chickpea flour and lupine concentrate, sodium caseinate, starch and control sample generally had the same profile in the temperature range 33-70^{0}C, major differences were noted within 5 - 33^{0}C. While heating the samples with added protein in the temperature range 5-10^{0}C, elasticity module increased slightly ($G'_{Chickpea}$ = 4931 Pa, G'_{Lupine} = 4255 Pa, G'_{Soy} = 3655 Pa), recorded the same temperature transition for all compositions (8.2^0 C). In control samples, with added starch and caseinate, values of G'increased further, transition temperatures (peaks) falling to a different level: 24.3^0 C 26.4^0 C respectively for control and for casein and starch module storage showing values: $G'_{Control}$ = 2166 Pa; G'_{Starch} = 895.4 Pa and G'_{CN} = 985 Pa.

Increased flexibility in the temperature range 5-33^{o}C may be due to cross-links that are formed between the meat proteins, between proteins and other constituents of the composition of meat (control), between meat protein and starch or casein, which are making the emulsions more cohesive, less sensitive to changes in temperature and further develops the gel network during heating. If the case of the sample of starch increase of G' is due to hydration and swelling of starch, with consequences on the growth of viscosity and storage modulus.

Elasticity samples with added vegetable protein (soy, chickpeas and lupine) the temperature was more 5^{o}C elasticity better than the control sample (without addition), G'chickpea is much higher than G'lupine, which is higher than G'soybean ($G'_{chickpea}$ = 4621 Pa, G'_{lupine} = 4019 Pa, $G'_{soybean}$ = 3455 Pa, $G'_{control\ sample}$ = 1490Pa).

Much higher values of modules of elasticity in samples with added protein in the baseline, compared with control sample, could be the result of interactions between: protein meat and vegetable protein (soy, chickpeas and lupine), vegetable proteins , protein and water, protein and fat emulsions causes the formation of dense and resilient to grinding, which includes water and fat, while the sample without added vegetable protein meat only soluble proteins bind water and fat, resulting in a less dense composition, sticky and elastic. Protein content of flours in fiber, capable of hydrated can also increase the viscosity and elasticity of the mixture.

In the temperature range 10-33^{0}C, rheograms of G' for the compositions with added protein (soy, chickpeas and lupine) decreased strongly to 30-33^{0}C temperature distortion due to meat proteins and release of water, soaking or partial melting fat emulsion during heating, and then keeping the same downward trend, but with a much smaller slope in the range of temperatures between 33-45^{0}C. There is a decrease in the elasticity module of storage reaching 1509 Pa., where the sample with the addition of chickpea flour, 1496 Pa for the sample with the addition of isolated soybean and 1328 Pa for the sample with added concentrated lupine. Between 30 - 35^{0}C Ziegler and Acton (1984) considers that the low elasticity of meat emulsion is because myofibrillar protein (actin, actomyosin and myosin) undergoes major conformational structural changes during heating and leads to their distortion. Also tropomyosin separated by filaments of actin and endothermic transition occurs above 40^{0}C the molecule of myosin and its subfragments, HMM and LMM.

Actomyosin complex dissociated at 45 - 50^{0}C, after which the chains of LMM undergo major changes within myosin at temperature between 50 - 55^{0}C to help reduce of G' at a temperature of 50^{0}C.

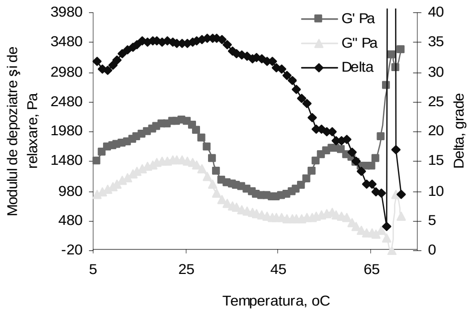

***Fig.1.1**. Rheograms modules of storage and relaxation and the angle of deflection versus temperature for composition without any additions.*

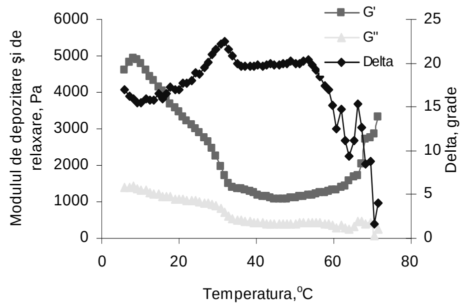

***Fig.1.2** Rheograms modules of storage and relaxation and the angle of deflection versus temperature for composition with chickpea.*

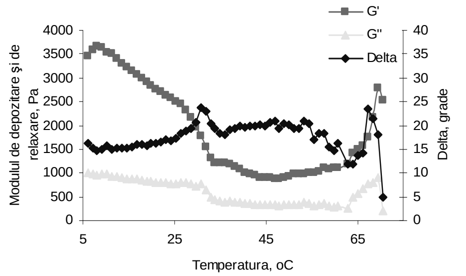

***Fig.1.3.** Rheograms modules of storage and relaxation and the angle of deflection versus temperature for composition with lupine.*

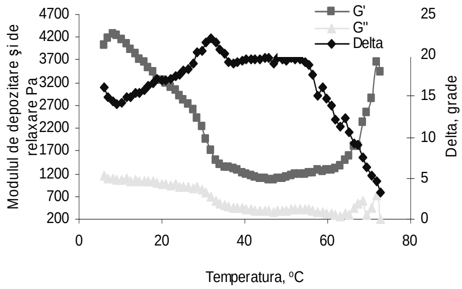

***Fig.1.4**. Rheograms modules of storage and relaxation and the angle of deflection depending on the temperature, composition of soybean*

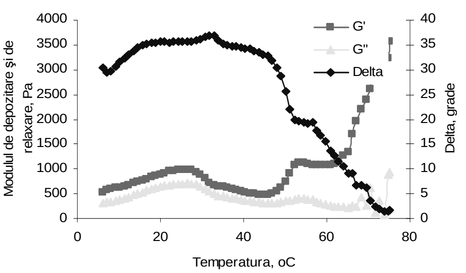

***Fig.1.5**. Rheograms modules of storage and relaxation and the angle of deflection versus temperature for composition with addition of sodium caseinate.*

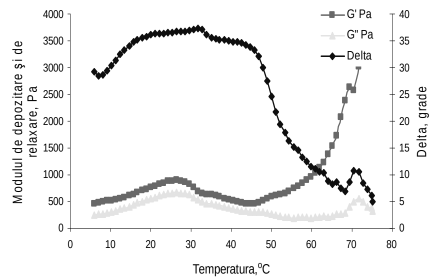

***Fig.1.6.** Rheograms modules of storage and relaxation and the angle of deflection versus temperature for composition with starch.*

Over temperature of 45^0C storage module increased slightly to 65^0C after, upward trends became more pronounced to the temperature of 70^0C, for all samples. 45^oC can be considered transition temperature of the soil protein gel, the gel network structure being strengthened even further by the strong heat treatment. In the temperature range 45-55 ° C were observed only slight increases in elasticity composition, length of the plateau is closely related to the nature of protein additives. The sample without additives length of the plateau was narrower, which is between 43.6-48^{o}C. Heating the samples above the temperature of 50^{0}C are increasing the elasticity of gels formed in the fact that increasing protein, which lost their quaternary, tertiary and secondary structure, are partially or totally distorted, their solubility is minimal and stable form new channels . Salt, hydrogen and disulphide links, and hydrophobic interactions play an important role in stabilizing the network structure.

If the temperature increases, hydrogen bonds are becoming less stable, disulfides and hydrophobic links interactions reinforces the gel network. Gelatinization of meat proteins, especially myofibrillar proteins induced heat leads to the formation of three-dimensional network, which carries both elastic properties and viscous properties. Temperatures between 55-70^{0}C provides three-dimensional network structure of gel hardening. Gel formation and its strengthening are exothermic processes, energy stored in material by protein aggregation, as evidenced by the surge in storage mode.

Samples of starch and sodium caseinate (Figures 1.6 and 1.5) have shown, however, a much smaller storage module compared with control sample (Figure 1.1), but very close to the developments between them (G'_{Starch} = 456 Pa, G'_{CN} = 534 Pa, $G'_{control}$ = 1490 Pa, the temperature of 5^{o}C). Reduce storage module for starch compositions can be explained by lack of solubility of starch in cold water and high moisture ratio (1:8). It is possible that during grinding, soluble proteins form protein films on the surface of starch granules, thereby preventing their hydration and low viscosity composition. Also polar lipids can form complexes with linear chains of starch, blocking the hydration and swelling of granules, which has the effect of decreasing viscosity.

With regard to compositions containing sodium caseinate with low viscosity, low initial storage module can be explained by high moisture ratio used (casein: water = 1:8). This results in increased free water in the system, which will reduce the interactions between particle surfaces and the viscosity of the liquid phase (Hamm and Riesner, 1967, Toth and Hamm, 1968). At the end of heat treatment, storage mode values tend to equalize, regardless of the nature of the addition (G' about 2600 Pa).

3. CONCLUSIONS

Rheological measurements showed that addition of vegetable protein (soy, chickpeas and lupine) improve strength of meat gels, while addition of casein and starch gel network structure reduces the strength, composition consisting of meat and fat.

Quality gel of the control sample, in terms of viscoelasticity properties, was weaker than the compositions with added plant protein, but better than those with added starch or casein.

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RESEARCH REGARDING THE RAW MILK PRODUCTION FROM TIMIŞ COUNTY
CERCETĂRI PRIVIND PROPRIETĂȚILE LAPTELUI MATERIE PRIMĂ DIN JUDEȚUL TIMIŞ

NELA CARAGEA, GH. D. PASAT

Key words: raw milk, protein, fat, density.

SUMMARY

The studies regarding milk quality is motivated by the need for current data on the quality of raw milk and milk products, the need to know the current issues regarding the applicability of the legislative framework and dairy processors involved in obtaining quality products.

Paper includes studies regarding the quality characteristics of raw milk for processing was done on raw milk collected from the area of Timis and Arad. Raw milk from each producer is physicochemical (density, pH, freezing point, fat contents, protein contents) and microbiological and hygiene characteristics (total plate count, somatic cell counts) and qualitative parameters being enrolled in the farm producer to serve as the criterion for payment of milk.

1. MATERIALS AND METHODS

4765 were analyzed raw milk samples, collected from each milk collection centers and analyzed by point of view physic-chemic and microbiologic.

Cow's milk came in Timis and Arad county area, from collection centers (Moravița, Ciacova, Izvin, Lovrin, Toager, Susan, Sinersig, Fititeaz, Cebza), consisting of 110 farms, the improved breeds belonging Baltata with Negru Romaneasca, Baltata Romaneasca (Simmental type) and Holstein-Frieze.

Milk is usually collected once a day, morning and in the warm season (May 1 to October 15), 2 times a day: morning and evening. By this collection system ensure that raw milk arrive as soon as at processing factory.

Bulk milk samples, were analyzed for their physicochemical properties and microbiological quality.

For quality control of raw milk were specific methods used for physical examinations (density, acidity, pH and freezing point), chemicals (fat and protein contents), biochemical (antibiotics) and microbiological (TBC, SCC).

Data resulted from the registrations made on the field, laboratory and statistically analyzed and compared with data reported in the literature (the arithmetical mean (X), standard deviation (S) and variability coefficient (V)).

2. RESULTS AND DISCUSSIONS

Raw milk analyzed is has a good quality in concordance with Romanian legislation, and by this view it is very valuable for the processor. After conducting sensory analysis not there was deviation from quality requirements.

According to international and European regulations, the presence of inhibitors in whole raw milk is prohibited.

Test for the presence of antibiotics in all samples subjected to analysis at the point of reception, was negative. This result is in concordance with law of Romania and the European Economic Community (EEC) (European Regulation 853/2004 requires that raw milk contains no antibiotics).

Determination of physico-chemical properties of raw milk were achieved by determining the density, pH, freezing point, the protein and fat contents.

Into the following table, are presented the qualitative parameters of cow raw milk for each mounth.

Density Was obtained an average density of 1.0282 g/cm^3, which fall within the normal range of density of milk at 20°C with a maximum of 1.0298 g/cm^3 in October and a minimum of 1, June 0268 g/cm^3.

Graphic representation (Fig. 1) shows higher average density of the cold period of the year. Values correspond to a dairy milk quality analysis; the mean density is in summer (May-September) of 1.0279 g/cm^3, and the months with low temperatures (October-April) of 1.0299 g/cm^3.

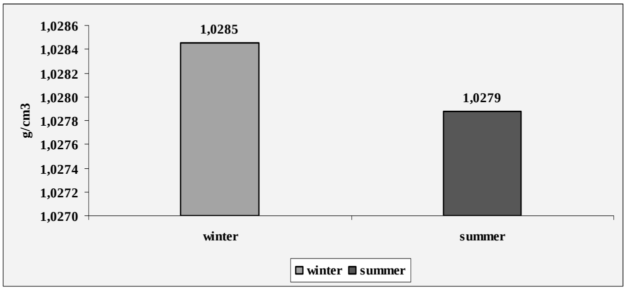

Fig. 1. The average values of the density of raw milk according to season

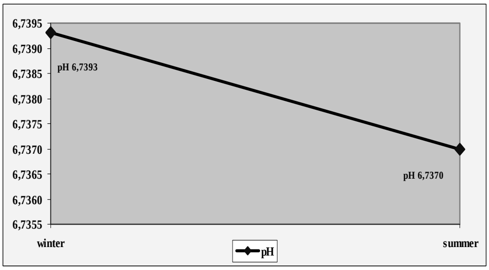

Fig. 2. the average value of the pH of raw milk according to seson

pH-ionic acidity Average pH of milk for processing the period under study (see Table. 1) were 6.7383±0.0011, a normal value for raw milk of cows. *Frank O'Mahony (1988)* stated that raw cow's milk pH is between 6.5...6.7 and *Gheorghe Georgescu (2003)* considers that normal values for raw milk whole range 6.6...6.7.

Table 1

Month	Samples (n)	Density of raw milk at 20°C, g/cm³			pH at 20°C			Freezing point (°C)			Protein content, %			Fat content, %		
		$\overline{X} \pm s_x$	S	V, %	$\overline{X} \pm s_x$	S	V, %	$\overline{X} \pm s_x$	S	V, %	$\overline{X} \pm s_x$	S	V, %	$\overline{X} \pm s_x$	S	V, %
January	129	1,0288±0,0004	0,004	0,3888	6,7088±0,0046	0,0517	0,77063	-0,5533±0,0020	0,0224	4,048437	3,4066±0,0084	0,0946	2,776962	3,8984±0,0696	0,79	20,26472
Februery	147	1,0282±0,0002	0,0016	0,1556	6,697±0,0113	0,1367	2,04121	-0,5396±0,0010	0,0116	2,14974	3,3558±0,0060	0,0725	2,16044	3,9347±0,0796	0,9644	24,5101
March	29	1,0278±0,0004	0,0018	0,1751	6,6862±0,0258	0,1385	2,071	-0,5404±0,0042	0,0226	4,18209	3,3069±0,0162	0,0868	2,6248	4,1034±0,2125	1,1438	27,8744
April	8	1,0275±0,0001	0,0003	0,0292	6,7825±0,0112	0,0315	0,4644	-0,5318±0,0031	0,0087	1,6360	3,3163±0,0366	0,1034	3,1179	4,1000±0,0423	0,1195	2,9146
May	724	1,0282±0,0001	0,0011	0,1070	6,7239±0,0021	0,0549	0,8165	-0,5321±0,0003	0,0059	1,1088	3,3370±0,0032	0,0863	2,5862	3,8094±0,0080	0,2137	5,6098
June	830	1,0268±0,0012	0,0347	3,3794	6,7389±0,0020	0,0556	0,8251	-0,5326±0,0002	0,0054	1,0139	3,3244±0,0022	0,0613	1,8439	3,8000±0,0072	0,2051	5,3974
July	694	1,0276±0,0016	0,0404	3,9315	6,7336±0,0015	0,0384	0,5703	-0,5300±0,0004	0,0094	1,7736	3,2935±0,0092	0,2414	**7,3296**	3,7744±0,0053	0,1378	3,6509
August	567	1,0291±0,0005	0,0112	1,0883	6,7459±0,0014	0,0315	0,4670	-0,5286±0,0004	0,0079	1,4945	3,2936±0,0070	0,1652	**5,0158**	3,8118±0,0076	0,1803	4,7300
Septem-ber	452	1,0277±0,0001	0,0004	0,0389	6,7427±0,0015	0,0302	0,4479	-0,5296±0,0003	0,006	1,1329	3,2930±0,0038	0,0809	2,4567	3,9726±0,0089	0,188	4,7324
October	282	1,0298±0,0009	0,015	1,4566	6,7692±0,0050	0,0827	1,2217	-0,5278±0,0007	0,0118	2,2357	3,4690±0,0090	0,15	4,3240	3,9876±0,0131	0,2192	5,4970
Novem-ber	129	1,029±0,0004	0,0045	0,4373	6,7918±0,0055	0,062	0,9129	-0,5289±0,0009	0,01	1,8907	3,562±0,0168	0,1907	**5,3537**	4,0981±0,0245	0,2781	6,7861
Decem-ber	115	1,0281±0,0045	0,0475	4,6202	6,7397±0,0067	0,0714	1,0594	-0,5306±0,0010	0,0101	1,9035	3,5629±0,0146	0,1556	4,3672	4,1419±0,0284	0,3025	7,3034
Average	**4106**	**1,0282±0,0003**	**0,0135**	**1,317**	**6,73835±0,0011**	**0,0654**	**0,9710**	**-0,5338±0,0002**	**0,01098**	**2,05767**	**3,37675±0,0020**	**0,12406**	**3,6739**	**3,952692±0,0062**	**0,3952**	**9,99825**

In the graphical representation (Fig. 2), it shows that higher average pH recorded during winter (October to April) of 6.7393, and lowers in summer (May-September) of 6.7370. Changes in pH between the two seasons is however very small, which indicates that there are big problems with mastitis milk, yet is close to the maximum normal pH of cow's milk.

