
SUMMARY OF PhD THESIS

Present and perspectives in milk bovine breeding from Apuseni Mountains

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INTRODUCTION

Agriculture has been around since ancient times and continues to be a vital area of human activity today. It remains the only source of food, an important supplier of raw materials for industry and also a significant market for its production.

The relative importance of agriculture differs from country to country, but it remains the main branch of the national economy in all states, including the highly developed ones. The experience of the last decades has shown that the problems of the world economy cannot be solved by disregarding agriculture.

As paradoxical as it may seem today in the midst of a scientific and technical revolution, which is leading to strong growth in world agricultural production, many countries are facing a food problem that tends to worsen over time, becoming a factor in destabilization of international life (ONACIU, 2013).

There are large gaps between developed and developing countries in terms of food opportunities. There has been a strong polarization of food consumption worldwide - on the one hand, about 2/3 of the population, mostly in underdeveloped and underdeveloped countries, where there are severe phenomena of hunger and malnutrition, and - on the other hand, a minority located mainly in industrialized capitalist countries, which can consume above national norms.

Cattle breeding is a basic vector in modern agriculture. Through the productions provided by cattle and in particular, cattle provide basic foodstuffs of high biological and nutritional value to humans.

At present, and in the future, due to the growth rate of the human population and the growing preferences for food of animal origin, the main goal in raising cattle is the continuous and sustained increase in milk and meat production.

The standard of living of the population and part of the manufacturing industry are directly influenced by cattle breeding, as they provide an appreciable volume of animal products of great importance for the consumption of the population and some raw materials for industry (VELEA and MURESAN, 2012b).

Due to the social role, the economic and numerical weight, in relation to the other species of farm animals, the cattle breeding is considered the spearhead of the world animal husbandry.

Therefore, it is necessary to pay more attention to the way in which each variant of growth and exploitation is chosen, to organize the production for a more efficient development of this branch. In this context, together with the breeding of cattle and the continuous optimization of exploitation technologies as well as their adaptation to the requirements of current animal husbandry, a special role belongs to the breeding activity by knowing as thorough and real knowledge of the characters and characteristics of cattle breeds. Correct and well-founded decisions regarding the breeding and exploitation of cattle in the future.

The experimental part of the thesis was carried out in three counties in Transylvania (Alba, Bihor and Hunedoara), where cattle farms, raised for milk, were inventoried and tracked. Milk quality analyzes were performed at SC BIOMILK S.R.L.

PURPOSE AND OBJECTIVES OF THE THESIS

Considering that the Bălțată Românească breed has an important share in the breed structure of cattle raised in Transylvania, the Apuseni Mountains area, in private-individual farms, we considered it necessary and opportune to carry out an in-depth study on the productive level and the current stage. to improve the populations in this area, as well as the traditional exploitation technologies practiced in this area.

The motivation of these researches is also due to the fact that although Transylvania is the area where the Simmental breed was introduced for the first time in the country and grows for almost a century, on the biological material of this initial breed and then on the Bălțată Românească breed. the indigenous breeds in the area, no in-depth research was undertaken, instead the Bălțată Românească breed was very much studied in other areas of the country (Bucovina and Banat in particular).

The motivation of the study is that currently this breed is grown almost exclusively in private farms, in small herds, hence the need to know how this breed has evolved in the area, the current stage of improvement, qualities and defects encountered, the specific technologies applied in the great growth, the genetic and economic effect on the biological material and of the particular peasant household. It is worth mentioning the fact that the cattle from the peasant household are almost non-existent, not only in the area we are referring to, but also in other areas of the country, where the Bălțată Românească breed has a significant share.

THESIS STRUCTURE

This thesis is structured in two main parts, the first part includes the study of literature, and the second part is its own contributions.

PART ONE: THE STUDY OF LITERATURE has in its content three chapters:

Chapter 1. THE SOCIO-ECONOMIC IMPORTANCE OF CATTLE BREEDING

Chapter 2. CURRENT SITUATION AND PERSPECTIVES IN CATTLE BREEDING with the subchapters News and perspectives in cattle breeding worldwide and News and perspectives in cattle breeding in Romania

Chapter 3. CHARACTERIZATION OF BREEDING BREEDS IN THE AREA OF THE WEST MOUNTAINS

PART TWO: OWN CONTRIBUTIONS comprises six chapters:

The purpose and objectives of the thesis are presented for the first time in the contributions section

Chapter 4. MATERIAL AND EXPERIMENTAL METHODOLOGY. The biological material used in the study is presented and the farms (individual farms) from the three counties are described: Hunedoara, Alba and Bihor and also the experimental methods used in the study, in 2 subchapters.

Chapter 5. RESULTS REGARDING THE MORPHOLOGICAL CHARACTERISTICS OF CATTLE RAISED IN THE AREA OF THE WEST MOUNTAINS includes 4 subchapters that

present the results on the morphological characteristics of cows raised on farms in the three counties and the comparative analysis of the average values of the main body properties. three counties.

Chapter 6. RESULTS REGARDING THE PRODUCTIVE CHARACTERISTICS OF DAIRY COWS RAISED IN THE AREA OF THE WEST MOUNTAINS includes 5 subchapters that present the factors that influence the individual milk production, the productive characteristics of the cows in the three counties and the comparative results of the productive properties. Apuseni.

Chapter 7. RESULTS OBTAINED REGARDING THE QUALITY OF MILK PRODUCED BY COWS STUDIED IN THE WEST MOUNTAINS In 5 subchapters are presented considerations on the characteristics of milk, milk quality in the three counties and comparative results on milk quality produced in cows in the three counties.

Chapter 8. RESULTS OBTAINED REGARDING THE MAIN REPRODUCTION PARAMETERS OF THE COWS STUDIED FROM THE WEST MOUNTAINS describes in 5 subchapters the considerations on the main reproduction parameters from the three counties and comparatively between counties.

