

RESEARCH ON PRODUCTIVE PERFORMANCE IN MEAT COW BREEDS FROM NEAMȚ COUNTY ZOOTECHNICAL HOLDINGS

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Abstract

In this scientific paper, the productive performances of beef cattle belonging to the Aberdeen Angus and Charolaise breeds from 6 farms in Neamț County were analyzed, studying the following indicators: birth weight (kg), body weight (kg), and average daily gain (g) at the age of 200 days (kg), and also 365 days (kg). The data on average values and variability of meat production indices show that the highest performances were 42.33 kg at birth, 246.29 kg and the average daily increase of 1030.71 grams per 200 days, and 433.69 kg with the average daily increase of 1074.33 kg, at the age of 365 days. On the last place was farm 1, which registered an average weight at birth of 30.70 kg, at 200 days this indicator was 188.59 kg, and the average daily gain was 786.20 grams; at 365 days the average weight was 320.84 kg and the average weight was 793.11 kg. Farm 1 raises the Aberdeen Angus breed, and farm 5 raises the Charolaise breed, which has better results due to the constant care of the breeder to improve the genetic material.

Key words: Angus, beef, Charolaise, performance, production.

INTRODUCTION

Meat is a special food source, compared to which the preferences and tastes of consumers have been and are constantly growing. Beef is a complete food, rich in protein and special properties regarding the taste, smell, aspect, etc. It contains 34.9% dry matter, of which 18.7% protein, 15.3% fat and 0.9% mineral salts, with an energy value of 2270 kcal/kg. It also contains all the essential amino acids - lysine 1.78 g/100 g meat, leucine 1.68 g, arginine 1.32 g, valine 1.14 g, isoleucine 1.04 g, phenylalanine 0.80 g, threonine 0.80 g, histidine 0.58 g, methionine 0.46 g, and tryptophan 0.22 g/100 g meat (Stanciu, 1999). Beef production in cattle is influenced by many factors, which requires systematization, thus: genetic, physiological, and also environmental factors (Acatincăi, 2010). Genetic and physiological factors can influence meat production by 30% up to 70% if we consider that for meat characters the genetic determinism is from intermediate to strong (Georgescu et al., 1998).

Environmental factors influencing the phenotypic performance of beef cattle relate in particular to the technology of exploitation,

feeding and reproduction having a decisive role.

The maintenance system can create comfort or discomfort with positive or negative effects on the growth and fattening process (Maciuc, 2012). Food influences meat production through the level and type of feeding, the quality of feed, the form and method of their administration. The energy-protein and mineral-vitamin level must satisfy the requirements of the vital functions and allow obtaining a maximum growth gain (Dinescu et al., 1996).

The breeding management process has a decisive role in raising and exploitation beef cattle, which directly influences the increase of the herd, and thereby the increase of the total meat production.

MATERIALS AND METHODS

In this paper, we present the research results from 6 farms in Neamț County where beef cattle are bred and exploited: Aberdeen Angus (103 heads) and Charolaise (73 heads).

The research objectives were: birth weight (kg), body weight at the age of 200 days (kg) and 365 days (kg), the average daily gain at the age of 200 days (g) and 365 days (g).

Differential significance tests were also applied through the Fischer test (F) which is used to verify the equality of dispersions of two normally distributed independent variables and the Tukey test, the most widely used multiple comparison procedure also called the honest significant difference test.

The data came from direct observations and determinations in the farm as well as from the farm's primary database, but also from the Own Performance Control (CPP) records made by the Aberdeen Angus Association and the Romanian Meat Cattle Breeders Association. All data were statistically processed and summarized in tables and figures.

The six farms studied were coded from 1 to 6 and are shown in Table 1.