Freezing point values for milk taken in the analysis (table no. 1) have shown that milk received was of good quality, with an average value of (-0.5338±0.0002°C). The coefficient of variation has on average 2.05767%, indicating relatively small variations between the values of the freezing point during the year. By analyzing the freezing point of raw milk from Cluj area, *Mirela Anamaria Mic (Jimborean) (2009)* recorded values ranging from -0532°C÷-0580°C, and falls within the results.

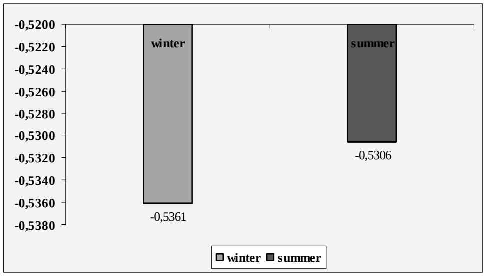

Fig. 3. The average values of the freezing point of raw milk according to season

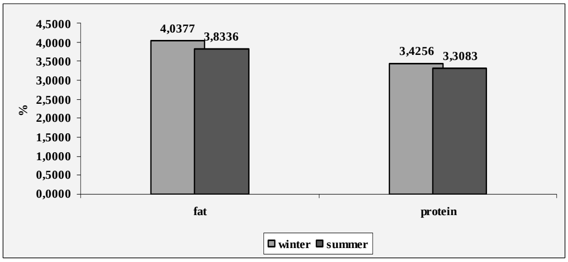

Fig. 4. The average values of the fat and protein content of raw milk according to season

Protein contents Analyzing the percentage of protein dynamics in relation to the period under study recorded values are given in Table. 1. The percentage of protein recorded overall growth trend in winter (see Fig. 4), the highest value reached in December 3.5629±0.0146%, followed by November with 3.562±0.0168% in October to 3.469±0.0090% and 0.0084% in January to 3.4066±0,0084%.

Research conducted by *Mirela Anamaria Mic (Jimborean) (2009)* on samples of milk from Cluj area obtained by analyzing the protein content of raw milk varies between 3.21% and 4.14%, with an average value of 3.536 ± 0 , 2322.

Fat contents The mean percentage of fat (table no. 1) is 3.95±0.0062%, higher than average in the percentage of fat from whole raw cow's milk, and established by Romanian legislation in force, that is, generally 3.5%. The mean rate of 3.0537±0.0062% fat than the average fat percentage of 3.8% for race BNR obtained by *Gheorghe Georgescu (1998).* The largest percentage of fat recorded in December with 4.1419±0.0284% and minimum in July with 3.7744±0.0053% which certifies that the winter diet of the animals have relied more on straw, highly concentrated in the dry food. During the summer where food is largely based on that juicy fat concentration decreases. For graphics (fig. 4) shows that the highest values of percentage of fat is obtained during the winter months from October to April with an average of 4.0377%, and lower values during May-September with an average rate of 3.8336% protein. This is due to weather conditions and how food animals in the two seasons.

Total bacteria count. From Fig 5 shows that, comparing the average values of NTG's full of raw milk received monthly in February registered the highest NTG of 66000 cfu/ml milk. The high value obtained in February, is due to high levels of NTG in C1 where there has been a NTG of 117740 cfu/ml milk, limit exceeded, a figure which indicates hygienically problems. From the graphical representation in all months that NTG did not exceed the maximum limit of 100000 cfu / ml.

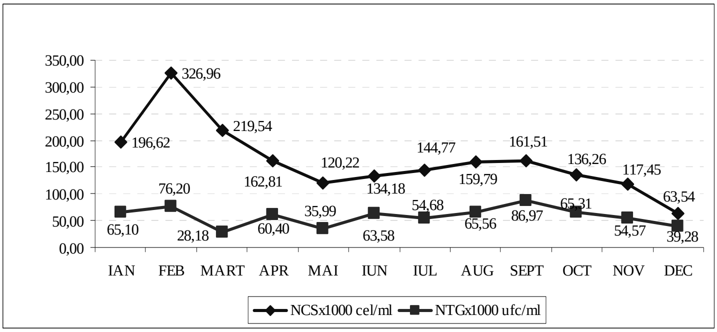

Fig. 5. The evolution TBC and SCC raw milk received monthly

Tracking the microbiological parameters of milk composition, gives information on hygiene conditions in which it was produced, handled, stored and transported material. The comparative analysis between months was found that the lowest values were observed in winter (October to April) and highest number of 36 samples (6%) taken in the summer months (May-September) than maximum permitted by the applicable standards for the NCS, are unfit for human consumption.

Somatic cell count. SCC parameter value for raw milk collected from the 9 collection centers have higher values in February to SCC = 326,960 cell/ml milk, the same for January and March.

It also notes a trend of increasing SCC's from June until September, then decreases. It is suspected if the results beyond legal limits presence of mastitis, the most frequent cause unhygienic milk are health of the mammary gland.

Among the factors identified in our study that could influence SCC values of milk and appearing in the literature, we can mention the animals age, breast rest, knowing that the SCC values increase before and after the resting breast, milking incomplete. Lowest values were observed in winter (October to April), and highest in summer months (May-September). The large number of cells harvested from milk is a dynamic atypical, given that growth in technology and exploitation of animals from which milk is sufficient weaknesses and especially because milking hygiene is not observed or verified animal health.

3. CONCLUSIONS

1. The density of raw milk was appropriate by normal. The comparison of monthly average values of density, achieved average density of 1.0282 g/cm^3. Ionic acidity (pH) for milk processing period under study was an average of 6.7383, representing a normal value for raw milk of cows. The mean freezing point for milk received in the period under study is -0.53378°C.

2. The mean percentage of fat in the period under review is 3.95% higher than average in the percentage of fat from whole raw cow's milk, established by Romanian legislation in force, which. It is in generally by 3.5%. There were higher values in winter and lower values in summer. These differences between seasons are caused by climatic factors and the different diets of the two seasons.

3. The mean percentage of protein is 3.3767%, the lowest values recorded during the summer months from May to September, with an average of 3.3083%, and values increased during the coldest of the year, months from October to April, with average protein percentage of 3.4256% and the average percentage of fat on all year is 3.3767% and not fall below 3.15% per month.

4. Of samples to determine NTG, 91.41% of samples fall within the rules recommended by the EU for NTG max. 100000 cfu/ml, and the remaining 8.59% samples are unfit for human consumption.

5. Of milk samples taken for determination of NCS, 70.87% samples fall within the recommended standard (NCS <400000cel/ml milk) and the remaining 29.13% did not meet EU hygiene requirements, samples are unfit for human consumption. The most common cause unhygienic milk is health of the mammary gland.

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DATA QUALITY ASSURANCE IN SAFE PRODUCTION OF FOOD

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Key words: ecology, eco-economy, safe food production,
Cuvinte cheie: ecologie , eco-economie, productie sigura de hrana

SUMMARY

The development of quality assurance programs is mandatory in the food production. The measuring of the physico-chemical parameters provides data for the certification of the materials used in the population feeding. In this respect, these data must be checked by authorized national laboratories. There is presented the role of the third part labs in the food chain. Special codes are developed and calibrated for qualification of the data enclosed in the bulletins.

The correct evaluation of the uncertainties in the food testing is performed by modern mathematics modeling as well as codes based on the covariance matrix method.

There is presented an application based on the technological planning.

1. THE DEVELOPMENT OF THE INDEPENDENT LABORATORIES

The most important challenge for a safe development of the safe production for population feeding is an integrated system of analysis for the certification of the conformity with European standards[1,2,3] as well as with the rules of the national legislation in force[4] . This means that independent laboratories provide quality control services based on :

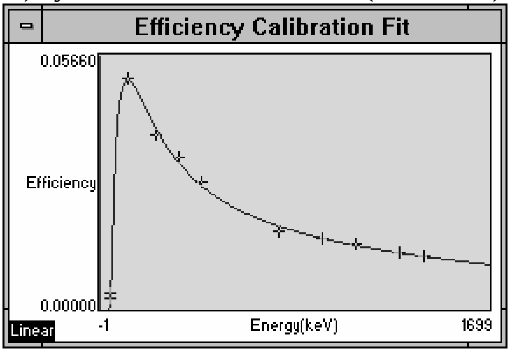
- a significant modernizing of the scientific basis of the labs
- the use of the experts with a great expertise and high level of training
- the utilization of the apparata and equipment of in the last generation
- the interpretation of the measuring results with complex codes , giving the propagation of errors [5.6]

In the programs of the safe production of food are acting units which check the conformity with the rules referring to the health of the population as well as the environmental protection. The quality assurance program developed for the authorization of these laboratories are based on the advanced methods [7,8] as well as the best practices recommended by the dedicated international organizations. The certification is a part of the effort for sustainable development of the country. The risks affecting the next generations can be avoid.[10]

These laboratories must correlate the used procedures with elaborated strategies of development and diversification of the products. The procedures are based on the physico-chemical methods used in a metrology regime as well as the appropriate mathematical methods for the interpretation of measuring results, including the utilization of the statistics criteria. The bulletins must provide relevant data, accordingly with ISO

17025 standard. In the polluted areas are developed special methods for their characterization. The authors used the high resolution gamma spectrometry to characterize by radiological point of view Magurele – Ilfov ecozone [10} In the figure no.1 is presented the calibration of the spectrometer for liquids checking. The method was validated by intercomparison with dedicated lab in Rossendorf,Germany[11}

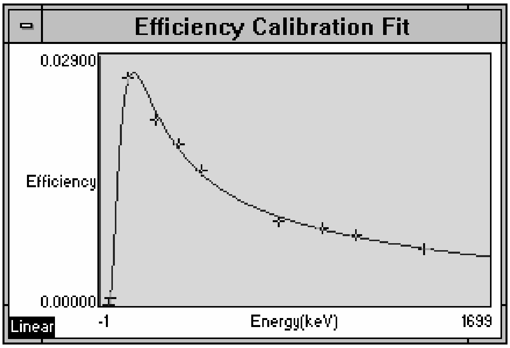
A) cylindrical volume sources (151,5 cm^3)



Efficiency Table

Energy	Effic.	Fit	Delta
45.40	0.002612	0.002612	0.00%
46.60	0.003842	0.003855	-0.33%
121.78	0.051429	0.051124	0.59%
244.70	0.038904	0.040464	-4.01%
344.28	0.033874	0.032713	3.43%
444.00	0.028364	0.027568	2.81%
778.90	0.017753	0.018714	-5.41%
964.00	0.016076	0.016078	-0.01%
1112.08	0.014855	0.014465	2.62%
1299.12	0.012755	0.012824	-0.54%
1408.03	0.012037	0.012013	0.20%

B) volume Marinelli sources (500 ml)



Efficiency Table

Energy	Effic.	Fit	Delta
39.52	0.000160	0.000160	0.00%
45.40	0.001025	0.001026	-0.06%
121.78	0.026291	0.026146	0.55%
244.70	0.021637	0.022487	-3.93%
344.28	0.018720	0.018111	3.25%
444.00	0.015721	0.015231	3.12%
778.90	0.009778	0.010369	-6.04%
964.00	0.008973	0.008936	0.41%
1112.08	0.008267	0.008060	2.50%
1408.03	0.006712	0.006727	-0.22%

Fig.1 Calibration of gamma spectrometer:

2. **PROGRAMMES FOR DATA VALIDATION**

The data quality objectives include the establishing of the problem, the decision identification, the knowing of data needs, the elaboration of the decision criteria, the definition of the limits for the decision errors, the improvement of the sampling plan. There are six types of markers for data validation:

- the reports to the decision level
- the documentation
- data source
- analytical methods and their limits
- data review
- quality factors for data.

The reports may to the decision makers to evaluate the checking process for data. The preliminary reports can indicate the present pollutants and their level of concentrations, giving the indications referring to the sampling, analyses as well as the interpretation methods.

The documentation is evaluated on the basis of the following issues:

- operational recordings in the studied facilities
- laboratory recordings
- data transfer records.

The operational records are: data of operators (name, training certification etc), general procedures used in the system, the reports regarding deficient issues as well as the corrective actions. The laboratory records must give the sampling system, the sample storage and the scheduling of the analysis. An additional quality control measuring will be performed by another operator and will be separately recorded. The transfer of data will be performed by the procedure specified in quality assurance program.

The evaluation of the historical information in the previous scientific reports provides the data source.

The selection of the analytical methods is one of the most sensitive issues in the process. Taking into account that the data just nearby the detection limits are affected by serious uncertainties, the decisions referring to sensitivity in measurements must be fundamental in the measuring protocols.

The data review is performed by quality assessment made by experts in analytical procedures, specifying the data qualification way. There are evaluated the overall data, the quality of the equipment, the precision of the measurement as well as the measure threshold in the reference materials.

3. TECHNOLOGICAL PLANNING

The technological prognosis is a significant task of the leadership, including:

- the establishing of the main objectives for research activity in the field
- the setting up of the organizational chart of the research institute to the perspectives and constraints on the long term
- the development of the strategy
- the assessment of the research projects considering the funds and manpower[12].

This is an important part of the innovative development for research-production cycle for the sustainable development of the country [13]. In the European approach, there is responsible personnel for these issues: technical coordinators, research managers, research director of the institute and the regional manager in case of the structural funds [14].

The building of scientific prognosis of the sustainable future in rural areas is an important aspect in the evolution of the food production. The following steps are enclosed in a simplified design:

- planning
- the collecting of data regarding the social issues in the studied areas
- the assessment of the control options

- the definition of the decision criteria
- the sensitivity analysis
- cost benefit evaluation
- DECISION.

The releasing in the environment can influence the development of the industrial processing of the food. The technological development could be accelerated by a more flexible legislative framework, an improved capacity of the rural communities to apply in European projects by local or regional economical agents. The use of the modern IT systems in all phases of the fabrication is mandatory for a fast evolution of the healthy feeding. There are other issues involved in safe agriculture: the prevention of the natural disasters and/or the mitigation of their effects, the development of biotechnologies, the safe management of soils and waters for the biodiversity conservation.[15]

During our visit in S.A.SANLACTA Targu Mures, in October 2008, by the courtesy of the management [16] the authors could study the planning development from their farms up to production units as well as the distribution.