Chapter 9. CONCLUSIONS AND RECOMMENDATIONS

PERSONAL CONTRIBUTIONS

Biological material and experimental model

The biological material studied consists of cows registered in the official control of production. It consisted of the Bălțată Românească cattle population exploited in the pedo-climatic conditions from the northwest of Transylvania (Alba, Bihor and Hunedoara counties) included in this area and having a total herd of lactating cows of 214 heads, structured as follows:

- in Hunedoara county - 5 farms with a total of 65 heads.
- in Alba county - 7 farms with a total of 80 heads.
- in Bihor county - 4 farms with a total of 69 heads.

The description of the experimental methods refers to the three main objectives of the thesis: the description of the morphological characteristics of the cattle raised in the Apuseni Mountains, the productive characteristics of the cows from the studied farms and the quality of milk produced in these farms.

The assessment of body shape and size in domestic animals is generally done by direct measurement, using metric and gravimetric methods, an operation called somatometry (metron = measure). This method tries to remove the approximations and errors of assessment that may occur in the assessments made with other methods. With the help of body and mass measurements one can appreciate the development and connection of different body segments or regions, which form the whole body and the general development of the animal.

The body dimensions of the Bălțată Românească cows were measured with:

- The cane
- Measuring compass

- Ribbon
- The scale

The body and mass measurements were as follows:

- Height at the withers or waist
- Height at croup
- Oblique length of the trunk
- The width of the croup
- Thoracic perimeter
- Height (depth) of the chest
- Chest width
- Lean body mass

The interpretation and use of data was done by expressing the results of the measurements obtained in absolute values, relative values and in body indices.

a) The absolute value

b) The relative value

c) Body indices:

1) Format indexes

2) Organic indices

3) Constitution indices

In order to express the research results and to obtain precise data, a series of calculations were used, which lead to the establishment of the variability estimates, grouped in:

a) Arithmetic mean

b) Dispersion indices

c) The study had the following objectives:

1. Analysis of the main indices of quantitative milk production regarding:

- Duration of lactation (days);
- The amount of milk (kg).

2. Analysis of the physico-chemical characteristics of milk production regarding:

- Percentage of fat (%);
- Percentage of protein (%);
- Percentage of casein (%);
- Percentage of lactose (%);
- Percentage of non-fat dry matter (%);
- Freezing point (water added);
- Inhibitory substances (antibiotics);
- pH;
- Urea.

3. Analysis of the microbiological characteristics of milk production regarding:

- Germ load (NTG)
- Somatic cell number (NCS)

4. Analysis of the main reproduction indices:

- The interval between calvings (IC, days);
- Breast rest (RM, days);

- Service period (SP, days);
- Birth rate (N%);
- Age of first calving (VPF, days).

RESULTS REGARDING THE MORPHOLOGICAL CHARACTERISTICS OF CATTLE RAISED IN THE AREA OF THE APUSENI MOUNTAINS

Morphological characteristics of cows raised on farms in Hunedoara County

In the following, the data representing the averages and the estimates of the variability at the main body dimensions of the herds of cows from the farms studied in the three counties (Hunedoara, Alba and Bihor) are presented. The number of cows analyzed, the mean and standard error, the standard deviation and the variation in the main measured body dimensions are presented for each farm.

The results of the main measurements performed on the herds of dairy cows from the Bălțată Românească breed and its crossbreeds, exploited in the farms studied in Hunedoara county are presented in table 1.

Table 1. Average values and estimates of variability in the main body dimensions of the herd of cows in the farms studied in Hunedoara county

Farm	Nr.cows(n)	Average $\bar{X} \pm s_x$ Eroarea standard	Standard deviation(SD)	Variance (V%)
1. Height at the withers				
H1	10	132.90±1.12	3.54	2.67
H2	20	137.15±0.86	3.83	2.79
H3	10	133.59±1.17	3.69	2.76
H4	19	137.21±0.65	2.84	2.07
H5	6	134.50±1.78	4.37	3.25
Total/average	65	135.71±0.48	3.90	2.88
2. Height at the croup				
H1	10	135.50±1.12	3.84	2.83
H2	20	140.00±0.89	4.00	2.86
H3	10	135.90±1.22	3.84	2.83
H4	19	139.84±0.80	3.47	2.48
H5	6	137.17±1.97	4.83	3.52
Total/Average	65	138.37±0.53	4.24	3.06
3. Oblique length of the trunk				
H1	10	160.30±1.36	4.30	2.68
H2	20	164.95±1.47	6.56	3.98
H3	10	161.70±1.56	4.92	3.04
H4	19	166.32±0.95	4.15	2.50
H5	6	163.00±2.21	5.40	3.32
Total/Average	65	163.95±0.69	5.55	3.39

4. Thoracic perimeter				
H1	10	194.00±2.17	6.86	3.54
H2	20	199.35±1.73	7.75	3.89
H3	10	195.10±1.95	6.15	3.15
H4	19	201.53±0.99	4.33	2.15
H5	6	197.33±2.53	6.19	3.13
Total/average	65	198.32±0.84	6.79	3.42
5. Depth of the chest				
H1	10	69.70±0.63	2.00	2.87
H2	20	71.05±0.77	3.44	4.84
H3	10	69.70±0.82	2.58	3.71
H4	19	71.89±0.42	1.82	2.54
H5	6	69.85±0.95	2.32	3.32
Total/Average	65	70.77±0.33	2.69	3.79
6. Chest width				
H1	10	51.20±0.70	2.20	4.30
H2	20	52.35±0.48	2.16	4.12
H3	10	51.40±0.73	2.32	4.51
H4	19	53.00±0.39	1.70	3.21
H5	6	51.67±0.95	2.34	4.53
Total/Medie	65	52.15±0.26	2.13	4.08
7. Croup width				
H1	10	54.30±0.68	2.16	3.98
H2	20	55.65±0.49	2.21	3.97
H3	10	54.80±0.80	2.53	4.62
H4	19	56.21±0.37	1.62	2.88
H5	6	54.50±0.96	2.35	4.30
Total/Average	65	55.37±0.27	2.17	3.92
8. Corporal mass				
H1	10	598.70±18.99	60.05	10.03
H2	20	659.25±13.26	59.32	9.00
H3	10	609.10±16.85	53.29	8.75
H4	19	666.84±9.76	42.56	6.38
H5	6	627.83±23.57	57.73	9.19
Total/Average	65	641.54±7.31	58.97	9.19