Table 1. Diary cattle farms encode, total number of animals in the herd and raised breeds

Farm encode	Name of the farm	Number of animals	Breed
1	S.C. Valdo Forest SRL	87	Aberdeen Angus (AA)
2	Bordianu Cristian	179	Aberdeen Angus (AA)
3	S.C. CGC Agria S.A.	189	Aberdeen Angus (AA)
4	Minuț Maria Simona	38	Charolaise (CH)
5	Arteni Mugurel	49	Charolaise (CH)
6	I.I. Dârlea Ofelia Nicoleta	65	Charolaise (CH)
TOTAL		607	

RESULTS AND DISCUSSIONS

From the data on the average values and variability of the meat production indices presented in table 2 at farm 1 it is found that an average birth weight of 30.70 kg was achieved for the 50 cases, the average weight at the age of 200 days was 188.59 placed between extremely wide limits, namely 146.10-238.00 kg and the average daily increase recorded was 786,200 grams with equally wide limits between 570.00-1050.00 grams.

From the analysis of the degree of dispersion for the weight achieved at the age of 200 days, the standard deviation having the maximum value of 51.981 kg, and the maximum coefficient of variation of 27.563%, it is found

that in this farm there is a heterogeneous cattle population in this age category.

At the age of 365 days, an average body weight value of 320.842 kg was recorded between extremely wide limits, precisely 217.94 - 374.39 kg and an average daily gain of 793.11 grams with very wide limits of 509.59-947.95 g. From the analysis of the degree of dispersion for the weight achieved at the age of 365 days, the standard deviation having the maximum value of 133.671 kg, and the maximum coefficient of variation of 41.663%, shows the heterogeneity of cattle in this age category.

Table 2. Average values and variability of farm meat production in farm 1

Indicators	n	\bar{X}	$\pm s - x$	s	V%	Minimum	Maximum
Weight at birth (kg)	50	30.70	0.628	4.441	14.467	24.00	40.00
Weight at 200 days (kg)	50	188.59	11.249	51.981	27.563	146.10	238.00
Average daily gain at 200 days (g)	50	786.200	26.965	123.571	15.718	570.00	1050.00
Weight at 365 days (kg)	50	320.842	38.841	133.671	41.663	217.94	374.39
Average daily gain 365 days (g)	50	793.11	45.974	172.017	23.024	509.59	947.95

From the data on the average values and variability of the meat production indices presented in Table 3 at farm 2 it is found that an average birth weight value of 30.29 kg was achieved for the 28 cases, the average weight at the age of 200 days was 189.05 kg placed between some fairly wide limits of 162.43-217.10 kg and the average daily gain recorded was 767.50 grams, with wide limits between 625.00- 900.00 grams.

From the analysis of the degree of dispersion for the weight achieved at the age of 200 days, the standard deviation having the value of 18,915 kg, and the coefficient of variation of 21.24%, it is found that in this farm there is a heterogeneous cattle population.

At the age of 365 days, an average body weight value of 321.54 kg was recorded, the limits being between 264.00-431.20 kg, and an average daily gain of 799.62 g with limits of 641.10 g, and 1098.63 g. From the analysis of the degree of dispersion for the weight achieved at the age of 365 days, the standard deviation having the value of 39.635 kg, and

the coefficient of variation of 12.327%, it is found that this age category has an average homogeneity.

Table 3. Average values and variability of farm meat production in farm 2

Indicators	n	\bar{X}	$\pm s - \frac{s}{x}$	s	V%	Minimum	Maximum
Weight at birth (kg)	28	30.29	0.388	2.052	6.776	28.00	36.00
Weight at 200 days (kg)	28	189.05	7.149	18.915	21.241	162.43	217.10
Average daily gain at 200 days (g)	28	767.50	36.608	103.544	13.491	625.00	900.00
Weight at 365 days (kg)	28	321.54	11.442	39.635	12.327	264.00	431.20
Average daily gain 365 days (g)	28	799.62	31.296	108.411	13.558	641.10	1098.63

From the data on average values and variability of the meat production indices presented in table 4 at farm 3 it is found that an average birth weight value of 30.85 kg was achieved for the 25 cases; the average weight at the age of 200 days was 223.25 kg, placed between quite wide limits (168.35-314.61 kg), and the average daily gain recorded was 907.00 grams with very wide limits of 625.00-1350.00 grams.