Fig. 2 The control of milk in Seuca farm, Mures county

A producer laboratory was developed also in the production unit in Targu Mures. The lab is placed in a clean area and it is organized by the quality assurance in the frame of recommendations ISO 17025. The certificates provided by this laboratory are dedicated to management of the plant as well as for sanitary authorities of the county (Fig.3).

The quality assurance program is strictly applied by production team in order to maintain the trade brand at the high level on the market. The QA manager trained a staff of QA operators working in all production phases as well as in the packing area. The products are control based on the sampling protocol. Also in the distribution on the market are special places for the quality control.

Fig. 3 Laboratory for milky production (by courtesy of SC SANLACTA ,MURES)

Fig. 4 Quality control on the production chain (by courtesy of SC SANLACTA ,MURES

4. CONCLUSIONS

a. The influence of the innovative approach of the safe food production is based on the advanced research, including up-to-date information technology.
b. The decision level must take into account the independent laboratory results, certifying the conformity with the European rules as well as the national laws.
c. The validation of the measuring methods is performed by the national metrology authorization as well as international intercomparisons.
d. The quality assurance systems used in the processes of the population feeding are mandatory in the European space.

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6. WILD LIFE MANAGEMENT, FISHERY AND AQUACULTURE

STUDY OF CYNEGETIC BIODIVERSITY IN “HATSEG COUNTRY” AREEA

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Key words: wild animal biodiversity; bio security; protected areas

SUMMARY

Investigations have been done in “Hateg Land – Retezat” region. The zone is located in the Western part of Romania and includes some hunt grounds and part of the scientific reservation “Gemenele” (She Twins) where hunting is forbidden. Evaluation of biodiversity has been provided on hunt grounds and on species. Species’ livestock was estimated using the direct counting of individuals and the paths traced in the snow, inside concentric cycles applied in statistically evaluation. Species ratio inside the hunt grounds were used to appreciate the ecological and genetic value of each of them. A new method of genetically analysis, based on chromosome microsatellites identification has to be applied. For DNA analysis sample collection is done using the TipyFix method.

INTRODUCTION

The present paper contains research provided in the frame of the S E E project “Conservation of the Bio and Geo diversity support of the sustainable development and of economical and social growth in the Hatseg Land – Retezat, zone “(of Romania). The project is led by Romanian Academy having as partners the Bucharest University and the Inter communitarian Association “ Tara Hatsegului” (Hatseg Land) having as objective the sustainability of the natural ecosystem of Retezat Mountain and the welfare of the inhabitants of Hatseg Land.

Biodiversity conservation represents one of the most important common international problems. The natural environment of Europe possesses many habitats and ecosystems. Romania acts concerning Nature protection and Biodiversity conservation by building up a national net of protected zones after scientifically identification.

Subject of this paper “Retezat Park” is the oldest National Park declared by law in Romania in the 1935 year. Park’s surface measures 38.047 ha among them 1.800 ha named “Gemenele” (The She Twins) being strictly protected. Relief of the Park is of high mountains of glacier type with more than 80 glacier lakes, the one of the largest water mirror (“Bucura”) having 8.86 ha surface and deepest one (“Zănoaga”) having 29 m depth. As large vertebrates' species Brown Bears, Wolves, Wild cats, Wild Boars, dears and Black Goats are living in the zone, nearby many small predators among which 8 species of Mustelidae. Results of the first investigations are presented.

1. MATERIALS AND METHODS

Investigations were located in the Hateg Land zone. There 7 hunt grounds: Carnesti (51), Zeicani (52), Grate River (53), Retezat (55), White River (56), Edge (57) and Strong River (59) were approached. Demographic methods have been applied. Along with chase's species identification, demographic indices like number, dispersion or longevity were assessed. As a novelty in demographic research chromosome microsatellite genetic markers are used.

Quantification of biological diversity concerning the number of species for each of the 7 hunt grounds has been done. Genetic diversity inside species has been evaluated by the estimated number of individuals. Species' livestock was estimated using the counting of individuals resulted from direct observation and examining the paths traced in the snow, inside concentric cycles applied in statistically evaluation. Species ratio inside each hunt ground was counted to appreciate the ecological balance of the place. Genetic diversity inside species is based on DNA analysis. To collect samples for DNA analysis the TypiFix method is used.

The TypiFix method, patented by Gotfried Brem, which needs only 2 steps to DNA purification, substitutes the blood samples collection pretending 8 steps up to the purification of DNA. Purification of nucleic acids from TypiFix samples is more than five times faster. The TypiFix™ ear tag system is a combination of a conventional ear tag with a simultaneous tissue sampling technology.The tissue samples are automatically collected and sealed in the TypiFix™ sample containers, where the tissue samples are preserved at ambient temperature and can be used for protein or DNA based assays. The easy handling of the TypiFix™ ear tag system allows economic sampling of whole populations and is therefore an effective tool for analysis of genetic markers for paternity control, traceability. The Typi-Fix®-System is a procedure for the collection of DNA containing tissue samples avoiding all these hurdles and problems. After collection the preservation and preparation of the DNA is initiated automatically by substances which are hold in stock in the sample receiving container. The identification number of the samples can be registered by a reading device (scanner). The sample container is connected to the eartag by a plug and socket and is easily removed after the eartag has been affixed and the tissue sample simultaneously collected. If desired, the sample container can also be used without the eartag.

2. RESULTS AND DISSCUSSIONS

Results of investigation are presented in table 1. Biodiversity of mammals (fur hunt) is higher than the one of birds (feather hunt). Pheasant for instance is present only in 2 hunt grounds. Partridge is present in 6 hunt grounds. On contrary 5 mammal species are present in all 7 hunt grounds. No one of the mammal species is present in less than 5 hunt grounds. 0f highest accommodation ability roebuck, hare, badger, wild cat and fox dispose. In the experiment we identify the hunting animals by analysis of the 10 microsatellite markers (S0005, S0090,S0101,S0155,S0355 S0386,SW24,SW240,SW857, SW951) and after the sample it was compared with the meat probe. These systems can also be used other large-scale for animals products identification with DNA analysis. The results of DNA analysis demonstrate the identity of a livestock animal can be established directly by the genetic information.

On the other hand the hunt grounds Great River (53), Edge (58) and Strong River (59) dispose of larger biodiversity all species being present except the pheasant.

Table 1

Hunt species diversity in 7 hunt rounds in the Hatseg Land – Retezat area (quantitative estimation – 2009 April 1)

Crt no.	Hunt kind	Species *(Latin name)*	Hunt ground (number cod) Carne-sti (51)	Zeica-ni (52)\	Grea-te River (53)	Rete-zat (55)	White River (56)	Edge (58)	Stro-ng River (59)	Total number of items
1	Fur hunt	Black goat *(Rubicapra rubicapra)*	-	81	172	89	-	150	215	707
2		Roebuck *(Capreolus capreolus)*	10	75	52	24	18	88	91	358
3		Buck *(Cervus elaphus)*	-	59	54	25	-	62	58	258
4		Wild boar *(Sus scrofa ferus)*	6	61	55	-	6	57	55	240
5		Hare *(Lepus europeus)*	180	20	10	8	196	49	56	519
6		Marmot *(Marmota marmota)*	-	-	25	80	-	34	39	178
7		Badger (*Meles meles)*	15	17	12	5	12	18	13	92
8		Polecat (common) *(Putorius sp.)*	15	20	10	-	15	38	16	114
9		Weasel *(Mustela nivalis)*	12	10	9	-	15	30	29	105
10		Wildcat *(Felis silvestris*)	5	7	6	5	5	7	7	42
11		Linx (Bobcat) *(Linx linx)*	-	3	5	3	-	7	6	24
12		Tree Marten *(Martex martex)*	-	19	16	12	-	15	14	76
13		Rock Marten *(Martex foina)*	-	9	8	7	-	8	9	41
14		Fox *(Vulpes vulpes)*	25	19	13	8	25	17	18	125
15		Wolf *(Canis lupus)*	-	5	5	3	-	10	9	32
16		Brown Bear *(Ursus arctos)*	-	17	15	7	-	25	26	90

	Feather hunt	Wood grouse *(Tetrao urogallus)*	-	10	16	15	-	68	62	171
		Pheasnt *(Phasianus colhicus)*	210	-	-	-	220	-	-	430
		Partridge (common) *(Perdix perdix)*	175	35	13	-	220	51	48	542

Poorest biodiversity in Carnesti (51) and White River hunt groundes is registered. Equal biodiversity hunt grounds have allways the same kind of species.

3. CONCLUSIONS

The needed biotope for bear, wolf and lynx is the forest. Birds prefer the hill areas.

Three hunting complexes should be distinguished: Roebuck – Wild Boar – hare in the hill area; Buck – Bear – Wood Cock in the green mountains and the Black Goat in the alpine part of the mountain.

There is a need for more extended studies upon the biological diversity and the genetic traits of the hunt pool in the Hateg Land and Retezat areas.

The Typi-Fix®-System is a procedure for the collection of DNA containing tissue samples avoiding all these hurdles and problems. we identify the hunting animals by analysis of the 10 microsatellite markers (S0005, S0090,S0101,S0155,S0355 S0386,SW24,SW240,SW857, SW951) and after the sample it was compared with the meat probe.

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NEMATODE PARASITES OF PHEASANTS (Phasianus colchicus L.) ARTIFICIALLY RAISED IN SERBIA

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Key words: helminthes, pheasants, *Phasianus colchicus*

SUMMARY

Helminthes has an important place in the pathology of game pheasants artificially raised. During the period 1987-2007. We examined a total of 1893 pheasants poults aged from 4 to 14 weeks old and 1432 adult birds. Examination performed at several phesanterias in Serbia. The following nematode species were found: *Syngamus trachea, Ascaridia galli, Ascaridia columbae, Heterakis gallinae, Heterakis islonce, Capillaria annulata, C.bursata, C.columbae, C.contorta, C.gallinae,* and *C.phasianina.* The intensity of infection in total was not high, except in case of infection with ascaridata and gapeworms, and depend of age of examined birds.

INTRODUCTION

Parasitoses caused by helminthes produce remarkable health problems in free-living and artificially raised pheasants. The great part of examination about pheasants parasites described helminthes fauna of free living birds and impointed its role in pathology of pheasants (*Fagasinski,*1964; *Gilbertson and Hugghins,*1964;*Pav and Zajiček,*1968; *Kellog and Pestwood,*1968; *Bejšovec*, 1968;1973; *Greiner,*1972; *Frank,*1977; *Pence et.all.,*l980; *Perilo,*1980; *Githokopoulos,* 1984., *Schrike,*1991, *Florestean and Pavlović,*2003: *Pavlović et all* 2003).

Similar examination were done in artificially raised pheasants and state thet helminthes normally occurs in pheasants farm breeding and have important place in the pathology of these birds (*Bickford and Gaafar,*1964., *Bejšovec,*1968., *Cosoroaba and Cidfan,*1979, *Perilo,*1980., *Schrike,*1991 *Florestean et al.*2001). In Serbia, however, this parasite has been infrequently examined. Several examination was performed by *Nevenić* (l953; 1960) and later by *Pavlović* (1990 b, 1991) and *Pavlović et all*. (1992; 1996, 2001).

1. MATERIALS AND METHODS

The study of helminthes infection on artificially raised pheasants was carried in 12 pheasanterias in Serbia in period 1987-2007. During our examination we have examined samples of faces and died pheasants. Samples of faces were collected monthly from birds flock and examined using sedimentation and flotation concentration technique, described by Euseby (1981). A total 1893 pheasants to 14 weeks old and 1432 adult pheasants were examined by parasitological necropsy. Determination of found helminthes we performed by keys given by Soulsby (1977).

2. RESULTS AND DISCUSSION

During our examination we found infection with helminthes in 41,83% (792/1893) pheasants to 14 weeks old and in 33, and 03% (473/1432) adult pheasants. Poliparasitisms caused by two species were found in 341 (18,01%) pheasants to 14 weeks old and to 343 (23, 95%) adult birds.

The following nematodes species were found: *Syngamus trachea* (Montagu, 1811), *Ascaridia galli* (Schrank, 1788), *Ascaridia columbae* (Gmelin, 1790), *Heterakis gallinae* (Schrank, 1788), Heterakis isolonche (Schrank, 1798), *Capillaria gallinae* (sin.C.caudinflata) (Kowalewski, 1859), *Capillaria annulata* (Molin, 1858), *Capillaria contorta* (Creplin, 1839), *Capillaria bursata* (Freitas &Almeida, 1934), *Capillaria columbae* (sin.C.obsignata) (Rudolphi, 1819),and *Capillaria phasianis* (Kotlan,1940).
In both countries at pheasants to 14 weeks old most prevalent was *Syngamus trachea* (37, 19%), followed by *Heterakis isolonche* (27,97), *Ascaridia galli* (12,98%), *H.gallinae* (11,14%), *Capillaria galinae* (10,28%), *C.columbae* (9,53%), *Ascaridia columbae* (9,53%) and *C.annulata* (7,71%). In these young pheasants group, especially when the infection was of strong intensity, we usually found clinical signs of disease. With intestinal helminths the birds had diarrhea and were markedly emaciated and generally weak. For gapeworm infection the characteristic signs were dyspnoa and asphyxia. The birds shake and toss their heads about and may be caught, or they extend the neck, open the beak and perform gaping movements. With serious infection the mortality reached 15%. Pathological changes are similar like described by *Cvetajeva* (1971), *Pavlović* (1991), *Pavlović et al.* (1996, 2003) and *Florestean at al.* (2001).

Adult pheasants, were infected with the same parasite species but the intensity of infection (except with *Syngamus trachea* and *Ascaridia galli* was) not sufficient to induce clinical signs of disease. *Syngamus trachea* was most abundance species (34,45%), followed by *Ascaridia galli* (23,06%) and *Ascaridia columbae* (18,19%), *Capillaria annulata* (8,23%), *C.columbae* (7,92%), *Heterakis isolonche* (7,41%), *H.gallinae* (4,57%), *C.gallinae* (4,57%) and *C.phasianis* (4,36%).

Comparing obtained results with results of other similar examination performed by *Bickford and Gaffar* (1964), *Novakova and Dušek* (1974), *Frank* (1977), Pence *et al.* (1980), *Perilo* (1980), and *Ghitokhopoulus* (1984) we concluded thet found helminthes species, have worldwide distribution with similar rate of infection. Found helminthes are wide range of distribution in bird population and was found at pigeons, fowls and other free living and breeding bird's species (*Bejšovec*,1968; *Okulewitz and Modrezejavska*,1980). Same parasites species were occurred on pigeons and domestic fowls in Serbia (*Pavlović et al*.1997 a). Many intermediate hosts (arthropods) and free-living birds infected with these helminth species allowed transmission to the pheasant. Populations artificially bred (*Bejšovec*1968;*Pavlović et al*.1990 c).

3. CONCLUSIONS

Examination performed at several phesanterias in Serbia in period 1987-2007. occurred following helminthes species: *Syngamus trachea*, *Ascaridia galli*, *Ascaridia columbae*, *Heterakis gallinae*, *Heterakis islonce*, *Capillaria annulata*, *C.bursata*, *C.columbae*, *C.contorta*, *C.gallinae*, and *C.phasianina.* The intensity of infection in total was not high, except in case of infection with ascaridata and gapeworms, and depend of age of examined birds.