The average values of the body dimensions followed on the cows studied in Hunedoara County show a medium to large herd (HG = 135.71 cm; HC = 138.37 cm) with an average body weight of 641.54 kg that falls within the desired minimum weight limit for this breed (650 -700 kg). There is also a good development of the chest which has an average width of 52.15 cm as well as the width of the hip at the hip with an average of 55.37 cm.

Morphological characteristics of cows raised on farms in Alba County

For Alba county, the same measurements of the body dimensions and of the main body indices on farms were made. The same measurements were performed on the entire herd of cows in the county depending on the number of lactations (see thesis). Table 2 presents the average values and estimated variability of the main body dimensions, measured on herds of dairy cows at different lactations and exploited in

Actualități și perspective în creșterea și exploatarea taurinelor de lapte din zona munților Apuseni
the farms studied in Alba County. The data presented show the following:

Table 2. Average values and estimates of variability in the main body dimensions of the herd of cows in the farms studied in Alba county

Farm	Nr.cows(n)	Average $\bar{X} \pm s_x$ Standard error	Standard deviation (SD)	Variance (V%)
1. Height at the withers				
A1	8	134.13±1.71	4.82	3.60
A2	10	130.40±1.45	4.58	3.51
A3	8	132.88±1.37	3.87	2.91
A4	16	133.13±1.33	5.30	3.98
A5	7	130.29±1.66	4.39	3.37
A6	21	134.71±1.24	5.67	4.21
A7	10	131.70±1.33	4.22	3.20
Total/average	80	132.85±0.56	5.03	3.79
2. Height at croup				
A1	8	137.38±2.00	5.66	4.12
A2	10	133.60±1.83	5.78	4.32
A3	8	136.75±1.60	4.53	3.31
A4	16	136.44±1.70	6.79	4.98
A5	7	133.57±2.05	5.41	4.05
A6	21	138.10±1.51	6.91	5.01
A7	10	134.80±1.62	5.12	3.80
Total/Average	80	136.19±0.68	6.11	4.49
3. Oblique length of the trunk				
A1	8	161.50±1.79	5.07	3.14
A2	10	157.20±1.72	5.43	3.46
A3	8	160.63±1.89	5.34	3.33
A4	16	160.56±1.75	6.99	4.36
A5	7	157.71±2.28	6.02	3.82
A6	21	162.95±1.48	6.77	4.16
A7	10	158.30±1.81	5.72	3.61
Total/Average	80	160.34±0.71	6.32	3.94
4. Toracic perimeter				
A1	8	194.50±2.84	8.04	4.13
A2	10	189.20±2.64	8.36	4.42
A3	8	192.88±2.22	6.29	3.26
A4	16	193.00±2.10	8.38	4.34
A5	7	189.29±2.95	7.80	4.12
A6	21	196.81±1.80	8.27	4.20
A7	10	190.30±2.21	6.98	3.67
Total/average	80	193.00±0.91	8.13	4.21
5. Depth of the chest				
A1	8	69.25±1.24	3.49	5.05
A2	10	66.80±0.95	3.01	4.51
A3	8	68.00±0.76	2.14	3.14
A4	16	69.06±0.88	3.51	5.08
A5	7	66.43±1.59	4.20	6.32
A6	21	69.76±0.84	3.85	5.51
A7	10	67.40±0.98	3.10	4.60
Total/average	80	68.44±0.40	3.54	5.17
6. Chest width				

Actualități și perspective în creșterea și exploatarea taurinelor de lapte din zona munților Apuseni

A1	8	52.00±0.85	2.35	4.60
A2	10	50.60±1.16	3.66	7.23
A3	8	50.88±0.72	2.03	3.99
A4	16	51.31±0.63	2.52	4.92
A5	7	50.00±0.76	2.00	4.00
A6	21	51.81±0.66	3.01	5.81
A7	10	50.70±0.47	1.49	2.95
Total/average	80	51.19±0.29	2.61	5.11
7. Croup width				
A1	8	55.25±1.06	3.01	5.45
A2	10	53.10±1.18	3.73	7.02
A3	8	53.25±0.70	1.98	3.72
A4	16	53.31±0.60	2.39	4.48
A5	7	52.43±0.72	1.90	3.63
A6	21	54.19±0.57	2.62	4.83
A7	10	53.50±0.54	1.72	3.21
Total/average	65	55.37±0.27	2.17	3.92
8. Corporal mass				
A1	8	603.75±24.76	70.04	11.60
A2	10	559.00±21.56	68.18	12.20
A3	8	586.88±19.93	56.37	9.61
A4	16	589.06±19.02	76.07	12.91
A5	7	555.00±24.35	64.42	11.61
A6	21	623.57±17.19	78.76	12.63
A7	10	566.00±18.09	57.19	10.10
Total/average	80	589.75±8.08	72.29	12.26

The herds of dairy cows exploited in the studied farms from Alba county present average values of weaker body dimensions compared to the cows exploited in the farms from Hunedoara county. However, the animals are well maintained for their condition, and the maximum individual values recorded give us hope that through good future management the herds studied on farms in Alba County will evolve in terms of body size.