Table 4. Average values and variability of farm meat production in farm 3

Indicators	n	\bar{X}	$\pm s - \frac{s}{x}$	s	V%	Minimum	Maximum
Weight at birth (kg)	25	30.85	0.731	3.865	12.528	25.00	37.00
Weight at 200 days (kg)	25	223.25	8.113	40.563	18.169	168.35	314.61
Average daily gain at 200 days (g)	25	907.00	41.107	205.533	22.661	625.00	1350.00
Weight at 365 days (kg)	25	369.66	15.165	45.495	12.307	300.00	440.00
Average daily gain 365 days (g)	25	905.32	40.356	121.069	13.373	726.03	1090.41

From the analysis of the degree of dispersion for the weight achieved at the age of 200 days, the standard deviation having the value of 40.563 kg, and the coefficient of variation of 18.169%, it is found that in this farm there is a population of cattle with average homogeneity for this age category.

At the age of 365 days, an average body weight value of 369.66 kg was recorded, the limits being between 300.00-440.00 kg, and an average daily gain of 905.32 grams with limits of 726.03-1090.41 g. From the analysis of the degree of dispersion for the weight achieved at the age of 365 days, the standard deviation having the value of 45.495 kg, and the coefficient of variation of 12.307%, results that at this age category the cattle population is characterized by an average homogeneity.

From the data on the average values and variability of the meat production indices presented in table 5 at farm 4 it is found that an average birth weight value of 38.81 kg was achieved for the 27 cases, the average weight at the age of 200 days was 242.50 kg placed between quite wide limits of 180.00-311.00 kg and the average daily increase recorded was 1017.05 grams, with limits between 711.40- 1355.70 grams.

From the analysis of the degree of dispersion for the weight achieved at the age of 200 days, the standard deviation having the value of 31.32 kg, and the coefficient of variation of 12.94%, it is found that in this farm there is a population of cattle with average homogeneity for this age category.

At the age of 365 days, an average body weight value of 376.42 kg was recorded, the limits being between 310.00-430.00 kg and an average daily increase of 925.08 grams with limits of 753.00-1068.00 g. From the analysis of the degree of dispersion for the weight achieved at the age of 365 days, the standard deviation having the value of 40.871 kg, and the coefficient of variation of 10.858%, results that at this age category the cattle population is characterized by an average homogeneity.

Table 5. Average values and variability of farm meat production in farm 4

Indicators	n	\bar{X}	$\pm s - \frac{s}{x}$	s	V%	Minimum	Maximum
Weight at birth (kg)	27	38.81	0.935	4.860	12.521	28.00	47.00
Weight at 200 days (kg)	27	242.50	6.144	31.329	12.944	180.00	311.00
Average daily gain at 200 days (g)	27	1017.05	29.967	152.806	15.024	711.40	1355.70
Weight at 365 days (kg)	27	376.42	11.798	40.871	10.858	310.00	430.00
Average daily gain 365 days (g)	27	925.08	31.275	108.342	11.712	753.00	1068.00

From the data on the average values and variability of the meat production indices presented in table 6 at farm 5, it was found that an average birth weight value of 42.33 kg was achieved for the 15 cases, the average weight at the age of 200 days was 246.29 kg, the limits being 205.00-342.00 kg, and the average daily gain recorded was 1030.71 grams with limits between 862.43-1502.51 grams.

From the analysis of the degree of dispersion for the weight achieved at the age of 200 days, the standard deviation having the value of 35.274 kg, and the coefficient of variation of 14.322%, it is found that in this farm there is a population of cattle with average homogeneity for this age category.