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CONTROLLED SPAWNING OF PIKEPERCH, *STIZOSTEDION LUCIOPERCA* (L.), IN RESEARCH AND DEVELOPMENT CENTER FOR FISH CULTURE NUCET

REPRODUCEREA CONTROLATĂ A ŞALĂULUI, *STIZOSTEDION LUCIOPERCA* (L.), LA CENTRUL DE CERCETARE DEZVOLTARE PENTRU PISCICULTURA NUCET

COSTACHE MIOARA, RADU DANIELA, COSTACHE MIHAIL

Keywords: *Stizostedion lucioperca* (L.); spawning; human chorionic gonadotropin (HCG); tank culture
Cuvinte cheie: *Stizostedion lucioperca* (L.): reproducere; gonadotropină corionică umană (HCG); creştere cazi

SUMMARY

The aim of the researches was to determine the effectiveness of the plastic tanks method in pikeperch propagation with and without hormonal stimulation. The researches was carried out in 2008–2009 in the Research and Development Center for Fish Culture Nucet. A total of 212 fishes were studied that were caught at natural spawning grounds. The effects of propagation without hormonal stimulation, expressed as the number of ovulating females, were highly significantly dependent ($P < 0.05$) on the stage of oocyte maturity; they ranged from 0% (stage I) to 100% (maturity stage IV), with an average value of about 18%. The application of 400 IU of human chorionic gonadotropin (HCG) per kg of female body weight synchronized the maturation process, facilitated reproduction in less mature fish (especially those in stage I), and resulted in enhanced spawning effectiveness in which the percentage of resting females was 72%. Hormonal stimulation significantly ($P < 0.05$) shortened the length of the time the fish were held in spawning tanks, which allowed their multiple use during the spawning season. The amount of obtained eggs ranged from 54.0×10^3 to 622.2×10^3 and it was positively correlated with female body weight ($R^2 = 0.6102$).

A similar, high correlation ($R^2 = 0.621$) was confirmed between body weight and the number of eggs . The embryo survival was 78% on average.

1. MATERIALS AND METHODS

MATERIALS

The research on pikeperch propagation in plastic tancks were carried out on the C.C.D.P. Nucet in 2008–2009. A total of 212 fishes were used in the present study. The average body weight of females in 2008 was 1.04 kg, and in 2009 it was 1.63 kg. The average body weight of males was 1.20 kg, and was more balanced in both years (*Table 1*).

Table 1

Characteristics of pikeperch spawners

Years	n	Females		n	Meales	
		body weight (kg)			body weight (kg)	
		range	average		range	average
2008	46	0,71–2,64	1,04	54	0,80–3,40	1,22
2009	52	0,90–3,60	1,63	60	0,72–3,40	1,20

EQUIPMENT

The research were carried out in plastic tank measuring 2 × 2 × 1,3 m.

Depending on the number of mature females, one or two spawning nests made of tiny willow roots were placed in each of the spawning tanks.

The sizes of nests varied; for females that weighed over 1.5 kg they measured 0.6 × 0.6 m, and for smaller females they were 0.5 × 0.5 m in size.

PROCEDURE

The oocytes were harvested using a catheter and preserved in a solution of ethanol, formalin and glacial acetic acid (6 : 3 : 1, v/v). The percentages of cells in the subsequent stages were determined for the oocytes that completed vitellogenesis: I – with a centrally located nucleus, II – with a migrating nucleus, III – with a nucleus that shifted towards the periphery of the cell, IV – after the breakdown of the nucleus morphological structure (GVBD) (*Brzuska* and *Bieniarz,* 1977).

Females were divided into four groups according to the degree of maturity. The first group consisted of fish with oocytes only in stage I or with this stage dominating at more than 60%. The second group consisted of fish with oocytes in stage II. The third group consisted of spawners in maturity stage III, and the fourth group contained mature individuals with oocytes in maturity stage IV.

Prior to placing the spawners in cages, they were marked with plastic tags mounted to their spinal dorsal fins; this allowed the specimens to be easily identified. After marking, the fish were bathed in a saline solution of 200 g NaCl per 10 l of water for two minutes. The females from groups I and II were placed separately in manipulation tank.

The fish in the experimental groups were hormonally stimulated using HCG. The hormone was injected peritoneally at a dosage of 400 IU per kg of female body weight. The degree of oocyte maturity was controlled every two days and when the females reached maturity stage III, they were moved to spawning tank. Females from groups III and IV were placed directly into spawning cages; however, some spawners with oocytes in maturity stage III were stimulated hormonally. Depending on the number of fish, one or two sets of spawners composed of one female and two males were placed in one tank. The nests and the water temperature were checked twice daily at 07.00 and at 19.00. The resting females were caught, weighed and their commercial fecundity (the number of eggs obtained during controlled tank spawning) was determined gravimetrically. Nests with eggs were moved to incubation in incubator Nucet where they were kept until the eyed stage when their survival rate was determined.

STATISTICAL ANALYSIS

The statistical analysis of the data was conducted using the STATISTICA program. The data on the number of ovulating females in the control groups and those that were hormonally stimulated were analyzed using logistic regression. The time of fish captivity in cages until egg release was analyzed using analysis of variance (ANOVA). If significant differences ($P < 0.05$) were detected, further analysis was carried out using the LSD test. The dependences between body weight and commercial fecundity and body weight and the number of eggs in the eyed stage were tested by regression analysis.

RESULTS AND DISCUSSIONS

SPAWNING TIME

In 2008, the water temperature ranged from 8.1 to 15.6°C, and in 2009 from 13.8 to 18.1°C. The thermal conditions in 2008 resulted in a longer spawning season; it significantly impacted spawner condition and health. Symptoms of fungal infections were observed in the majority of fish and especially in females in maturity stages I and II. Nevertheless, the spawner survival rate in both years was similar, 98 and 99%, respectively.

Despite of different thermal conditions, the fish residence time in the tanks until spawning was similar in both years. It was significantly dependent on the degree of female maturity ($P < 0.001$) in both the control and experimental groups. The impact of hormonal stimulation on the maturation and ovulation processes, and thus on the fish residence time in the tanks, was also significant ($P < 0.05$; *Table 2*). Both in 2008 and 2009, no female in stage I (control group) began reproduction. After six to nine days in the tanks, oocytes with a centrally located nucleus (50–70%) or with one that moved slightly towards the cell periphery (30–50%) were observed in their gonads. Spawners that were hormonally treated reproduced between the fifth and eighth day (*Table 2*). Of the females in stage II from the control group, spawning occurred between day five and seven in 2008 and day four and seven in 2009. When hormonal injections were applied, significant acceleration ($P < 0.001$) and greater synchronization of spawning was observed. In such cases, spawning began within two to five days. In group III, the impact of hormonal stimulation on maturation was observed to a lesser extent although it was also statistically significant ($P < 0.05$); females injected with HCG started reproduction within one to three days, and spawners from the control groups within one to four days (*Table 2*). The most mature fish started spawning the earliest, i.e. within 24 hours from the moment they were placed in the spawning tanks.

Table 2

Results of pikeperch spawning in tank from 2008 – 2009

Preparation used	Number of females			% of stripped females			Tank time (days)		
	2008	2009	total	2008	2009	average*	2008	2009	average *
I stage of maturity									
Control	11	13	24	0,0	0,0	$0,0^{A}$	-	-	-
HCG	1	6	7	100,0	66,7	$83,4^{B}$	5	5–8	6,2
II stage of maturity									
Control	11	9	20	23,1	54,5	$38,8^{A}$	5–7	4–7	$5,4^{A}$
HCG	8	13	21	100,0	92,3	$96,2^{B}$	4–5	2–5	$3,6^{B}$
III stage of maturity									
Control	10	3	13	69,2	50,0	$59,6^{A}$	2–4	2–3	$2,8^{A}$
HCG	5	5	10	80,0	80,0	$80,0^{A}$	1–3	1–3	$1,7^{B}$
IV stage of maturity									
Control	-	3	3	-	100,0	100,0	-	1	1,0
HCG	-	-	-	-	-	-	-	-	-

* data with the same superscripts in the same column are not significantly different (P >0.05)

SPAWNING PERCENTAGE

Spawning effectiveness, measured as the percentage of spawned females, depended mainly on the degree of their maturity and the applied hormonal stimulation (Table 2). In 2008 and 2009, the spawning effectiveness of the least mature fish (stage I) from the control group was 0%. Better results were obtained for females with oocytes in stages II or III, 23.1 and 69.2% (2008) and 54.5 and 50.0% (2009), respectively. The best results were obtained for fish from stage IV at 100%. The percentage of females that began reproducing increased thanks to the application of hormonal injections (Table 2). The spawning effectiveness in both study years was 80% for the group of fish whose oocytes were in maturity stage III when they were caught at the spawning grounds. On average, this was 20.4% higher than in the control group.

Additionally, in the group of less mature fish (stage II), a statistically significant increase in the number of females that spawned was observed. In 2008, all the females that were hormonally stimulated spawned, and in 2009 the number of the resting spawners was slightly lower at 92.3%. The highest differences in spawning effectiveness were observed between the females from the control group and the experimental group that belonged to maturity stage I. On average, they comprised 83.4% of the resting fish in the experimental group and 0% in the control group.

COMMERCIAL FECUNDITY

The commercial fecundity of females ranged from 54.0×10^3 to 622.2×10^3 eggs and it was positively correlated with their body weight ($R^2 = 0.6102$).

The average body weight of the smallest fish (weight class from 0.71 to 1.00 kg) was 0.91 kg and they yielded from 40 to 194 g of eggs. One female released 170.1×10^3 eggs, which in terms of grams of body weight meant 185/g eggs on average. Females weighing from 1.01 to 1.50 kg had a higher degree of commercial fecundity that ranged from 150.0×10^3 to 492.0×10^3 eggs, with an average value of 277.0×10^3 eggs per female, i.e. 235 eggs/g of body weight. The average fecundity of females from the next size group, 1.51 – 2.00 kg, was higher by almost 130.0×10^3 eggs. Their fecundity ranged from 231.0 to 555.0×10^3 eggs. The least numerous, however the most fertile group, weighed over 2.01 kg (from 2.13 to 3.01 kg). On average, the fecundity of this group was 513.6×10^3 eggs at an average body weight of 2.54 kg. In both study years, the survival rate until the eyed stage was similar and ranged from 82 to 86% of the number of released eggs. The number of eggs in the eyed stage obtained from particular females ranged from 50.1×10^3 to 566.5×10^3 eggs and it was positively correlated with their body weight ($R^2 = 0.621$), and thus with their commercial fecundity. Females weighing from 0.71 to 1.00 kg yielded on average 143.2×10^3 eggs, i.e. 155 eggs per g of female weight. The highest average number of eggs in the eyed stage was obtained from fish from the three consecutive size classes, i.e. 240.4×10^3 , 343.5×10^3 and 433.3×10^3 eggs. These values, recalculated into grams of female body weight in size classes 1.01–1.50 kg and 1.51–2.00 kg, were similar at 199 and 201 eggs, respectively. In the group of the largest fish (>2.01 kg) about 171 eggs in the eyed stage/g of female spawner weight were obtained.

3. CONCLUSIONS

Despite of different thermal conditions in the two study years, the effectiveness of reproduction based on the total number of spawned females was similar.

Spawning effectiveness in the control group was similar in 2008 and 2009 In 2008, 30.0% of the females spawned, and 27.5% females did so in 2009. The percentage of females that spawned varied in different groups and it was positively correlated with the degree of maturity. The best effectiveness (100% spawning) was obtained from spawners in which over 50% of the oocytes were in GVBD stage. The poorest effectiveness was recorded in the most abundant and least mature group; no females from maturity stage I spawned. Similar studies were carried out in Finland (*Antila et al.*, 1988; *Salminen et al.*, 1992).

Since pikeperch spawners are very sensitive, both the time of their placement in the cages and the duration of their captivity have a significant influence on the effectiveness of their reproduction. During the studies described in this paper, the time after which the non-hormonally treated fish began spawning was strongly dependent on their maturity stage and ranged from one to eight days. Most frequently, the females began reproduction after two to four days. After hormonal stimulation, the female fish spawned faster. The spawning effectiveness also increased significantly.

The commercial fecundity of the studied females in all groups was similar and depended on body weight. It ranged from 60.0×10^3 eggs in the fish with body weight from 0.71 to 1 kg to 682.5×10^3 eggs for females with body weight above 2 kg. Spawners from the 1–2 kg size class had the highest fecundity expressed as the number of eggs per g of body weight at 235 eggs/g while the heavier spawners (> 2 kg) showed lower fecundity. The lowest fecundity was observed in the fish with body weight below 1 kg (185 eggs/g).

Thus, the 82–86% survival rate until the eyed stage obtained in the present study can be regarded as very satisfactory.

In order to determine with high probability the ability to spawn and the spawning effectiveness as well as to estimate tank and spawning nest requirements, it is necessary to determine the maturity stage of spawners after they are caught.

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TESTING THE GROWTH IN ONE SUMMER CULTURED CARP (*CYPRINUS CARPIO* – Linne, 1758), IN TANKS, IN DIFFERENT DENSITIES

TESTAREA CRESTERII CRAPULUI DE CULTURA IN VARA I *(CYPRINUS CARPIO* – Linne, 1758), IN CAZI, IN DIFERITE DENSITATI

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Cuvinte cheie: testare, crap, cazi, densitati
Key words: test, carp, tanks, densities

SUMMARY

Studies were aimed at testing the growth of a summer carp culture in different densities, type Evos in tanks, placed in a covered enclosure. Experiences growth in the summer I have done in two technological options (first option to use a total of 300 copies with an average weight of 8,54 g / ex in the density of 5,124 kg/m^3, in the Two variables were used 150 copies of juvenile carp with an average weight of 9,02g/ex in density 2,706 kg/m^3). Production has achieved best value (15, 84 kilograms /tank at is 31, 68 kg/m^3) in the experimental version (V.2) where he used a density of less popular. The experiment was conducted over a period of 88 days between June 15 and September 10, 2009.

1. MATERIALS AND METHODS

To achieve biological experiment were used Evos type 2 tanks with a capacity of 1m ³ and a useful volume of 500l/tub.

Tanks are placed in a station designed to increase postembrionar between fish species covered by the research and production in Fish Research Center Nucet.

The experiment was conducted during June 15 to September 10, 2009 in three experimental versions. Tanks used to populate a number of 600 specimens of carp fingerling 45 days old, with average weight between 8, 54 and 9.02 g / ex.

Experimental variants made were:

- *Variant I* - This version has been used fingerling 300 carp weighing an average of 8,54 g / ex, representing a density of 2,562 kg / 5,124 kg/m3 respectively tank;
- *Variant II* - This version was used with 150 fingerling crap the average weight of 9,02 g / ex, representing a density of 1,353 kilograms / tank 2,706 kg/m^3 respectively.

Fish were fed with feed that has a protein content of 55%, type ALLER UNISTART the form of extruded pellets.

Daily, were administered manually feed in two meals at fixed hours (10^{00} and 15^{00}).

Set daily ration of fish feeding in the first stage (31 days) was 25% of body weight, 10% in the second stage (31 days) and 4% in the third stage of the experiment (26 days).

Forage ration was changed (from measurements made twice a month), consistent with increased growth achieved.

At the end of the experiment, based on measurements were determined following parameters:
- *survival %*
- *Increased growth (W)* = final weight (Wt) - initial weight (W0) (g);
- *Feed conversion rate (FCR)* = Feed Total (F) / increase in total growth rate (W) (w / w);
- *Specific growth rate (SGR)* = 100 (ln Wt - ln W0) / t (% BW / day);
- *Coefficient of protein efficiency (PER)* = Enjoy all the growth (W) / amount of protein given (g);

2. RESULTS AND DISCUSSIONS

Throughout the main experiment were monitored water quality parameters (Table no. 1).

Table 1

The main chemical parameters of water culture

Crt.	Parameter	U. M.	Values recorded
1	pH	up H	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	AmoniuNH^{+}_{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 PO43 +	mg /l	0,2

Water temperature recorded values were 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 density. Monitored parameters were within acceptable limits for carp.

Throughout the experimental fishing was done twice a month in which we aimed to control the pace of growth, maintenance and health status of fish.

Data on growth performance of fish are presented in Table 2.