Morphological characteristics of cows raised on farms in Bihor County

In the last of the counties followed in this study, Bihor county, the same measurements of body size and main body indices on farms and on the entire herd of cows in the county were studied in the farms studied. The 4 farms in Bihor County presented values included in the following tables.

Table 3. Average values and estimated variability at the main body dimensions of the herd of cows in the farms studied in Bihor county

Farm	Nr.cows(n)	Average $\bar{X} \pm s_x$ Standard error	Standard deviation (SD)	Variance (V%)
1. Height at the withers				
B1	21	137.57±0.86	3.96	2.88
B2	21	137.76±0.91	4.16	3.02
B3	17	136.24±1.07	4.42	3.25
B4	10	137.10±1.30	4.12	3.01

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Total/average	69	137.23±0.50	4.11	3.00
2. Height at croup				
B1	21	140.33±1.07	4.90	3.49
B2	21	140.86±1.05	4.83	3.43
B3	17	139.06±1.28	5.27	3.79
B4	10	139.80±1.47	4.66	3.33
Total/average	69	140.1±0.59	4.88	3.00
3. Oblique length of the truck				
H1	21	165.67±1.29	5.91	3.57
B2	21	166.05±1.20	5.51	3.32
B3	17	164.18±1.69	6.98	4.20
B4	10	165.40±1.85	5.85	3.54
Total/average	69	165.38±0.72	5.98	3.61
4. Thoracic perimeter				
B1	21	204.48±1.47	6.76	
H2	21	206.24±1.50	6.88	
B3	17	202.76±1.83	7.54	
B4	10	205.10±2.16	6.84	
Total/average	69	204.68±0.84	6.97	
5. Depth of the chest				
B1	21	72.48±0.73	3.33	
B2	21	72.52±0.70	3.19	
B3	17	71.59±0.77	3.18	
B4	10	72.20±1.01	3.19	
Total/average	69	72.23±0.38	3.18	
6. Chest width				
B1	21	51.86±0.48	2.22	
B2	21	52.67±0.46	2.13	
B3	17	51.41±0.58	2.37	
B4	10	51.80±0.65	2.04	
Total/average	69	51.99±0.27	2.21	
7. Croup width				
B1	21	55.52±0.52	2.40	
B2	21	56.48±0.62	2.82	
B3	17	55.00±0.76	3.12	
B4	10	55.50±0.79	2.51	
Total/average	69	55.68±0.33	2.74	
8. Corporal mass				
B1	21	696.43±14.36	65.79	9.45
B2	21	713.81±14.82	67.93	9.52
B3	17	679.71±17.62	72.66	10.69
B4	10	701.00±21.21	67.07	9.57
Total/average	69	698.26±8.19	68.05	9.75

The average values and the estimated variability of the main body dimensions, measured on the herd of dairy cows, exploited in the farms studied in Bihor County, are presented in table 3.

The average values of the body dimensions followed on the farms studied in Bihor County show a medium to large size (HG = 137.23 cm; HC = 140.10 cm) with an average body weight of 698.26 kg which falls within the desired weight limit for this breed (650 -700 kg). There is also a good development of the chest which has an average width of 51.99 cm as well as the width of the hip at the hip with an average of

55.68 cm.

Because the average values of body size highlighted by the herds exploited in the farms studied in Bihor County are good, as well as the maximum individual values found in these animals of 145 cm for HG, 149 cm for HC, 78 cm AT, 218 cm for PT and 830 kg for body weight, we can say that with proper selection and proper exploitation technology, can achieve and even exceed the goals set for this breed, on body development, in a fairly short time.

RESULTS REGARDING THE PRODUCTIVE PROPERTIES OF DAIRY COWS RAISED IN THE AREA OF THE APUSENI MOUNTAINS

Factors influencing individual milk production

The milk production of a cow is influenced by a series of factors with direct or indirect action on its body (HRIC and PAVLIK, 2012, MUREȘAN et al., 1983). In principle, these factors act simultaneously and associated depending on the stage and time when the target animal is found during the technological course, but with different intensity, both on the quantity of milk and on the quality and chemical composition of the milk. The herd of cows that was the object of the research is of Bălțată Românească breed, that is why we considered it necessary to present some zoeconomic features of it in the opinion of some authors from the specialized literature, as follows:

ONACIU (2013) considers that Bălțata Românească is a semi-early breed, which reaches full maturity at 4-4 ½ years, and reproductive maturity at 17-22 months. The economic life is 8-9 lactations and even more, with their duration of 270-330 days and with birth rates around 85%. Milk production varies between 3000-6500 kg, with 3.6-4.2% fat.

UJICĂ et al. (2007) consider that, if well maintained, the Bălțată Românească breed gives productions of 3500-4000 kg of milk / lactation, with 3.8% fat.

ACATINCĂI (2010) considers that in the Bălțată Românească breed, depending on the feeding and maintenance conditions, the milk production varies in wide limits. On average, the production is 3000-3500 kg of milk / lactation, with 3.7-3.8% fat. In elite farms and in those where appropriate operating conditions are ensured, productions of over 4500 kg of milk / lactation are obtained.

Comparative results of the productive characteristics of the studied cows from the Apuseni Mountains

Comparing the three counties studied in milk production per lactation and the duration of lactation (Table 4, figure 1), we can see the differences between the average productions.