At the age of 365 days, an average body weight value of 433.69 kg was recorded, the limits being between 390.00-470.00 kg and an average daily gain of 1074.33 grams with limits between 958.90-1164.00 g. From the analysis of the degree of dispersion for the weight achieved at the age of 365 days, the standard deviation having the value of 25.911 kg, and the coefficient of variation of 5.974%, results that at this age category the cattle population is homogeneous.

Table 6. Average values and variability of farm meat production in farm 5

Indicators	n	\bar{X}	$\pm s - \bar{x}$	s	V%	Minimum	Maximum
Weight at birth (Kg)	15	42.33	1.780	6.894	16.284	30.00	55.00
Weight at 200 days (Kg)	15	246.29	9.427	35.274	14.322	205.00	342.00
Average daily gain at 200 days (g)	15	1030.71	44.701	167.255	16.227	862.43	1502.51
Weight at 365 days (kg)	15	433.69	7.186	25.911	5.974	390.00	470.00
Average daily gain 365 days (g)	15	1074.33	6.871	64.591	6.012	958.90	1164.00

From the data on average values and variability of meat production indices presented in table 7 at farm 6, it was found that for the 31 cases an average birth weight of 38.26 kg was achieved, the average weight at the age of 200 days was of 241.95 kg placed between quite wide limits of 196.00-284.00 kg and the average daily increase recorded was 1020.28 grams with limits between 876.29-1260.00 grams.

From the analysis of the degree of dispersion for the weight achieved at the age of 200 days, the standard deviation having the value of 22.93 kg, and the coefficient of variation of 9.47%, it is found that in this farm there is a homogeneous cattle population for this age category.

At the age of 365 days, an average body weight value of 401.63 kg was recorded, the limits being between 280.48-454.96 kg and an average daily gain of 994.28 grams, with wide limits of 641.10-1197.00g. From the analysis of the degree of dispersion for the weight achieved at the age of 365 days, the standard deviation having the value of 50.209 kg, and the coefficient of variation of 12.501%, results that at this age category the cattle population is characterized by an average homogeneity.

Table 7. Average values and variability of farm meat production in farm 6

Indicators	n	\bar{X}	$\pm s - \bar{x}$	s	V%	Minimum	Maximum
Weight at birth (kg)	31	38.26	0.904	5.033	13.155	27.00	51.00
Weight at 200 days (kg)	31	241.95	5.261	22.933	9.478	196.00	284.00
Average daily gain at 200 days (g)	31	1020.28	22.853	99.616	9.763	876.29	1260.00
Weight at 365 days (kg)	31	401.63	13.419	50.209	12.501	280.48	454.96
Average daily gain 365 days (g)	31	994.28	40.239	150.561	15.143	641.10	1197.00

From the analysis of the average values and variability of the meat production indices to the descendants of the cattle in the six farms studied under presented in Tables 2, 3, 4, 5, 6 and 7 and from Figure 1 it is revealed that the best phenotypic performances were registered on the farm 5 and the weakest on the farm 1.

In the farm 5 where the best performances were recorded, the Charolaise breed is raised, which is a specialized breed for meat production, the adult cows can reach weights of 1000 kg, the intensively fattened youth achieve a high average daily gain of 1200-1400 g (Lupan et al., 1997).

However, if we compare the phenotypic performances obtained in farm 5 with the data from the literature, it is revealed that the average daily increase obtained is lower than the productive characteristics of the Charolaise breed. This situation indicates that there are

deficiencies to be remedied in this farm as well, especially of the environmental factors that influence the meat production.