For all experimental variants were calculations following indexes:

-FCR (feed conversion rate) (Figure 1);

-SGR (specific growth rate), (Figure 2);

-PER protein retention efficiency (g) (Figure 3);

Table 2

Fish growth performance

Fish growth performance	Stage 1 31 days Tank 1	Stage 1 31 days Tank 2	Stage 2 31 days Tank 1	Stage 2 31 days Tank 2	Stage 3 26 days Tank 1	Stage 3 26 days Tank 2
Total feed given per tank (g)	19,840	10,230	26,220	13,640	16,500	9,100
Mean initial fish weight (g/fish)	2,562	1,353	8,467	4,439	20,433	11,050
Fish harvested (kg)	**8,540**	**9,020**	28,800	30,200	69,500	75,200
Total fish gained (Kg)	8,467	4,439	20,433	11,050	**28,870**	**15,841**
Mean final fish weight (g/fish)	28,800	30,200	69,500	75,200	**98,200**	**108,500**
Fish gained (g/fish)	20,260	21,180	40,700	45,000	28,700	33,300
Total fish gained (kg)	5,905	3,086	11,966	6,611	8,437	4,890
ln Wo	2,145	2,199	3,360	3,408	4,241	4,320
ln Wt	3,360	3,408	4,241	4,320	4,587	4,687
SGR (% BW/d)	3,921	3,898	2,842	2,943	1,330	1,410
FCR (kg/kg)	3,360	3,315	2,191	2,063	1,956	1,861
Protein /tank	10,912	5,627	14,421	7,502	9,075	5,005
PER (g)	0,541	0,548	0,830	0,881	0,930	0,957

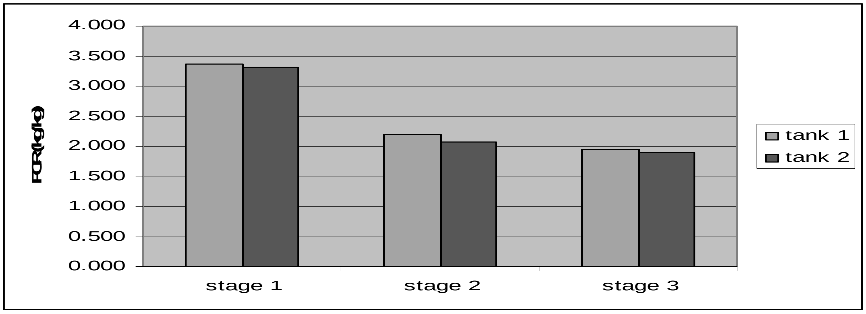

Figure 1 - The variation FCR (g/g) along the experimental period

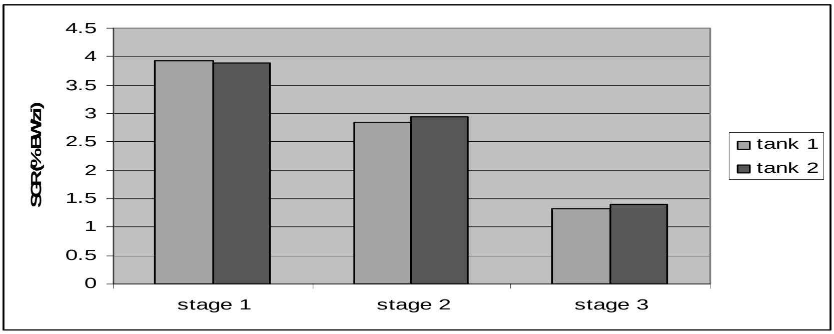

Figure 2 - Specific growth increase SGR (%BW/day)

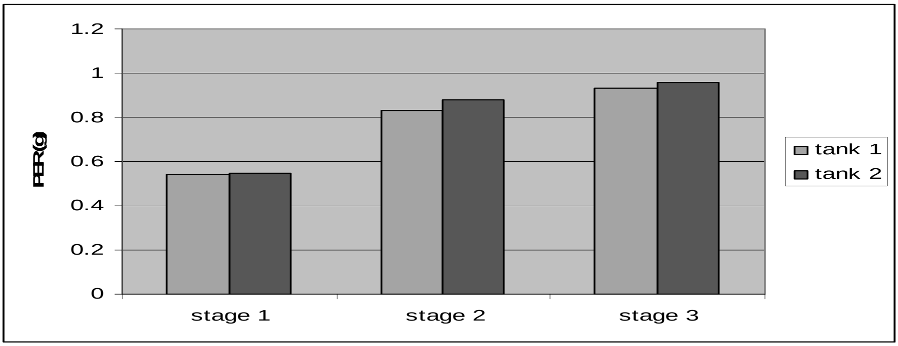

Figure 3 - Protein efficiency ratio (PER (g)

Values obtained from this experiment showed a good increase in tank in which he used a density of less popular.

Regarding the survival was 98, 00 % and 97, 33%.

The best growth rate was acquired in the second experimental variant.

On the economic aspect of feed testing results are given in table no. 3.

Tabel 3

Economic efficiency of feed

	Tank no. 1	**Tank no.2**
The total amount of feed (kg)	62,56	32,97
Fish production (kg)	28,87	15,84
Conversion factor (kg/kg)	2,16	2,08

3. CONCLUSION

- After the experiment the best results were obtained in which the second variant, where density was less popular. Density of population is of major importance in growing fish in tight spaces.
- In all cases survival recorded high values.

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TECHNOLOGY FOR POND REARING OF NORTH-AMERICAN STURGEON *POLYODON SPATHULA* (Walbaum, 1792) TOWARDS ACHIEVING MARKETABLE FISH IN A THREE EARS CYCLE

TEHNOLOGIE DE CRESTERE ÎN HELESTEE, A STURIONULUI NORD-AMERICAN *POLYODON SPATHULA* (Walbaum 1792), ÎN VEDEREA OBTINERII PESTELUI DE CONSUM, ÎN CICLU DE 3 ANI

CECILIA BUCUR, DANUT VIZITIU, SOARE STANCIOIU

Cuvinte cheie: *Polyodon spathula*, tehnologie de crestere polyodon, peste de consum, helestee, iazuri si lacuri de acumulare
Key words: *Polyodon spathula*, technology for rearing polyodon, marketable fish, pond, waterholes and dams

SUMMARY

The North-American sturgeon *Polyodon spathula* (Walbaum, 1792) – Order *Acipenseriformes*, family *Polyodontidae* – is a big fish 1.5 – 2 m, leaves in fresh water and is a zooplankton feeder. The natural habitat of species is hydrographic basin of Mississippi River. It was bring in Fish Culture Research and Development Center Nucet – Dambovita yearly from 1992 to 1999, for acclimate to conditions from our country and rearing in ponds, waterholes and dams. From 2002, the polyodon is artificially bred at Nucet for rearing in ponds for meet production, or for inhabiting waterholes and dams towards acquiring caviar. It was elaborate a technology for rearing of polyodon in ponds in a three years cycle adequate for ecological conditions from Romania, applicable in fishy exploitations. Towards achieving the polyodon as marketable fish, it is necessary to roam multiple technological sequences (from larval stage to the age of three years). In the first year, after resorption of the yolk bag to the age of 30 – 40 days, sturgeon is reared in tanks and concrete ponds (in cover places), after that is practice the growth in first summer, using protected earthen ponds. After wintering, it is continue the growth in summer II and III, in polyculture with cyprinids.

At the age of three years, the sturgeon can reach 3 – 5 kg/ex, attaining a net harvest of 200 – 300 kg of sturgeon/ha.

The rearing technology of North-American sturgeon *Polyodon spathula* in 3 years cycle avail the possibility to increase the quality of production by acquiring from waterholes and ponds of an additional production of about 200 – 700 kg sturgeon meet/ha at maximum efficiency. *P. spathula* being a zooplankton feeder (do not eat fodder).

1. MATERIAL AND METHODS

The rearing technology of North American sturgeon *Polyodon spathula*, towards achieving marketable fish in 3 years cycle is defined by:
- material base;
- biological material from culture and technological management.

Material base is distinctive for each rearing phase.

The postembryonic development phase (from resorption of yolk to the age of 30 – 40 days):
- covered areas (greenhouses, breeding stations);

- tanks “Evos” type, tarpaulin, concrete tanks with capacity of 20 – 50 – 90 – 120 cubic meters, appointed with independent input and output of water and with system for avert the escape of fingerlings;
- earthen ponds of 0.2 – 0.5 ha for intensive cultures of cladocerans (*Daphnia magna and D. longispina*);
- simple installations for achieving of young *Artemia salina* for feeding of polyodon larvae in case of some problems at the provision with zooplankton organisms;
- gathering fillet and carrying jars for zooplankton appointed with oxygen installation for cases when zooplankton quarry belong to a distantly place.

First summer rearing phase, starting from 30 – 40 days, polyodon fingerlings are moved in external ponds having a small area of 0.5 ha, protected against the ichthyophagous birds by a net enclosure boarded to a wood structure, covered with a strings mesh.

For the phase of sturgeon rearing in the second and third summer, the special installations for protection are no longer necessary. Rearing of polyodon is accomplish in polyculture with cyprinids at different ages, using ponds having area between 0.4 and 5.0 ha, and average depth of 1.5 – 2 m, filled up constantly with water.

Natural feed come from a pond intended especially for culture of zooplankton organisms, that is fertilized with organic matter: digested lay stall (more efficient is the hors manure) and chicken manure, 5000 – 8000 kg/ha in primary stage, associated if need with mineral fertilizer (nitrate and super phosphate at proportion N/P of 8 – 10 : 1), obligatorily supplied with unicellular protein (fodder yeast, shock dose 50 kg/ha after 10 days from flooding) and then maintenance doses (daily are delivered 0.5 – 1 kg/ha, in the first 2 weeks and 1.5 – 3 kg/ha forwards), or bakery yeast (3 – 5 kg/day/ha, at a water temperature of 10 – 18 ^{0}C and 2 – 3 kg, at 17 – 23 ^{0}C), doses are assigned according to results of laboratory analyses.

Fertilization of rearing ponds for second and third summer is accomplish with digested chicken manure or lay stall, about 8000 kg/ha. In the growth season, any fertilization is break off directly when dissolved oxygen concentration decline under the level of 30 % from saturation.

For achieve of *Artemia salina* are used Zug-Weiss incubators (carafes) (8 litters capacity) adapted (by obturation of basal port and insertion through the upper part of an aerator), with role in water oxygenation and maintenance of Artemia eggs in the water body. For incubation are used 2 g of dried eggs/l of environment (NaCl 35 g/l). Water temperature for incubation is 27 ^{0}C, with permanent aeration and lighting (with fluorescent lamp of 40 W). Incubation time last 27 – 28 ours.

Harvest of hatched Artemia is made by siphon in a fresh solution of NaCl 30 g/l, in witch are maintained with gentle aeration, at room temperature until they are delivered as food (maximum 4 hours).

Before delivering, young Artemia are filtered out by nytal net with mesh size of 25 μ and rinsed with water from rearing basin.

Concrete ponds from covered enchant as well as first summer rearing ponds are inoculate with zooplankton from external cultures (10 – 15 kg of moist yooplankton biomass/ha for concrete pond and 20 – 30 kg for earthen pond). A good growth is assure when the density of zooplankton organisms from rearing areas is maintained at a high level of 1200 – 1500 ex/l. In tanks and basins, polyodon larvae are feed from the first days with young *Artemia salina* (acquired by incubation) and zooplankton (*Daphnia magna*, *D. longispina* or *Moina*) delivered rhythmically from external cultures.

On ponds for rearing in first, second and third summer, where polyodon is reared along with cyprinids, is necessary delivering of artificial feed to inhibit the complementary species to become concurrent with polyodon for natural food.

The biological material intended for stocking the tanks and concrete ponds is constituted by polyodon larvae that go on mixed feeding. Recommended stocking densities (according to ability of insuring natural food from cultures) are of: 250, 500, in concrete ponds (120 m^3), and 1000 ex/ha, in tanks.

At the age of 30 – 40 days, polyodon fingerlings are captured from tanks and concrete ponds and stocked in ponds for rearing in first summer, on densities of 5000 ex/ha, depending on pond productivity.

For cancel out of environmental conditions (mobilization of sediments, macrophytes control), ponds are also stock with 2 years old *Cyprinus carpio* (100 ex/ha) and 3 – 4 years old *Ctenopharyngodon idella* (120 ex/ha).

Recommended stocking densities for polyodon in the second summer are 200 – 300 ex/ha, and for third summer polyodon 100 – 200 ex/ha, assigned according to natural productivity of pond.

The proposed stocking formulae are:

second summer - *P. spathula*$_{1-1+}$ *= 200 - 300 ex./ha ;*
C. carpio$_{1-1+}$ *= 2.000 ex./ha ;*
H.molitrix$_{1-1+}$ *= 400 ex./ha ;*
Ct. idella$_{2-2+}$ *= 100 ex./ha.*

or, *P. spathula*$_{1-1+}$ *= 200 - 300 ex./ha ;*
C. carpio$_{2-2+}$ *= 1.000 ex./ha ;*
H.molitrix$_{2-2+}$ *= 200 ex./ha ;*
Ct. idella$_{2-2+}$ *= 200 ex./ha.*

third summer *P. spathula*$_{2-2+}$ *= 100 - 200 ex./ha ;*
C. carpio$_{2-2+}$ *= 1000 ex./ha ;*
H.molitrix$_{2-2+}$ *= 200 ex./ha ;*
Ct. idella$_{2-2+}$ *= 200 ex./ha.*

2. RESULTS AND DISCUSSIONS

The acquired results in the growth phase from 30 to 40 days in concrete pond with volume of (100 m^3) are materialized in average body masses of 6 – 9 g/ex, length TL = 85 – 140 mm and survival rates of 40 – 50 % for density variant of 500 ex/m^3 and 65 – 80 % for variant 250 ex/m^3 (in tanks). Acquired results are conformable with that mention by literature (Semmens & Shelton – 1986, Rosen & Hales – 1981, Michaletz et.al. – 1982, Vinogradov et.al. – 1987) and Romanian authors (Vizitiu et al – 1992. 1993). We speak of that survival and growth of polyodon larvae and fingerlings are severely limited by the availability of zooplankton (especially cladocera), being necessary the assurance of some densities of cladocera over 300 ex/l, also the amount of dissolved oxygen have not to decline under 3 – 4 mg/l. (C.Stoicescu, 1995).

Acquired results on rearing first summer, of 1 year polyodon (second summer) and 2 years (third summer), are displayed in table nr.1.

Table 1

Acquired results on rearing first summer, of 1 year polyodon (second summer) and 2 years (third summer)

Age	Stocking density Ex./ha	Rearing time (days)	W_i (g/ex.)	W_f (g/ex.)	Sv %	Multiplication rate	Growth rate kg/ha
P. spathula 1th summer	5000	120	6.5	200	75	30.5	700
P. spathula 2nd summer	200	150	200	2000	90	10.0	300
P. spathula 2nd summer	300	150	200	1800	85	9.0	400
P. spathula 3rd summer	100	150	2000	5000	90	2.5	250
P. spathula 3rd summer	200	150	2000	4000	88	2.0	304

It is noticeable that on rearing in second summer are acquired additionally 300 – 400 kg of polyodon meet/ha, with average body mass of 1.8 – 2.0 kg/ex and a survival rate of over 85 %. On rearing in third summer, production of *Polyodon spathula* meet is of 250 – 300 kg/ha. On stocking densities of 100 – 200 ex/ha, the average individual body mass arrive to 4.0 – 5.0 kg/ex, on a survival rate of about 90 %.

These productions are acquired with condition that plankton biomass do not decries under 3.0 mg/l for all rearing cycle.

3. CONCLUSIONS

By insertion of *Poliodon spathula* species in stocking formulas of cyprinid ponds are acquired 250 – 400 kg of superior fish (sturgeon) per ha without consumption of additional fodder and other relevant farther costs.

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A CASE REPORT OF MYXOZOAN INFECTION WITH TWO DIFFERENT MORPHOLOGIC ASPECTS IN FRESHWATER FISH

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Key words: Stizosteidon lucioperca, Esox lucius, Henneguya psorospermica

SUMMARY

Myxozoans are metazoan parasites living in aquatic hosts (teleost fish and invertebrates). Many species cause severe outbreaks in both farmed and wild fish stocks belonging to freshwater and marine aquatic systems. In what *Henneguya psorospermica* is concerned, as for the majority of myxozoans, the oligochaete stage – actinospore – is the infective stage to a fish host. Most actinospores have been reported in the families Nadidae and Tubicidae, although the parasite specificity in the invertebrate host is still unclear.
The aim of the scientific work was to elucidate the specific aethiology of the gills infection observed in clinical and anatomo-pathological examinations of two freshwater fish, perch *(Stizosteidon lucioperca)* and pike *(Esox lucius)* from the Danubian Delta area.