Table 4. Average comparative milk production of cows by different lactations

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LACTATION	HUNEDOARA COUNTY		ALBA COUNTY		BIHOR COUNTY	
	Nr. days	Milk production on lactation	Nr. days	Milk production on lactation	Nr. days	Milk production on lactation
LT I	322.40	4073.80	318.75	3918.53	326.77	4233.50
LN I	302.70	3921.62	302.31	3805.66	303.85	4076.14
LT a II-a	319.80	4429.59	330.31	4254.25	334.81	4543.82
LN a II-a	303.13	4301.81	303.69	4053.20	304.24	4297.62
LT a III-a	329.11	4802.03	323.40	4492.58	329.64	4925.03
LN a III-a	304.00	4578.44	302.10	4314.97	303.36	4686.16
LT a IV-a	330.11	5141.98	318.06	4787.47	336.67	5244.65
LN a IV-a	303.00	4893.81	300.94	4632.19	304.33	4942.03
LT a V-a and more	327.73	5231.26	319.75	4913.71	334.83	5341.89
LN a V-a and more	304.18	5015.73	302.08	4764.43	304.11	5046.28
AVERAGE TOTAL LACTATION	325.60	4796.40	321.36	4528.05	332.64	4815.26
AVERAGE NORMAL LACTATION	303.52	4605.23	302.15	4372.82	304.00	4569.17

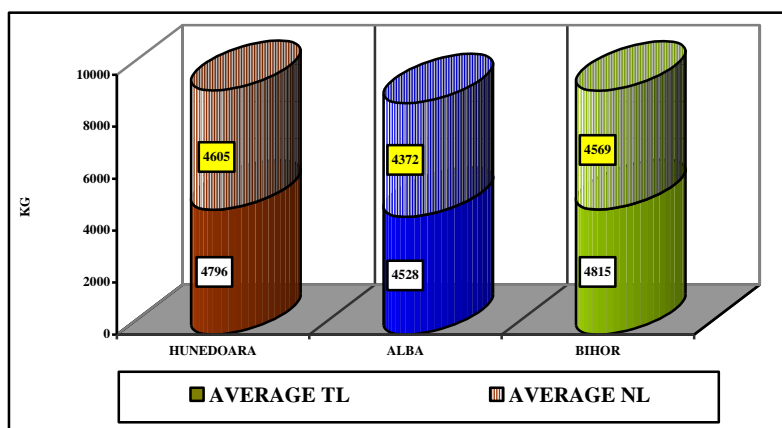


Figure 1. Comparative average milk production on total and normal lactations

Analyzing the data obtained on the average milk production per cow, as well as the duration of lactation by counties, it is found that:

- on total lactation, the highest production is held by Bihor county with 4815.26 kg (332.64 days), followed by Hunedoara county with 4796.40 kg (325.60 days) and Alba county with 4528.05 kg (321.36 days).

- on normal lactation, the highest production is held by Hunedoara county

with 4605.23 kg (303.52 days), followed by Bihor county with 4569.17 kg (304.00 days) and Alba county with 4372.82 kg (302.15 days).

Different authors, studying the productive properties of different breeds of cows in our country, obtained results similar to those presented in this study (DOLIȘ et al., 2015, FODOR and ÓZSVÁRI, 2015, MUREȘAN et al., 1983, NEAMȚ et al., 2011).

RESULTS OBTAINED REGARDING THE QUALITY OF MILK PRODUCED BY COWS STUDIED IN THE WEST MOUNTAINS

The farms where this study was conducted are considered organic farms, being located in different mountainous regions of Romania. Products from organic farms are increasingly gaining the attention of consumers on the market, and therefore adequate information on these products is needed (SCOZZAFAVA et al., 2020). Among the motivations to consume organic products are first of all health and secondly various environmental reasons (RANA and PAUL, 2017; CEYLAN et al., 2018). Various studies show that organic products in Romania represent only a small percentage of the total agri-food market (ROMAN, 2010; VIETORIS et al., 2016; CEYLAN et al., 2018). Therefore, studies conducted in different farms located in mountainous regions can lead to the identification of organic producers, and to the increase in the number and quantity of organic products on the market (RĂDUCUȘI et al., 2016).

If we compare literature studies conducted in Romania (other geographical origins) (CZISZTER et al., 2008; GĂLCĂ et al., 2008) or abroad (FAHMID et al., 2016; RAFIQ et al., 2016), by far, the samples from the cows from Bihor county have the highest nutritional values, due to the high content of lipids, proteins and sugars.

Similar values for these parameters were obtained by ONACIU et al. (2015) from milk collected from Sălaj County from Red Holstein breed cows. Other studies (RĂDUCU et al., 2012; JURCO et al., 2016; ONACIU et al., 2016) obtained similar values for parametric chemical milk from cows Bălțată Friesian or Bălțata Românească. Vegetation and geographical region have an important role in determining the chemical composition of milk, a role even more important than the breed of the animal.

The pH of the milk is slightly acidic (6.5-6.7). Milk also contains various organic acids (lactic, butyric, propionic, acetic and citric), contributing to the aroma and taste of milk or milk products (GARDE et al., 2012). The pH of the analyzed samples was between 6.40 and 6.53, the samples from Alba county having the lowest pH (average of 6.47), the milk samples from Hunedoara and Bihor counties, having similar values (6.51-6.52). The general observation for Alba and Bihor counties was for the 5th and higher lactation, which presented the highest values of fat, protein and lactose, for all farms located in these two regions. The explanation for these high values for fats and proteins is the higher degree of lactation: the higher the lactation, the lower the amount of milk and the higher the values of these parameters. The compounds containing milk amines (urea) ranged from 24.59 mg / dl to 28.59 mg / dl. In general, milk from early (small) lactations has low amounts of urea. There were no

significant differences between the investigated parameters from all locations, except for small statistically insignificant differences, which were attributed to the geographical origin and the position where the farms are located.