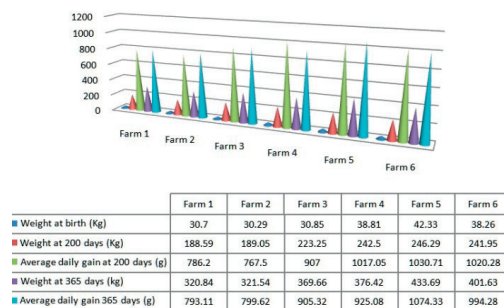


Figure 1 Meat production performances in all the studied farms

The tests for the significance of differences in productive performance to the number of beef cattle studied on these farms show that there are significant differences between farm 1 and farm 6 of 7.56 kg in birth weight, as well as 7.97 kg between farm 2 and farm 6, 4.08 kg between farm 5 and farm 6, 11.63 kg between farm 1 and farm 5, 12.05 kg between farm 2 and farm 5, 8.11 kg between farm 1 and farm 4, 8.53 kg between farm 2 and 4, 11.21 kg between farm 1 and 3, of 11.62 kg between farm 2 and 3, for the highest significance threshold, $p < 0.01$. A significant difference was also found between farm 3 and 6 of 3.65 kg, as well as between farm 4 and 5, of 3.52 kg, where $p < 0.05$.

Significance tests of differences in productive performance in beef cattle studied on farms for weight at the age of 200 days show significant differences for the highest significance threshold $p < 0.01$ between farms 1 and 6 of 53.36 kg, between farms 2 and farm 6 of 52.90 kg, of 57.70 kg between farm 1 and farm 5, of 57.24 kg between farm 2 and farm 5, 53.91 kg between farm 1 and farm 4 and 53.45 kg between farm 2 and farm 4.

Significance tests of differences in productive performance in beef cattle studied on farms for weight at 365 days of age show significant differences for the highest significance threshold $p < 0.01$ between farm 5 and 1 of 112.85 kg and between farm 5 and farm 2 of 112.15 kg.

CONCLUSIONS

The following conclusions can be drawn from the study:

The best phenotypic performances analyzed in terms of the five indicators, as follows: average birth weight (kg), average weight at 200 days (kg), average weight at 365 days (kg), average daily increase at 200 days (g) the average daily allowance at 365 days (g) were recorded on the farm 5.

Thus, at farm 5, an average weight of 42.33 kg, 246.29 kg at 200 days, and 433.69 kg at 365 days was recorded at birth and the average daily increase was 1030.71 grams at 200 days and 1074.33 grams at 365 of days. The Charolaise breed is raised on farm 5.

At farm 1, an average weight of 30.70 kg, 188.59 kg at 200 days and 320,842 kg at 365 days was recorded at birth, and the average daily gain at 200 days was 786.20 grams and 793.11 grams at 365 days. Farm 1 raises Aberdeen Angus breed.

An important aspect that determined the differences of the productive performances is the one related to the characteristics of the beef cattle breed that grows here, the Charolaise breed that is characterized by a hypermetric body development, where the height of cows is 135-140 cm and the height of bulls is 142-155 cm; regarding the body weight of cows the limits are 800-1000 kg and 1100-1300 kg in bulls. Also, the birth weight of calves is higher than those of the Aberdeen Angus breed, which directly leads to higher weight gains.

The higher performance achieved on the farm 5 is due to the farmer's special interest in improving the number of beef cattle he owns and also due to the fact that the farmer has higher education, the field of specialization: veterinary medicine. Thus, breeding on farm 5 is focused on the main sources of genetic progress (breeding bulls, selection).

The food that is administered to the cattle in farm 5 it is well balanced in energy and protein, this being another important factor that led to the best results in this husbandry operation.

That is why it is necessary to specialize the workforce, as to increase the level of knowledge and skills of those who work directly in production for the following activities:

- establishing diets according to body weight, age of animals, productive level for beef cattle according to the average daily gain;
- performing artificial insemination, thus reducing production costs by paying labor on one hand, and on the other hand the cow insemination can be done with tested and breeding bulls, which is the first and most important source of genetic progress in populations of beef cattle.

However, if a study is compared to the data from the literature with reference to the productive performance of the Charolaise breed, it is revealed that the average daily gain obtained on farm 5 is lower than these data.

This is partly due to the extensive farming system applied in this farm.

From this point of view, there is a need to concentrate, specialize, and optimize the size of beef cattle breeding units so as to introduce modern technologies (industrial type) in order to organize beef meat production, leading to increased profitability of this kind of farms.

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