Following the parasitological examinations resulted that, even though there were obvious differences in what it concerned the morpho-pathological aspects of the parasitic cysts and their locations between the two species of fish, the aethiology of the desease was the same; the spores belonged to the protozoan *Henneguya psorospermica*.

INTRODUCTION

Romania hosts the greatest part of the Danube Delta and the best preserved ecosystems therein. The area is about 2,840 km² long, comprising numerous streamlets, channels, ponds and lakes, in which 45 freshwater species of fish are known to inhabit.
The epidemiology of parasitic diseases in the fish tend to change according to the environmental changes and other influencing factors, which altogether lead up to difficulty in determining a predictable pattern of disease. This aspect has been inferred also regarding the myxozoan infection in fish, which does not have a clear pattern of host specificity and may show a discontinuous prevalence [1].

<u>Background</u>: Genus *Henneguya* Thélohan, 1892, is comprised mainly of species that parasitise freshwater fish, the gills being the most frequent site of infection [2]. Reliable data on the infection with *Henneguya* spp in the Danube Delta can scarcely be found, so that more pertinent case reports on the subject and further investigations are required. However, some myxozoan species have been identified also in Romania. During a survey carried out from October 2005 to March 2007 in Isac lake and Sulina arm, we noticed that the prevalence of *Henneguya* spp varied a lot from one year to another, making it hard to predict the frequency of the diseases on long-term. The seasonal prevalence is related to a number of (environmental) factors influencing the life cycle of the parasite and availability of the hosts [1].

Like many myxozoans, *Henneguya psorospermica* has a complex and unclear life cycle and although it is possible that the parasite would need two hosts, it is suspected that, like other myxozoans, it might as well be transmitted directly between fish [1].

Aim: Although it is believed that some myxozoan spores may show some degree of morphological plasticity [1], and important data about their location within the host are available [3], too few inferences have been made about the possibility that also the cysts could vary in size and distribution within the specific tissue they locate. Therefore, our study focused on this matter. Additionally, it was aimed to evaluate the prevalence of *Henneguya* sp during 2003 - 2008 in order to assess whether there are discontinuities in the prevalence of the disease.

Study site: The climate of the Danube Delta is temperate continental with strong influences from the vicinity of the Black Sea. In the interior of the delta the continental character of the climate is very pronounced. It is the driest and sunniest region (70 days with blue sky, 2500 hours of sunshine/year) of Romania. The mean annual temperature is 11°C (-1°C in January and 22°C in July), with mean precipitation between 400 and 300 mm/year, decreasing from west to east. The evaporation is around 1000 mm/year, favorized and amplified by the strong and frequent winds, resulting in long periods of drought in the summer. The north-west winds cause frequent storms in spring and autumn.

Two areas in the west of the delta were surveyed for five years:

▫ Sontea-Fortuna Aquatic Complex (comprising 9 lakes and 6 channels)
▫ Gorgova-Uzlina Aquatic Complex (comprising 12 lakes and 6 channels)

1. MATHERIALS AND METHODS

A total of 527 individuals of *Esox lucius* and 468 individuals of *Stizosteidon lucioperca* were examined from 2003 to 2008. The gills were clinically examined and cyst samples were taken from the infected gills. Fresh preparations of the cysts were made; some preparations were stained by the green malachite technique. The prevalence of *Henneguya* sp in the two aquatic complexes was evaluated using the point prevalence method.

2. RESULTS AND DISCUSSION

A large number of parasitic cysts varying in size, morphology and site of infection between the two studied species of fish were noticed. The gills were hyperemic and into the opercular cavity an extremely consistent mass of branchial mucus was present. Clinically, both species showed signs of anaemia and hypoxy.

Microscopically, the isolated spores are spindle-shaped, with 2 symmetric polar capsules; at the posterior end two appendices are present; the description fits the morphology of *H. psorospermica*.

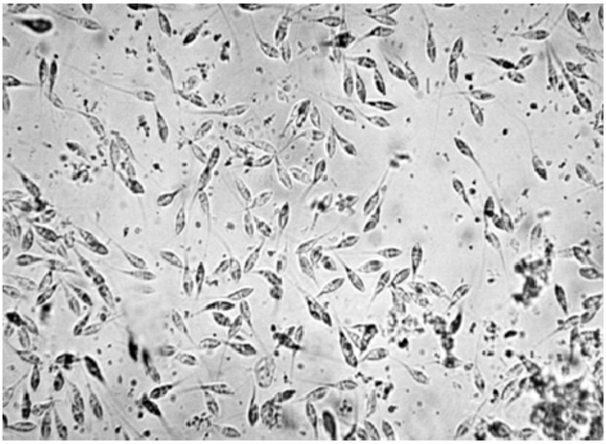

Fig. 1 - Henneguya psorospermica spores in Stizosteidon lucioperca

An average of the point prevalence of *Henneguya* sp in *Esox lucius* and *Stizosteidon lucioperca* during 2003 – 2008 was:

- In Sontea-Fortuna A. C.: 7.45% in *Esox lucius*; 10.15% in *Stizosteidon lucioperca*
- In Gorgova-Uzlina A. C.: 8.12% *Esox lucius*; 11.11% in *Stizosteidon lucioperca*

Maximum prevalences were registered in:

- March 2003 in *Esox lucius* in Sontea-Fortuna A. C.
- October 2004 in *Stizosteidon lucioperca* in Gorgova-Uzlina A. C.
- October 2006 in *Stizosteidon lucioperca* in Gorgova-Uzlina A. C.

3. CONCLUSIONS

▪ These findings indicate that although cyst size and location within the gills may vary among the fish host, the isolated spores from the both types of cysts may fit one morphologic description.

▪ The frequency of the disease was discontinuous. Among the possible risk factors we suspect breed susceptibility and natural climate variations which occurred during the entire period of the study.

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RESEARCH REGARDING THE EVOLUTION OF CORPORAL MASSES AND FOOD CONVERSSION ON JUVENILE OF SIBERIAN STURGEON (*ACIPENSER BAERI*) RAISED IN RECIRCULATING SYSTEM between 6.12.2008 and 8.02.2009

CERCETĂRI PRIVIND EVOLUȚIA MASEI CORPORALE ŞI A CONVERSIEI HRANEI LA PUIETUL DE STURION SIBERIAN (*ACIPENSER BAERI*) CRESCUT ÎN SISTEM RECIRCULANT ÎNTRE 6.12.2008 ŞI 8.02.2009

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Cuvinte cheie: Acipenser baeri, masă corporală, spor real de creştere, coeficient de conversie a hranei
Keywords: Acipenser baeri, body mass, real weight gain, specific consumption of feed.

SUMMARY

The research was performed on a population of 2851 of Siberian sturgeons (Acipenser baeri), between 6.12.2008 and 8.02.2009.The juvenile with the age between 190 days and 246 days, was maintained in 4 tanks with the volume of 12,56 m^3/tank. The average water temperature in the tanks was 16,70^{0}C in the first period of control, 11,94^{0}C in the second period and 13,64^{0}C in the third period.Juveniles were fed with granulated feed from Coppens (Ø=1,5 mm;54% PB şi 15% GB) and Aqua Bio (Ø=3 mm;44% PB şi 22% GB).At the age of 246 days, the juveniles reached an average body mass between 125,10±6,46 g and 246±7,70 g, as well as an average body length between 34,07±0,57 cm and 42,11±0,33 cm.During the 56 experimental days, the 2851 Siberian sturgeons have gained a real weight gain of 67,03 kg, with a specific consumption of feed of 3,01 kg feedj/kg spore and an index of feed conversion of 0,33 kg spore/kg consumed feed.Between the age of 190 days and 205 days when the average water temperature was 16,70^{0}C, juveniles obtained a real weight gain of 129 kg, with a specific feed consumption of 0,61 kg granulated feed/kg spore and an index of feed conversion of 1,63 kg spore/kg consumed feed.

Present research continues previous studies performed during the period 10.10.2008 – 21.11.2008, within the super intensive technological platform of raising sturgeons in recirculating system from U.S.A.M.V.B. Timişoara. Research made by BURA and colab. (2009) and BURA and SZELEI (2009), have highlighted a specific consumtion of feed of 0,84 kg feed/kg spore and an index of feed conversion of 1,19 kg spore/kg consumed feed, on *Acipenser baeri*. On the *Acipenser ruthenus*, it had been obtained a specific feed consumption of 0,79 kg feed/kg and an index of feed conversion of 1,27 kg spore/kg consumed feed.

1. MATERIALS AND METHODS

Research has been conducted on 2851 specimens of Siberian sturgeon (*Acipenser baeri*), between 6.12.2008 and 8.02.2009.Juveniles hatched on the 1.06.2008, was maintained in 4 polyester tanks reinforced with glass fiber, with a diameter of 4 m, height of 1,2 m and a capacity of 12,56 m^3. Water temperature between 6.12.2008 and 20.12.2008 varied between 15,4^{0}C and 18^{0}C (average of 16,70^{0}C), between 20.12.2008 and 16.01.2009 between 10^{0}C and 14,6^{0}C (average temperature reaching 11,94^{0}C) and between 17.01.2009 and 21.01.2009 between 11^{0}C and 15^{0}C (average of 13,64^{0}C).Juveniles were fed between 22.11.2008 and 15.01.2009 with Coppens granulated feed, 1.5 mm diameter and containing 54% PB and 15% GB, and after 15.01.2009 Aqua Bio granulated feed, 3 mm diameter and containing 44% PB and 22% G.B.

Usually were made weighings and body measurements every 2 weeks to a number of 30 individuals from each tank. Because of low temperatures, which led to reduced consumption of food, and not to generate an additional high stress, body mass measurements were performed at an interval of 4 weeks.

Based on the determinated body mass, it has been established the amount food given to the population of Siberian sturgeon from each tank.

Based on calculations given by mass, were determined bioproductivi indicators on Siberian sturgeon juveniles aged between 190 days and 246 days.

2. RESULTS AND DISCUTIONS

Body mass of Siberian sturgeon juveniles (tab. 1), at the weighings made on the 6.12.2008 (at the age of 190 days) recorded the lowest average value in the IV/4 tank of 105,13±3,02 g, and the highest average value in the IV/7 tank of 225,10±7,25 g. Individual values of body mass of juveniles ranged from 66 g to 323 g.From the analysis of the variability coefficient results an average variability of the body mass in all tanks. At all four lots, the safety index of the mean satisfies us as precision ($S\bar{x}$ <5%).

The body length of the Siberian sturgeons juveniles, at the age of 190 days was 31,08±0,35 cm in tank IV/4 and 39,47±0,33 cm in tank IV/7. Individual values of this character ranged from 27.5 cm to 43 cm. For the body length, the lots had displayed a low variability (CV<10%), and the mean pleased us, as precision.

At the determinations made on the 21.12.2008 (at age 205 days) the lowest average body mass was recorded in tank IV/4, of 115,97±4,45 g and the highest average body mass in tank IV/7, of 251,13±7,87 g. Individual values of body mass have ranged from a minimum of 73 g and a maximum of 357 g.Variability of the body mass is average for most lots, except the lot from tank IV/4, in which variability was low.The safety index of the mean satisfies us as precision at all lots.

At the age of 205 days, body length had recorded the lowest average value in tank IV/4, of 32,17±0,33 cm, and the highest average value in tank IV/7, of 41,20±0,25 cm. Individual body lengths were located between 29 cm and 43.5 cm. The variability of this character was small whitin the lot, and the mean satisfies us as precision.

At the weighings performed on the 17.01.2009 (at age 232 days), it is noted that the Siberian sturgeon juveniles from tanks IV/5 and IV/7, have an average body mass lower then the previous weighing because of reducing the amount of feed with about 30-

40% because of low water temperatures and low feed consumtion by the fishes. Body length recorded small increases reaching average values between 34.30±0.53 cm (Tank IV/4) and 41.47±0.44 cm. Individual values were located between 30 cm and 47.5 cm.

Determinations made on 31.01.2009 (at age 246 days), average body mass was lower in tanks IV/4, IV/5 and IV/6. The only tank with a pozitive gain was IV/7, in which the average body weight reached 249±7,70 g. The variability of this character is high only for the lot from tank IV/4, the others being medium.

Length of body, slightly below the previous determination, only the group of tank IV/4, recorded average values between 34,07±0,57 cm (lot IV/4) and 42,11±0,32 cm. Individual values were located between 29 cm and 48 cm.Variability of the character whitin the lots was low and the mean satisfies us as precision in all cases.

In table 2 is presented the amount of feed given to the Siberian sturgeon juveniles (*Acipenser baeri*) in relation to the number of individuals and their body mass.

At each weighing the total body mass was established by multiplying the average body mass with the number of individuals from each tank. By multiplying the total body mass with the feed balance resulted the calculated amount of feed.

The 2851 Siberian sturgeons reached a total body mass of 480,23 kg on the 6.12.2008, which has increased to 609,26 kg on 21.12.2008, and then fell to 554,57 kg on 17.01.2009 and at 547,26 kg on the 31.01.2009.

Decrease of the total body mass can be put to count on dramatic reduction of temperature and minor feed consumption,fact that determined us, at first to reduce the amount of feed given, and then to administer feed at lower levels,every two days.This can be also observed from the comparation of the calculated amount of feed and the amount of feed given. Thus, after the weighings on the 17.01.2009, we should have given 6,948 kg feed/day, the environmental conditions determined us to dispense only 1,672 kg feed/day.

In table 3 are listed the bioproductivi indicators of the Siberian sturgeon juveniles (Acipenser baeri) between the age of 190 days and 246 days. During the 56 experimental days, the 2851 Siberian sturgeons have gained a real weight gain of 67,03 kg. If between 6-20.12.2008 have achieved a real weight gain of +129,03 kg, in the following two experimental periods, fish population has decreased by -54,69 kg (between 21.12.2008 and 16.01.2009) and respectively - 7,31 kg (between 17-30.01.2009). Specific feed consumtion for total period was 3,01 kg feed/kg spore, and the index of feed conversion has reached 0,33 kg spore/kg feed.