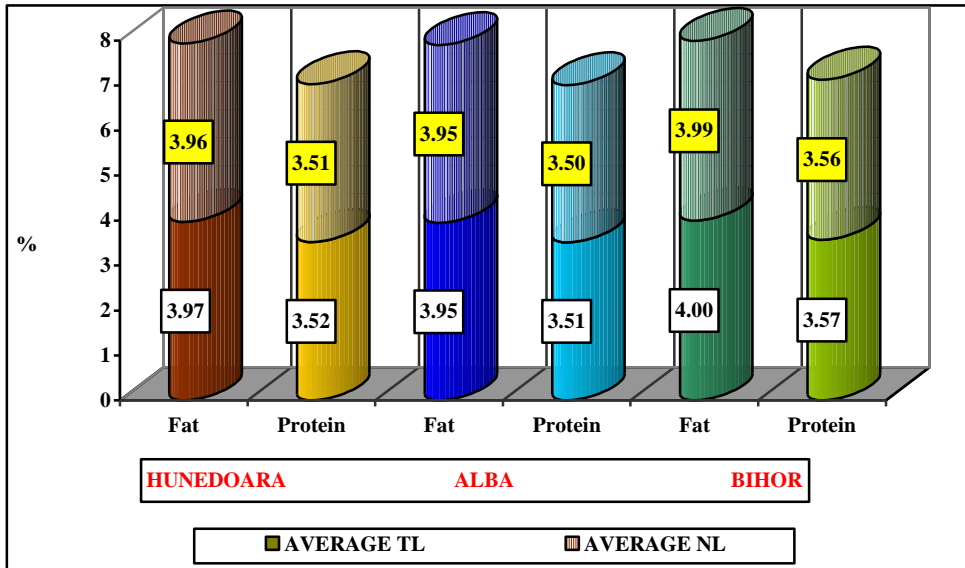


Figure 2. Comparative average of the main milk constituents

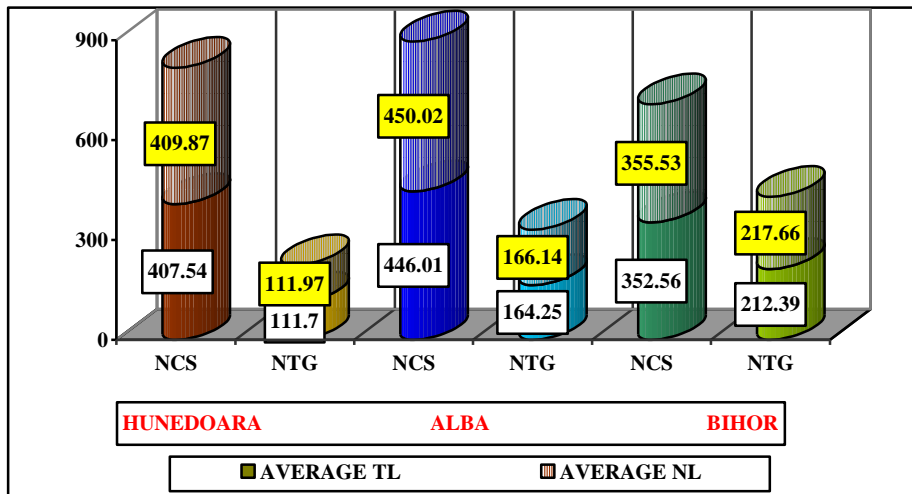


Figure 3. Comparative average of milk hygiene

RESULTS OBTAINED REGARDING THE MAIN REPRODUCTION PARAMETERS OF THE COWS STUDIED IN THE WEST MOUNTAINS

Considerations on the main reproduction parameters

The process of reproduction is a factor of great importance in determining the efficiency of animal production. Thus, the reproduction process influences the rate of numerical increase and qualitative improvement of the cattle herd, with direct effects on the profitability of the farm.

The evaluation of the reproduction efficiency in a cattle farm is synthetically assessed by calculating and analyzing the reproduction indices.

Reproduction indices allow permanent knowledge of the quality of reproduction activity and avoid situations that can cause economic losses but at the same time by planning reproduction correlated with optimal reproduction indices through the process of engineering and technological design, allows the technologist to draw up business plans, projects and feasibility studies for the development of some farms or the opening of financing and crediting lines for agricultural activities (ONACIU, 2013).

Comparative results regarding the main reproduction parameters of the studied cows from the Apuseni Mountains

Table 5. Average of the main reproduction parameters in total lactations

HUNEDOARA COUNTY				
	IBC days	BR days	SP days	CI days
n	65	65	65	266
Media X	878.08	56.69	96.98	400.83
Eroarea sX	11.22	1.24	2.95	2.21
Deviatia s	90.44	9.97	23.81	36.04
Variatia V%	10.30	17.58	24.55	8.99
Min.	632	40	37	321
Max.	1036	92	147	565
ALBA COUNTY				
n	80	80	80	302
Media X	841.00	58.46	94.83	395.51
Eroarea sX	9.67	1.00	2.68	1.96
Deviatia s	86.47	8.98	24.01	34.13
Variatia V%	10.28	15.37	25.32	8.63
Min.	681	41	43	327

Max.	1084	90	148	504
BIHOR COUNTY				
n	69	69	69	214
Media X	856.09	60.42	107.62	398.86
Eroarea sX	9.89	1.20	2.75	1.81
Deviatia s	82.12	9.99	22.85	26.55
Variatia V%	9.59	16.54	21.23	6.66
Min.	646	42	47	331
Max.	1034	90	167	512

Analyzing the data obtained regarding the main reproduction parameters by counties, we can specify the following:

- the average age at the first calving had the lowest value in the primiparous cows from Alba county, this being 841.00 days, followed in ascending order by those from Bihor county who at the first calving had 856.09 days and those from Hunedoara county who had 878.08 days at first calving.
- the average duration of breast rest in the studied herd was 56.69 days in Hunedoara county, 58.46 days in Alba county and 60.42 days in Bihor county.
- the studied staff had an average service period of 94.83 days in Alba County, of 96.98 days in Hunedoara County and of 107.62 days in Bihor County.
- the calculated average of the interval between calvings in the studied population was 395.51 days in Alba county, 398.86 days in Bihor county and 400.83 days in Hunedoara county.

CONCLUSIONS AND RECOMMENDATIONS

The conclusions that resulted from the analyzes performed in this doctoral thesis "News and perspectives in the breeding and exploitation of dairy and meat cattle in the Apuseni Mountains area" are formulated from the perspective of the two main research directions and are presented below:

1. The analysis of the main body dimensions measured on the herds of dairy cows, exploited in the farms studied in Hunedoara, Alba and Bihor counties highlights the following aspects:

- The average values of the body dimensions followed on the cows studied in Hunedoara County show a medium to large herd (HG = 135.71 cm; HC = 138.37 cm) with an average body weight of 641.54 kg that falls within the minimum weight limit desired for this breed (650 -700 kg). There is also a good development of the chest which has an average width of 52.15 cm as well as the width of the hip at the hip with an average of 55.37 cm.
- The average values of the body dimensions followed on the farms studied in Alba County show a medium-sized herd (HG = 132.85 cm; HC = 136.19 cm) with an average

body weight of 589.75 kg which is well below the minimum weight limit desired for this breed (650 -700 kg).

- The average values of the body dimensions followed on the farms studied in Bihor County show a medium to large herd (HG = 137.23 cm; HC = 140.10 cm) with an average body weight of 698.26 kg that falls within the desired weight limit for this breed (650 - 700 kg). There is also a good development of the chest which has an average width of 51.99 cm as well as the width of the hip at the hip with an average of 55.68 cm.

From the analysis of the morphological characteristics of the cows exploited in the farms studied, we can conclude that the studied cattle herds have a good body development, even very good, which offers a favorable biological platform for productive life;

2. Body indices calculated from biometric measurements indicate a harmonious development. the studied animals being well proportioned, with a constitution that includes them in the mixed morpho-productive type.

The results regarding the productive properties of dairy cows in the Apuseni mountains area, led to the establishment of numerous conclusions and recommendations, further listing the most important and significant:

Comparative average of total and normal lactation milk production:

- on total lactation, the highest production is held by Bihor county with 4815.26 kg (332.64 days), followed by Hunedoara county with 4796.40 kg (325.60 days) and Alba county with 4528.05 kg (321.36 days).

- on normal lactation, the highest production is held by Hunedoara county with 4605.23 kg (303.52 days), followed by Bihor county with 4569.17 kg (304.00 days) and Alba county with 4372.82 kg (302.15 days).

Comparative average of the main constituents of milk:

- the best percentages of fat were obtained both on total lactation and on normal lactation in Bihor county, these having values of 4.00% on LT and 3.99% on LN. It was followed by Hunedoara county with 3.97% on LT and 3.96% on LN and Alba county with 3.95% on LT and 3.95% on LN.

- the highest protein percentages were obtained on both total lactation and normal lactation in Bihor County, these having values of 3.57% on LT and 3.56% on LN. It was followed by Hunedoara County with 3.52% on LT and 3.51% on LN and Alba county with 3.51% on LT and 3.50% on LN.

Comparative average of milk hygiene:

- the lowest number of somatic cells (NCS) was registered in the milk from Bihor county, these having values of 352.56 / ml on LT and 355.53 / ml on LN. It was followed by Hunedoara County with 407.54 / ml on LT and 409.87 / ml on LN and Alba county with 446.01 / ml on LT and 450.02 / ml on LN.

- the lowest number of germs (NTG) was registered in the milk from Hunedoara county, these having values of 111.70 / ml on LT and 111.97 / ml on LN. It was followed by Alba County with 164.25 / ml on LT and 166.14 / ml on LN and Bihor County with 212.39 / ml on LT and 217.66 / ml on LN.

Comparative average of the main reproduction parameters:

- the average age at the first calving had the lowest value in the primiparous cows from Alba county, this being 841.00 days, followed in ascending order by those from Bihor county who at the first calving had 856.09 days and those from Hunedoara county who had 878.08 days at first calving.
- the average duration of breast rest in the studied herd was 56.69 days in Hunedoara county, 58.46 days in Alba county and 60.42 days in Bihor county.
- the studied animals had an average service period of 94.83 days in Alba county, of 96.98 days in Hunedoara county and of 107.62 days in Bihor county.
- the calculated average of the interval between calvings in the studied population was 395.51 days in Alba county, 398.86 days in Bihor county and 400.83 days in Hunedoara county.

The results obtained, which reflect the current level of milk production, lead us to believe that the herd of cows in the researched holdings is well adapted to the environmental conditions specific to the area and if exploitation and management conditions close to optimal are ensured, dairy cows can respond by productive performances close to the real genetic potential.

Most physico-chemical indices fall within the normal limits, unanimously accepted by the existing standards. The microbiological indices of milk do not fall within the scale of requirements for the admission of milk raw material of <100,000 / ml NTG milk and <400,000 / ml NCS milk according to European Standards. Reproductive activity is good and can be improved. Due to the great importance of reproduction, for the economically productive results of the activity in dairy farms, special care and attention is required for its planning and management.