Table 1

Mass and body lenght of Siberian sturgeon juveniles (*Acipenser baeri*) in period 22.11.2008-31.01.2009

n = 2851 specimens

Tank	Body mass (g)								Body length (cm)							
	n	$\overline{X}$	$S\bar{x}$	S	CV	$S\bar{x}$ %	Min	Max	n	$\overline{X}$	$S\bar{x}$	S	CV	$S\bar{x}$ %	Min	Max
06.12.2008																
IV/4	30	105,13	3,02	16,52	15,71	2,87	66	140	30	31,08	0,35	1,90	6,11	1,13	27,5	34
IV/5	30	140,40	4,09	22,38	15,94	2,91	102	190	30	33,50	0,38	2,07	6,19	1,13	29	38,5
IV/6	30	219,27	7,87	43,11	19,66	3,59	157	320	30	39,17	0,31	1,68	4,30	0,79	36	43
IV/7	30	225,10	7,25	39,69	17,63	3,22	127	323	30	39,47	0,33	1,83	4,65	0,84	35	42,5
21.12.2008																
IV/4	30	115,97	4,45	24,37	21,02	3,84	73	178	30	32,17	0,33	1,82	5,66	1,03	29	35,5
IV/5	30	183,20	5,68	31,09	16,97	3,10	136	284	30	37,25	0,34	1,88	5,06	0,91	34,5	43
IV/6	30	226,70	5,60	30,65	13,52	2,47	178	296	30	40,10	0,33	1,81	4,51	0,82	37	43
IV/7	30	251,13	7,87	43,11	17,17	3,13	190	357	30	31,20	0,25	1,36	3,29	0,61	37,5	43,5
17.01.2009																
IV/4	30	126,77	5,30	29,05	22,92	4,18	83	204	30	34,30	0,53	2,89	8,44	1,55	30	40,5
IV/5	30	180,67	5,69	31,19	17,26	3,15	131	197	30	37,62	0,39	2,16	5,73	1,04	34	42
IV/6	30	237,40	8,95	49,01	20,64	3,77	168	357	30	40,98	0,43	2,33	5,70	1,05	37	47,5
IV/7	30	246,93	6,96	38,14	15,45	2,82	181	340	30	41,47	0,44	2,43	5,86	1,06	36,5	46
31.01.2009																
IV/4	30	125,10	6,46	35,40	28,30	5,16	83	244	30	34,07	0,57	3,11	9,14	1,67	29	42
IV/5	30	175,00	4,90	26,83	15,33	2,80	140	246	30	38,47	0,35	1,90	4,95	0,91	35,5	42,5
IV/6	30	230,00	8,30	45,46	19,59	3,60	167	342	30	41,67	0,52	2,86	6,86	1,25	38	48
IV/7	30	249,00	7,70	42,19	16,95	3,09	193	353	30	42,11	0,33	1,84	4,37	0,78	37,5	46,5

Table 2

The amount of food given to Siberian sturgeon (*Acipenser baeri*) in relation to the number of individuals and their body mass

Tank	Nr. individuals	Average body mass (kg/individual)	Total body mass (kg)	Feed balance (%)	Calculated amount of feed (kg/day)	The amount of feed given (kg/day)
06.12.2008						
IV/4	767	0,105	81,00	1,5	1,210	1,043
IV/5	772	0,140	108,00	1,3	1,400	1,213
IV/6	663	0,219	145,20	1,2	1,742	1,520
IV/7	649	0,225	146,03	1,2	1,752	1,513
TOTAL	2851	0,168	480,23	1,27/1,10	6,104	5,289
21.12.2008						
IV/4	767	0,116	89,68	1,5	1,345	0,715
IV/5	772	0,183	141,28	1,3	1,836	0,848
IV/6	663	0,227	150,50	1,2	1,806	1,056
IV/7	649	0,251	227,80	1,2	2,733	1,056
TOTAL	2851	0,214	609,26	1,27/0,60	7,720	3,675
17.01.2009						
IV/4	767	0,127	97,41	1,5	1,461	0,321
IV/5	772	0,181	139,73	1,3	1,677	0,379
IV/6	663	0,237	157,13	1,2	1,887	0,486
IV/7	649	0,247	160,30	1,2	1,924	0,486
TOTAL	2851	0,195	554,57	1,25/0,30	6,948	1,672
31.01.2009						
IV/4	767	0,125	96,74	1,5	1,451	0,567
IV/5	772	0,175	135,10	1,3	1,756	0,667
IV/6	663	0,230	153,82	1,2	1,846	0,756
IV/7	649	0,249	161,60	1,2	1,939	0,756
TOTAL	2851	0,192	547,26	1,27/0,50	6,992	2,746

Table 3

Bioproductive indicators of Siberian sturgeons juveniles (*Acipenser baeri*)

Period	Tank	Real weight gain (Sr) [kg]	Apparent weight gain (Sa) [g]	Daily weight gain (kg/day)	Specific growth rate (%/day)	Specific feed consumption (kg feed/kg spore)	Index of feed conversion (kg spore/kg feed)
06-20. 12.08	IV/4	8,68	11	0,58	58	1,80	0,55
	IV/5	33,28	43	2,22	222	0,55	1,83
	IV/6	5,30	8	0,35	35	4,30	0,23
	IV/7	81,77	26	5,45	545	0,28	3,60
	TOTAL	**129,03**	**-**	**8,60**	**860**	**0,61**	**1,63**
21.12.08 – 16.01.09	IV/4	7,73	11	0,29	29	2,49	0,40
	IV/5	-1,55	-2	-0,06	-6	-8,21	-0,07
	IV/6	5,63	10	0,25	25	4,30	0,23
	IV/7	-67,50	-4	-2,50	-250	-0,42	-2,37
	TOTAL	**-54,69**	**-**	**-2,02**	**-202**	**-1,81**	**-0,55**
17-30. 01.09	IV/4	-0,67	-2	-0,05	-5	-6,71	-0,15
	IV/5	-4,63	-6	-0,33	-33	-1,15	-0,87
	IV/6	-3,31	-7	-0,24	-24	-2,06	-0,49
	IV/7	1,30	2	0,09	9	5,23	0,19
	TOTAL	**-7,31**	**-**	**-0,52**	**-52**	**-3,20**	**-0,31**
06.12.08 – 08.02.09	**TOTAL PERIODS**	**67,03**	**-**	**6,06**	**-**	**3,01**	**0,33**

În whitch: $S_r=B_f-B_i$; $S_a=M_t-M_i$; $R_{zc}=(B_f-B_i):t$; $R_{cs}=[(B_f-B_i):t]x100$; $Q_{ch}=C_{fa}/S_r$; $I_{ch}=S_r/C_{fa}$
n= 2.851

3. CONCLUSIONS

1. At the age of 246 days, the Siberian sturgeon juvenile reached an average body mass between 125,10±6,46 g and 249±7,70 g, as well as an average body length between 34,07±0,57 cm and 42,11±0,33 cm. Individual values of minimum and maximum body weight ranged between 83 g and 353 g and body length between 29 cm and 48 cm.

2. For the Siberian sturgeons taken in study, we determined a medium variability for the body mass and a low variability for the body length.

3. During the 56 experimental days, the 2851 Siberian sturgeons have achieved a real weight of 67,03 kg, with a specific feed consumtion of 3,01 kg feed/kg spore and an index of feed conversion of 0,33 kg spore/kg consumed feed.

4. In case of low temperature water environment, in order not to affect water quality and fish life-threatening, must resort to reducing the feed ration.

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BIOCHEMICAL CHANGES WHICH OCCUR DURING FREEZING IN FISH MEAT CONTAMINATED WITH HEAVY METALS

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Key words: heavy metals, (SOD) superoxide dismutase, (GPx) glutathione peroxidase, atomic absorption spectrophotometry

SUMMARY

Heavy metals (Pb, Cu, Cd, Zn, Hg) along with their compounds are considered cancerous for humans and animals. Because of this, the quantitative determination of such substances in food products and mainly in fish is a problem of great importance. This is why, the present paper will investigate, from a biochemical point of view, 5 sweet water fish species (bream, mackerel, carassius, tench, perch) , originated from the area of Sulina Arm and auxiliary canals, by analyzing the heavy metal content of these samples, using atomic absorption spectrophotometry, and the enzymatic activity of superoxide dismutase (SOD) and of glutation peroxidase (GPx), using photocolorimetry. The measurements were performed on both fresh fish meat and on fish meat frozen/thawed after 4 and 8 weeks. The investigations results showed that, from the copper, zinc and mercury point of view, all the values are between normal values, as stated in the Sanitary Veterinary Norms, for all the fish species investigated, with the observation that the mercury level is close to the upper limit of this scale. Cadmium and mercury have not been put into evidence. The SOD and GPx activity is considerably low for the fish samples in which the mercury content was at the higher limit (bream), knowing the fact that heavy metal inactivate this enzyme. After 4 , but mostly after 8 weeks of freezing, the activity of the two enzymes is considerably decreased due to low temperature, the lowest values being registered in the samples of Bream and Mackerel. The paper also studied the content of heavy metals in mud, water and leaves or stalks of reed, and showed that the mud accumulates the highest quantity of heavy metals.

STUDY CONCERNING THE CAPTURE OF REPRODUCTIVE STURGEONS FOR UNFOLD OF AQUACULTURE ACTIVITIES AND REALIZATION OF NATIONAL PROGRAM FOR DANUBE REPOPULATION AND SUSTAIN WITH STURGEONS

STUDIU PRIVIND CAPTURAREA REPRODUCĂTORILOR DE STURION ÎN VEDEREA DESFĂŞURĂRII ACTIVITĂȚII DE ACVACULTURĂ ŞI A REALIZĂRII PROGRAMULUI NATIONAL DE REPOPULARE ŞI SUSȚINERE A DUNĂRII CU EXEMPLARE DE STURIONI

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Cuvinte cheie: sturioni, monitorizare, repopulare, Dunăre
Key words: sturgeons, monitoring, repopulation, Danube

SUMMARY

On account of intensive fishing (over-fishing) during the period of 1996-2000, of reduce some essential reproductive and feeding areas as result of Danube obstruct on Iron Gates and decreases of environmental quality from Danube and Black Sea, all sturgeon species from Inferior Basin of Danube are menaced.

For conservation and sustainable utilization of wild sturgeon populations which reproduction in Danube, Ministry of Environment and Ministry of Agriculture, Forests and Rural Development give a Common Order no 330/262, published in Official Monitor of Romania, Part. 1, no 385/4 may 2006. The adopted rules subscribe to rules group concerning the preservation of some fish species which, in the last decades, suffering a massive decreased of livestock, and these measures are according to wide trend concerning the preservation of endangered species.

The rehabilitation of Danube sturgeon populations is realized by populate with individuals that come to autochthonous artificial reproduction stations, taking in account the maintain of phenotipical characteristics of wild individuals. The sturgeon breeding in Romania (populate the Danube with individuals that come to autochthonous artificial reproduction stations) is a sustainable solution for decreased of negative impact of fishing of sturgeons which populate natural waters.

1. MATERIALS AND METHODS

In this study, was utilized data collected by National Institute for Research and Develop “Danube Delta” – Tulcea, which monitoring by scientifically fishing the Danube sturgeon annual offspring, in feeding area from 64.5 marine mile (Danube km 118).

Also, it was analyzed data from different commercial societies which captured sturgeons for controlled environmental reproduction and youth liberate.

For the possibility to participate on Danube Populate and Sustain Program with youth sturgeons from endangered species, a commercial society must be approved by National Agency for Fishing and Aquaculture. Also, these societies must have contracts for carry out services with fisher associations.

The fisher association must respect some conditions:

- to be registered on National Office of Trade Register;

- to have “License for commercial fishing” give by National Agency for Fishing and Aquaculture;
- to draw up “individual work contract” for employed fishers with work card;
- to have available “Aquaculture License” give by National Agency for Fishing and Aquaculture based on “Commercial fishing license”;
- to have available “Special license for reproductive individuals capture” give by National Agency for Fishing and Aquaculture, fishers and authorized boats.

Both, National Institute for Research and Develop “Danube Delta” – Tulcea and these commercial societies, by them actions, take part to implementation and unfold the Danube Populate and Sustain Program with youth sturgeons from endangered species.

The phases of sturgeon reproductive individual’s capture and offspring liberate process are:
- reproductive individuals capture;
- to declare the capture to National Agency for Fishing and Aquaculture;
- o park the reproductive individuals in natural environment until transport;
- to draw up “Capture file” by an official of National Agency for Fishing and Aquaculture, in which will be registered: specie, somatic measurements and sex;
- transport by special devices to reproduction station;
- reproduction of capture individuals;
- marked of reproductive individuals for monitoring;
- liberation in natural environment.

The monitoring data of natural reproduction result and abundance of annual offspring in Danube is taking in account for species identification which is need sustain populate of generation in considerate year.

Also, the comparison between natural reproduction level and recruit different sturgeon species constitute the bases for to put on hierarchical system the offspring from each species with which need populated the Danube in considerate year.

The considerate sturgeon species are represented by these which natural live in our country waters: Beluga (*Huso huso*), Black Sea sturgeon (*Acipenser güldenstaedti*), Sevruga (*Acipenser stellatus*), and Sterlet (*Acipenser ruthenus*) respectively.

2. RESULTS AND DISCUSSIONS

Monitoring the sturgeon captures during the period of 2000-2008, it observed that in the years 2006 and 2007, of all diadromic sturgeon species from Danube, the natural reproduction and recruit ratio showing a deficit, especially to Black Sea sturgeon and Sevruga in year 2008 (table 1 and figures 1-5).

For producing the offspring necessary in Danube Populate and Sustain Program, according to Common Order no 330/262 (2006), National Agency for Fishing and Aquaculture give licenses for reproductive individuals capture to six societies.

In 2008 was capture by special license 188 live sturgeons: 19 Beluga individuals, 17 Black Sea sturgeon individuals, 87 Sevruga individuals and 65 Sterlet individuals.

After artificial reproduction, was liberate in Danube 174 wild sturgeon reproductive individuals and 4 individuals was kept for future reproduction.

Data concerning the weight of marked offspring in coast water population nearly Danube Delta, as well as these concerning annual growth ratios realized by offspring and health status also are necessary for efficiency evaluation of Danube Populate and Sustain Program and make correction which conduct to maximization of offspring survive (table 2), and rediscover of them in the fishing capture.

Just in this way may be justified carrying on financing Danube Populate and Sustain Program on state budget.

Table 1

Results of Danube sturgeon capture monitoring (2000-2008)

National Institute for Research and Develop "Danube Delta" source

Year	Beluga		Black Sea sturgeon		Sevruga		Sterlet		Total	
	No	%/CPUE	No	%/CPUE	No	%/CPUE	No	%/CPUE	No	%/CPUE
2000	59	58,42% 7,375	6	5,94% 0,75	11	10,89% 1,375	25	24,75% 3,225	101	100% 12,625
2001	39	73,6% 1,623	4	7,65% 0,167	5	9,4% 0,208	5	9,4% 0,208	53	100% 2,208
2002	75	51,72% 1,744	13	8,97% 0,302	2	1,38% 0,046	55	37,23% 1,279	145	100% 3,372
2003	5	7,25% 0,143	0	-	3	4,35% 0,036	51	88,40% 1,743	69	100% 1,972
2004	69	40,83% 1,683	3	1,77% 0,73	5	2,96% 0,122	93	54,44% 2,244	169	100% 4,122
2005	110	40,74% 10	1	0,37% 0,091	14	3,19% 1,273	145	53,70% 13,182	270	100% 24,55
2006	18	100% 0,51	0	0	0	0	0	0	18	100% 0,51
2007	27	62,7% 0,659	1	2,3% 0,24	0	0	15	35% 0,366	43	100% 1,049
2008	74	87,06% 2,846	0	0% 0	8	9,41% 0,308	3	3,539% 0,115	85	100% 3,269
Total	471	-	25	-	48	-	401	-	945	-

*CPUE – capture per effort unit (number of individuals capture in surface by 850 x 96 m, fishing with a special trawl for sturgeon youth, with 20 mm eye dimension).