SELECTIVE BIBLIOGRAPHY

1. ACATINCĂI, S. 2004, Producțiile bovinelor, *Editura Eurobit, Timișoara*.
2. CEYLAN, R.F., M.G. AKPINAR, A.M. CHERCIOV, B. OZKAN, M. GUL, 2018, Consumer preferences of organic products for Romania. *International Journal of Agriculture, Forestry and Life Science*, 2(2), 47-55.
3. CZISZTER, L.T., S. ACATINCĂI, A. BOGNAR, I. TRIPON, D. GAVOJDIAN, S. BAUL, S. ERINA 2008, Study of morphological and milk production traits of a Romanian Black and white cow population from the south-western Romania. *Bulletin UASVM Animal Science and Biotechnologies*, 65(1-2), 156-160.
4. DOLIȘ, L., I. GÂLCĂ, M. DOLIȘ, 2015, Research regarding production and reproductive traits on the first four lactation, in Romanian Black and White dairy cows. *Lucrări științifice, Seria Zootehnie*, 55, 191-195.
5. FAHMID, S., A. SAJJAD, M/ KHAN, N. JAMIL, J. ALI, 2016, Determination of chemical composition of milk marketed in Quetta, Pakistan, *International Journal of Advances Research Biological Science*, 3(5), 98-103.
6. FODOR, I. și L. ÓZSVÁRI, 2015, The evaluation of reproductive performance in dairy herds. In: Proceedings of the 5th International Conference on Management 2015. Management, leadership and strategy for SMEs' competitiveness. *Szent István University Publishing House, Gödöllő*, 461-466. Indexes, Available online: <https://www.wvu.edu/~agexten/forglvst/Dairy/dirm5.pdf>

7. GARDE, S., M. ÁVILA, P. GAYA, R. ARIAS, M. NUNEZ, 2012, Sugars and organic acids in raw and pasteurized milk Manchego cheeses with different degrees of late blowing defect, *International Dairy Journal*, 25,87-91.
8. GÎLCĂ, I., V. MACOVEI, D. BREBEANU, R. STĂNESCU, E. ȚICĂU, C. DUBIȚ, 2008, Evaluation of the milk quality and udder health based on the somatic cell counts. *Bulletin UASVM Animal Science and Biotechnologies*, 65(1-2), 32-34.
9. HRIC, P. și I. PAVLIK, 2012, Factors effecting of the milk production in select herd of Slovak spotted breed. *Scientific Papers: Animal Sciences and Biotechnologies*, 45(1), 185-188.
10. JURCO, E., G. ONACIU, Z. MARCHIS, 2016, Research on productive performance and quality of milk from Simmental cows grown in agricultural conditions of Rupea, Brașor County, *Bull. UASVM Cluj Animal Science and Technology*, 73(2), 224-225.
11. MUREȘAN, G. și col . 1983, Influența vârstei primei fatări asupra producției de lapte din lactația I la rasa bălțată cu negru. *Simp. I.A. Cluj 11-12 nov.*
12. NEAMȚ, R.I., L.T. CZISZTER, F.C. NECIU, F.C. MARINESCU, D.E. ILIE, C.I. LIVIU, 2011, Study regarding milk production and days in milk in the Fleckvieh-Type Romanian spotted breed from S.C.D.C.B.Arad, *Scientific Papers: Animal Science and Biotechnologies*, 44(2): 302-304.
13. ONACIU, G., E. JURCO, O. NEGREA, 2015, The Study of ther Main Milk Production Traits of Red Holstein Breed, Raised in Sălaj County. *Bulletin UASVM Animal Science and Biotechnologies*, 72(2), 270-271.
14. ONACIU, G., E. JURCO, L. OGNEAN, 2016, Appreciation of the Mammary Gland Health Status Based on the Quality Traits of Milk Obtained from Friesian-Black Spottred Breed. *Bulletin UASVM Animal Science and Biotechnologies* 73(1), 1-6.
15. ONACIU, G. 2013, Creșterea bovinelor - *Editura Casa Cărții de Știință, Cluj - Napoca*
16. RĂDUCU, Camelia, Vioara MIREȘAN, Mirela CADAR, O. NEGREA, Dana PUSTA, I. IURCA, Aurelia COROIAN, I. FEȘTILĂ, D. COCAN, R. CONSTANTINESCU, 2012, Study on the Quality of Raw Milk Collected from Different Collecting Centers of Bistrița-Năsăud County. *Bulletin UASVM Animal Science and Biotechnologies* 69(1-2): 337-338.
17. RĂDUCU, Camelia, Vioara MIREȘAN, Aurelia COROIAN, C. POP, O.C. COROIAN, D. COCAN, Liuza ANDRONIE, 2016, Study on the Milk Quality Parameters in Three Farms from Sălaj County. *Bulletin UASVM Animal Science and Biotechnologies*, 73(2), 256-258.
18. RAFIQ, S., N. HUMA, I. PASHA, A. SAMEEN, O. MUKHTAR, M.I. KHAN, 2016, Chemical composition, nitrogen fractions and amino acids profile of milk from different animal species, *Asian-Australas Journal of Animal Science*, 29(7), 1022-1028.
19. RANA, J. and J. PAUL, 2017, Consumer bedhavior and purchase intention for organic food: A review and research agenda. *Journal of Retailing and Cosumer Services*, 38, 157-165.
20. RIECKA, Z. and J. CANDRÁK, 2011, Analysis of relationship between production and reproduction triaits of Holstein cattle population in the Slovak Republic. *Scientific Papers Faculty of Animal Sciences and Biotechnologies, Timișoara*, 44(1), 332-336.
21. ROMAN, G.V 2010, Situația Agriculturii Ecologice în România, cited by Vietoris et al, 2016.
22. SCOZZAFAVA, G., F. GERINI, F. BONCINELLI, C. CONTINI, E. MARONE, L. CASINI, 2020, Organic milk preference: is it a matter of information?. *Appetite*, 144, 104477.
23. UJICĂ, V., C. MACIUC, I. NISTOR, 2007, Managementul creșterii vacilor de lapte *Edit. Alfa Iași*
24. VELEA, C. și G. MUREȘAN, 2012b, *Tratat de creștere a bovinelor. Volumul 2*, ISBN 978-973-53-0896-4, *Editura Risopront Cluj*.

25. VIETORIS, V., D. KOZELOVÁ, M. MELLEN, M. CHRENEKOVÁ, J.E. POTCLAN, M. FIKSELOVÁ, P. KOPKÁŠ, E. HORSKÁ, 2016, Analysis of consumer preferences at organic food purchase in Romania. *Polish Journal of Food and Nutrition Science*, 66(2), 139–146