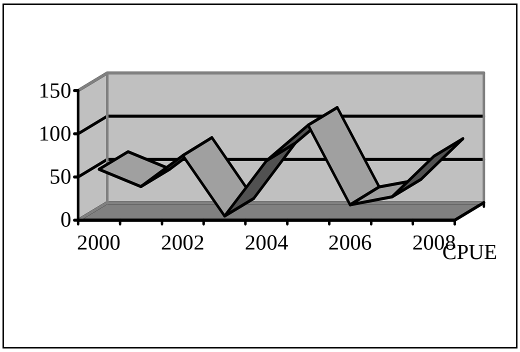

Fig.1. Beluga production index

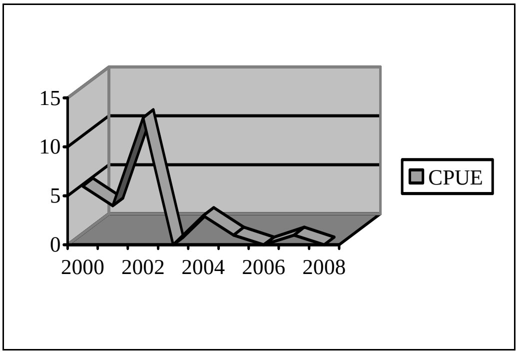

Fig.2. Black Sea sturgeon production index

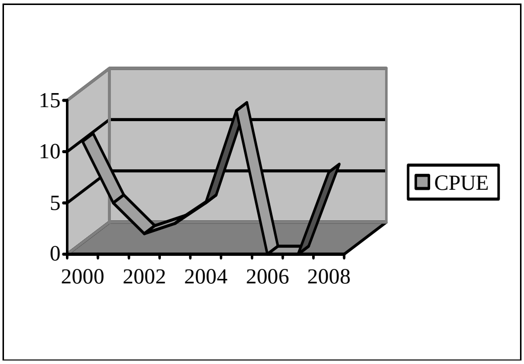

Fig. 3. Sevruga production index

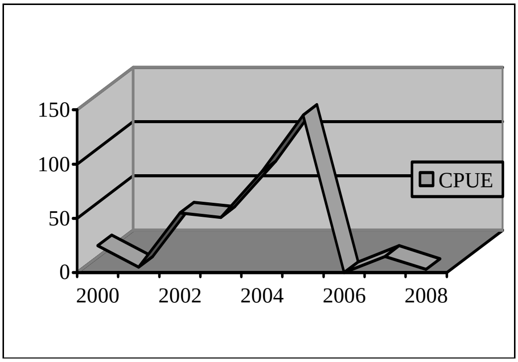

Fig. 4. Sterlet production index

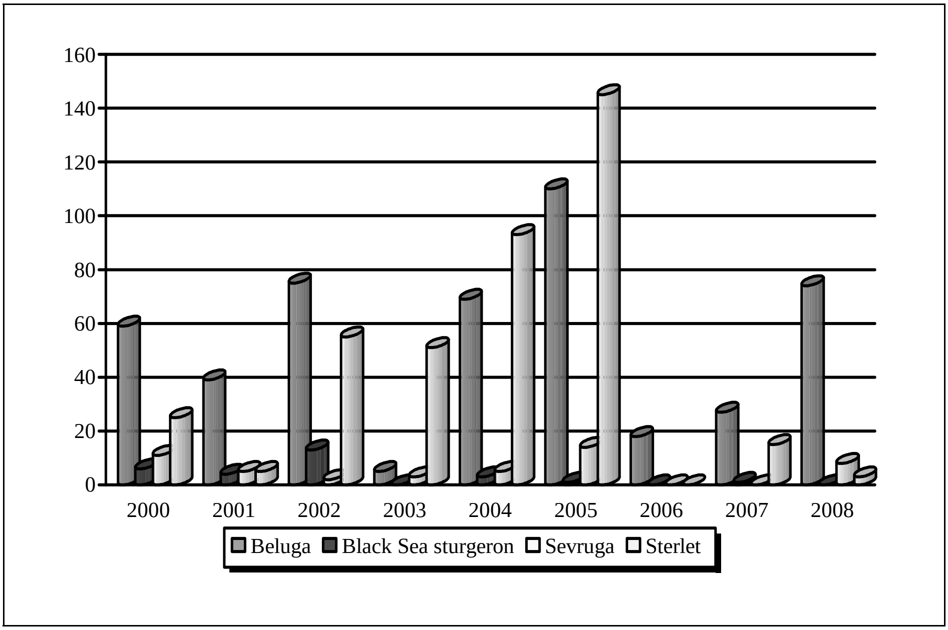

Fig.5. Sturgeon production indexes during the period of 2000-2008

Table 2

The marked sturgeon offspring in Romanian Danube (2005-2007)

National Institute for Research and Develop "Danube Delta" source

Year	Specie	Age (month)	Origin	No of exemplars populate in Danube	Place of launching	Date of launching
2005	B. S. sturgeon (4 parents) (1F+3M)	5	Isaccea	77	Mm54	19 IX
		17	Isaccea	23	Mm54	19 IX
		16	C-ța Isaccea	2488	Mm54	13-16 IX
	Sevruga (14 parents)	5	Brateş	2376	Km153	13-16 IX
		5	Brateş	5205	Km161,5 Mm72,7	13-16 IX
	B.S. sturgeon Sevruga	5	Isaccea	300	Mm54	19 IX
Total	B.S. sturgeon			2588		
	Sevruga			7881		
	Total			10469		
2006	Sevruga (14 parents)	6	Brateş Tămădău	53300	Dunăre Km161 Borcea Km 40	4-5 XII
	Beluga 2F+3M	6	Tămădău Isaccea	9500 3000	Borcea km 40 Dunăre Mm54	4 XII 6 XII
Total	Sevruga + Beluga			65800		
2007	B.S. sturgeon 1F +3M	6	Tămădău	86500 18000	Dunăre km 630 Isaccea km40	12-13 XII 14 XII
	Beluga 2F+5M	7	Isaccea	15129	Dunăre Mm54 Isaccea	21-22 XII
Total	B.S. sturgeon + Beluga			111629		

3. CONCLUSIONS

3.1. Develop of sturgeon breeding in Romania, respectively the Danube populate with sturgeons com from autochthonous artificial reproduction stations, represent an sustainable solution for decreased of negative impact of fishing of sturgeons which populate natural waters.

3.2. Note that in our country, a negative aspect is uncontrolled break through of some sturgeon species from other areas and autochthones.

3.3. From scientific point of view, introduction of other sturgeon species, other as local species, lead to genetic alteration with negative consequences upon populations.

3.4. The sturgeon population rehabilitation from Danube basin is realized by populate with individuals from autochthones artificial reproduction stations, with preservation of wild individuals phenotypical traits.

3.5. Is necessity the permanent monitoring of sturgeon population.

3.6. The protection of youth and adult sturgeons by avoid of accidental capture during fishing.

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FUTURE OBJECTIVES CONCERNING THE FOOD SUPPLY NECESSARY AT A WORLD LEVEL

PERSPECTIVE PRIVIND ASIGURAREA NECESARULUI DE HRANA LA NIVEL MONDIAL

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Cuvinte cheie: criza alimentară, criza peştelui, prognoze demografice, revoluția verde
Key words: alimentary crisis, fish crisis, demographical prognostics, green revolution

SUMMARY

The demographical livestock of the planet is estimated to reach about 6.788.956.761, nowadays, this over 60% from the world population live together on the Asian continent and try by all possible means to slow down the impact of the alimentary crisis, however phenomenon which worries the whole planet. Today, demographical growth surpasses 1,3% and over about 15 years, specialists predictions estimate a livestock of about 8 billion, obvious phenomena which worry humankind in providing the food necessary. The over posing of so many crisis elements which link together by a perfect interdependence come to disturb the fragile alimentary chain. At a macro-level, the management of alimentary crisis, represent an effect of so many negative influences, beginning with the financiary ones, to which one adds the effect of global warming. The green revolution seems to remain the only phenomenon which tries to fight against and to a balance in a certain manner, the very weak balance between alimentary demand and offer. This must ensure a very large quantity in comparison with the one existing of 60 years ago.

INTRODUCTION

Once with the human being giving up to hunting and fishing, period when step by step the captivity begins – taming, respectively domestication of animals – the human being is preoccupied with providing food, as well for animals, as for himself. Again, step by step, humans tried to improve some techniques concerning agricultural crops, animals exploitation, them amelioration of plants species varieties and of animal breeds, fact which allows him some demographical developments. During the demographical evolution, there were acknowledged some steps, connected to the ways of providing the food necessary, anyhow of a proportional manner, according to statisticians. The much faster evolution of the population triggers important efforts in order to assure the food necessary and about 300 years ago, a great British savant, a famous reverend but also mathematician, Thomas Robert Malthus, tries to demonstrate certain theories which afterwards are called as „malthusian decay” being a real pessimist, as he was called by the critics of that era. Towards , the end of the 18th century, he demonstrated that the world population grows in geometrical progress, so that in only 25 years, the world population doubles, and the yield grows in arithmetical progression, much slower, predicting a certain “biological trap” where humankind may suffer.(steps also unwillingly made due to).

Within his much criticized work of 1798, called “Essay upon population principles” Thomas Robert Malthus showed that population power is infinitely more important than the earth power or the capacity of producing existence means, suggesting among other a continuous biological control by: contraception, abstinence, elongation of marriage age, starvation, war, epidemics, etc. he suggested that alimentary helps should be given to the poor ones, in order to avoid the birth of more kids in misery, triggering a lot of critics this being considered an inphamous person of his era.

But according to the world demographical evolution, after 1950, it was acknowledged the larger population growth, which may also be considered as an evolution favourised by the food supply, respectively the adequate agricultural yields (according to J.K. Bourne Jr.).

According to the International Institute of Research for Alimentary Politic from Washington DC, the growth of an agricultural productivity with 1% - 2% per year cannot reach a present demographical level, at an ever higher request, and the crisis is considered to be imminent, according to Joachim von Braun warnings.

According to statisticians, only in 1999, in July, the world population accounted for only 5.995.544.836 inhabitants, having a growth rate of 13%, existing 22 births per 1 000inhabitants and mortality of 9 people to 1 000 inhabitants.

The big development of prices at a world level, clearly demonstrated that the food demand is much more important and that the poorest billion of people from the planet will be going to suffer in the near future.

One cannot make a quantification or an hierarchy of the influence of these factors, these ones being only enumerated, existing a certain interaction among them, such as: the decrease of food reserves triggers the growth of basic food prices and global warming appears to be the origin of the other crisis.

Starting from a global level, it is acknowledged, according to the descriptions made by I.I.C.P.A.`s members from Washington DC , U.S.A. that this chain reaction of crises, over which we may add the one concerning global warming can’t do anything else than worsening this “fragile alimentary network” unfavoring the food supply in comparison with the ever bigger demand, at a global level. The prognosis for 2030 is neither good nor optimistic in this respect.

If the yield increases in a certain rhythm and the prediction that in 2025, the globe population will reach about 8 billion, the alimentary demand will be much higher. At a global level, these elements don`t seem to be worrying only if the agricultural yield reaches a proper level of supplying food (according to Joel K. Bourne)

According to USDA; FAO 2008 – 2009 and to table no. 1 (Sean Mc. Naughton), making a synthesis analysis, one acknowledged that the results aren’t quite optimistic, and the same billion, mentioned above, is to be wished in a very optimistically manner not to suffer the same „ malthusian correction” of 20th century, this one being undertaken during 1943, being called “The Bengalish Starvation” according to the descriptions of S. Mc Naugton, USDA – FAO.

In this respect, the world index as a medium price of grain, due to major request, increases from 107 in January 1990 to 274 in April 2008, respectively to 185 in January

2009, as a very strongly stimulated request concerning the shortage and the increase of the oil prices.

Table 1

World production and consumptions (according to FAO)

Specification	Study years	
	1960	2008 – 2009
World grain yield (billion tons)	0,823	2226
World consumption (billion tons)	0,815	2162

Starting from a global level with estimations and prognosis, there are analyzed certain areas such as Asia and Africa, being considered the most fragile areas with important demographical considerations which will be strongly influenced by global warming.

According to major alimentary demands, after 1950 – 1960, it appears the so called "Green Revolution" which makes itself felt as an emergent alimentary offer, by which it rises or it appears an increase of biological productivity for different varieties of grains and technical plants, adjusted to areas or sites, existent outhunt the crisis, associated to a technological revolution too; irrigation – fertilization, respectively industrial agriculture. This past green revolution may be considered as an emergent solution of past times which puts its marks by its intensive characteristic and by the technologies applied for the respective crops but by the excessive use of fertilizers, pesticides etc. and of the irrigation witch mainly influences the penetration inside the soil of those substances with a certain remanence, so that it results their rude effect upon people's life in certain African states, India, China, effect witch didn't delay to appear.

"The biological price" the way it was called, concerning water quality due to the pollution of phreatic layer saved from starvation hundreds of million people.

Nowadays, when the alimentary crisis controls the same areas, regions (which seem not to get free out of this "biological war"); world specialists and experts try a certain slowllines of effects, as it was predicted until 2030, being necessary a second green revolution. This may be achieved only by an increase of the biological productivity based upon the mixing of the top fields of genetic engineering limited to the improvement of tropical crops technologies and of much more effective irrigation systems, especially under the pressure or influence of global warming. Even this fact imposes a rationalization of the water consumption and a decrease of desert extension process.

According to the last report of the Institute of International Research for Alimentary Politics (according to Z. G. Bai and al.) these was established, at world level, a prognosis, not a really happy one, according to which about 24% from the cultivated areas are to be decreasing concerning biological productivity, and concerning biological productivity, and beginning with the years \`60 - \`69, there is an yearly event of world grain crops growth, such as 2,9% in 1962 – 1969, 1,6% in 1990 and an estimation of only 28% in 2040, being considered a worrying phenomenon.

<u>Other opportunities during the so called alimentary crisis</u>

The desperate human being was looking for new food resources, and at a global level, the humankind still hopes to find some other food reserves , such as the ones which make to return in time and find old occupations, respectively, fishing. We have the hope that at least in the aquatics environment there is something taking into account the immensity of waters which cover the Earth, but the hopes are in vain, as specialty sea – ocean institutes from the territory waters of continents, foresees for more than 10 years, another crisis known under the name of world fish crisis.

In this respect, during the latest 25 years it was acknowledged an alarming decrease of fish world reserves which were exploited in an excessive manner.

Making an analysis of the world fishing, during 1950`s, here were caught about 25 million fish tons and in 2004, the figure approaches to about 100 million tons (according to FAO, 2007). And this excessive fishing leads to the extinction of many fish breeds.

ICCAT statistics (The International Commission for Tuna Preservation in the Atlantic Ocean), as will IFREMER (The French Institute of Research for Sea Exploitations), as the Sea Fishing Department of SUA predicts a strong decrease of sea and ocean biomass. This appears as a result of the excessive exploitation due to the infringement of fishing international laws and to the lack of protection for some breeds, including the prohibition periods. There are many signal alarms, emphasized by the specialists in sea biology or Ecofish type organization in order to keep the preservation of some small tissue biological reserves with a blue swimmer using different methods which prevents its catching even during the reproduction period. In the neighborhood of Europe, the tuna comes in the Mediterranean Sea and the existence of many tuna farms tries to protect them in all the development stages. I.M. Framentim, a French sea biologist states that there is an identical situation of tuna with the one of the code, another breed which is in objective of the fishermen activity at a world scale. According to UNO starting with 2004 this “excessive fishing” will unavoidably lead to the strengthening of the fish crisis at a world scale, and only during the latest 10 years, the fish world reserve decreased with about 1/3. The factors of the sea ecological disaster may be as simple as possible stated such as:

- the global management on species is difficult due to many states boarding seas and oceans which don’t respect the international laws;
- the industrial fishing destroys about 90% among big predator species – which may lead to a trophyc and ecological unstabilization;
- the concentration of some international fishing fleets in the areas, where one can find some reserves such as shoals of fish, identified by up to date procedures and techniques;
- qualitative decrease of sea fish biomass and the ever higher competition of some big companies which own real ocean fleets of modern fishing boats which can make important captures;
- ever bigger demands for certain breeds with tradition in the human consumption in comparison with its decrease as sea biological sources.

At an European level, there is a very important retail market, about 40% from the necessary is assured only from imports.

There is situation when not even this feed reserve can’t assure the humankind necessary and when many African people even Asian one, neighboring the seas, couldn’t find even here, the daily minimum food necessary. In this framework, we can guide ourselves towards a sustainable agriculture, found in another “green revolution” contest. At a world level, there are many institutions which alarm us concerning the decrease of alimentary reserves, respectively food supply for at least two billion of people which live together in the droughty areas – areas already damaged without predicting the effect of global warming. This latter one mainly leads to the decrease of these water supplies and of agricultural crops too. If we analyze the demographical issue, the agricultural prediction in Asia and Africa is pessimistic by a decrease with about 35 – 40%, not so far we can’t talk of an alimentary safety but of a major alimentary crisis.

From hydrological point of view, we may meet during the following 40 – 50 years only farms with modern aquaculture, where one will be able to find species which nowadays are over fished in the seas and oceans of the globe, so that this may be considered as a measure of decreasing the respective “fish crisis”.

In order to supply the food minimum, it will be tried a second green revolution, but under the strong pressure of global warming. This process needs the foundation of some rainforest crops resistant to drought or to the effect of “Malthusian decay” which may be eminent due to the alimentary crisis. All these are the uneffective results of the interventions and ameliorations of the alimentary crisis where diminishing the resources mentioned above.

CONCLUSIONS

The prognosis is somber enough so that the most important states and especially agricultural institutions work together in starting some actions meant to minimize the impact of this catastrophe. Firstly, during this alimentary crisis one hopes to diminish the causes but also the effects of global warming, respectively the diminution of desert area, by using genetically engineering, concerning the resistance of grains stems, in terms of drought, the improvement of biological crops of growing variety but also of the animal breeds having the some objective, as in the case of a complex, caught manly “the green revolution”, but this time the analyses will be done taking into account another scale. If the livestock must live in their resources basis and the growth should be limited under an account of it, it will be obvious soon enough that it won’t be a solution according to Adam Smith’s sayings stated within the work “The Wealth of Nation”.

The first type of phenomena which lead unavoidably to the alimentary crisis which makes on object of interest for the whole humankind which rapidly must find the ways of action and intervention.

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