

# ANALYSIS OF AVERAGE VALUES AND VARIABILITY OF LACTATION PRODUCTION INDICES IN THE BROWN BREED POPULATION FROM THE AREA OF BOTOSANI COUNTY

R.G. Mihalache<sup>1</sup>, I. Gîlcă<sup>1</sup>, R.N. Rațu<sup>1\*</sup>

<sup>1</sup>Iasi University of Life Science „Ion Ionescu de la Brad”, Romania

## Abstract

*The Brown breed is mostly found in hilly and submontane areas, especially in the counties of Neamț, Bacău, Vrancea, Buzău, Prahova, Argeș, Vâlcea, and Mehedinți. This distribution area follows the path of the Carpathian Mountains and starts at the N-V of Maramures. One of the main goals of the field researchers was to raise, through development, both milk output and its quality.*

*For these reasons, the research was carried out in accordance with the Brown breed's household exploitation system, one of the most common breeds raised in the Moldovan region. The study used a total of 404 animals that were officially recorded in the production control inside the Botosani county selection facilities.*

**Key words:** *quantity, production, fat*

## INTRODUCTION

The importance of raising and exploiting bulls in the national agricultural economy can be highlighted by aspects such as (Ledinek Maria, 2018):

- Growth in any region through appropriate technologies, due to the specificity of the digestive system (ruminants);
- The effective utilization of the vegetative mass obtained both on natural meadows and from the culture of field plants.
- Obtaining high productions of milk and meat, depending on the specifics of each breed and appropriate growing and exploitation conditions (Acatincai, Csiszter, 2010).

For these reasons, cattle occupy an important place in the total number of livestock raised and exploited globally, with a percentage of approximately 35% of global agricultural production (Cecchinato et al. 2015; Brown Breed Association).

The current situation in the breeding and exploitation of cattle as well as the continuous trends to increase productions have the following in mind (Gîlcă, 2006):

- the production potential of the biological material;
- the ability to improve the biological material;
- the adoption of more efficient growth and exploitation technologies;
- specialization and concentration of productions;
- production valorization methods;
- increasing the economic efficiency of productions.

In this context, the research carried out in this work also falls into place, through which we aimed to contribute to the knowledge of the current stage of breeding and exploitation of the Brown breed bulls in the N-E area of Romania (Mihalache Roxana et al., 2019).

However, the Brown breed began to be exploited in approximately all the counties of N-E Romania, one of the main objectives of the researchers in the field was to increase, through improvement, both milk production and its quality. Therefore, milk production is to be 5500 kg with 4% fat and 3.4% protein content and 220Kg fat and 187 kg protein respectively (Marchiș et al., 2014; Șonea et al., 2016). For these reasons, in this paper, we follow the results recorded by farms in Suceava county regarding the average values and the variability of production indices for

\*Corresponding author: roxana.ratu@uaiasi.ro

The manuscript was received: 12.10.2022

Accepted for publication: 13.12.2022

the population of Brown bulls in the area of Suceava county.

## MATERIAL AND METHOD

The research was carried out in accordance with the household exploitation system of the Bruna de Maramureş breed, one of the most common breeds raised in the Moldovan region. The study used a total of 404 animals that were officially recorded in the production control inside the Suceava county selection facilities (Santus, Ghiroldi, 2005).

Through the management of the technological factors of production, the degree of technical equipment, the labor force as well as the method of capitalizing the production, the number of cows in this area were raised, fed, maintained, and exploited in private households that differed in terms of ensuring the fodder base and the structure of the rations (Bielfeldtak et al., 2006).

The research involved performing investigations at the macroeconomic level and using various information sources to create a sample. Interviewing the breeders allowed researchers to collect data and information not included in the most recent statistics. The information acquired on the primary biological components, technological managerial, and economic determinants was systematized,

processed, and evaluated both at the macroeconomic level and at the sample level (Scurtu, Blaj, 2005; Dascălu et al., 2011; Wiggans et al., 2017).

The electronic data processing was carried out in the EXCEL program and the phenotypic parameters of the analyzed population were estimated based on the calculation of sample statistics: mean ( $\bar{X}$ ), variance ( $S^2$ ), standard error of the mean ( $S\bar{X}$ ), standard deviation ( $S$ ) and coefficient of variation ( $V\%$ ) (Confederate Margareta et al., 2005).

## RESULTS AND DISCUSSIONS

In the following, the results are presented regarding the productive performances obtained for the first six lactations of the bulls of the Brună breed distributed over the area of Botosani county.

Therefore, for the duration of the total lactation, it can be observed that The duration of the total stay recorded values between  $367.17 \pm 13.63$  days and  $318.28 \pm 13.23$  days, the highest value was found in the first lactation and the lowest in the second lactation (fig. 1.). As for the values of the variance of the standard deviation as well as those of the coefficient of variation were very high, a fact that gives the analyzed population a very heterogeneous character.

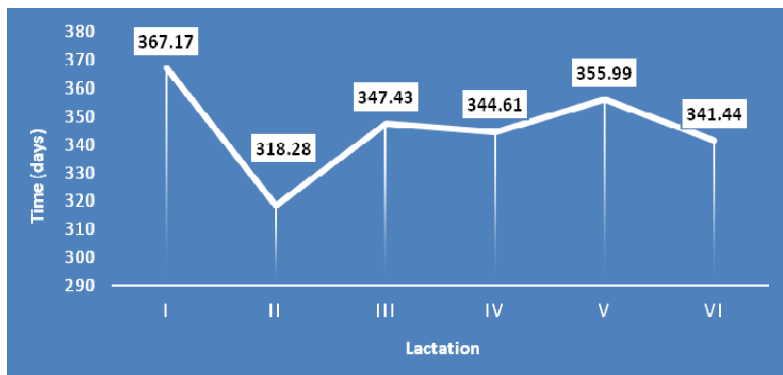


Fig. 1 Average values of the total duration of the milking season

The data on the duration of normal lactation on successive lactations show that it was higher compared to standard lactation which has a number of 305 days.

Regarding normal milk production during normal lactation depending on the sequence

of lactations, the average values were between  $2976.37 \pm 215.67$  kg (at lactation I) and  $3443.62 \pm 181.60$  kg at lactation V, value which also represents the maximum lactation from the VI lactations analyzed.

Noteworthy is the amplitude of variability that presents extreme limits varying between 39.58 kg and 94.66 kg; therefore, the values of the variance of the standard deviation as well as those of the coefficient of variation highlight the variability of the batches, which is very high, a fact that gives the population a very heterogeneous character. All these aspects highlight the fact that in the area of Botosani county there is the possibility of selection and genetic improvement by

retaining more variants and multiplying in the reproduction process of valuable genotypes.

The analysis of the variation string for the amount of milk in the first normal lactation highlights the fact that 2.70% of the analyzed population recorded amounts between 705 - 1071 kg of milk; 39.18% of the bulls studied had to milk production between 1803 kg and 5097 kg and the difference, respectively 58.12%, recorded values that were between 5013 kg and 7516 kg (tab. 1. and fig. 2.)

Table 1 Variability of the milk production per first normal milking season, for the Brown breed population from Botosani country

Min. – Max.	Absolute frequency	Relative frequency
705.00 – 1071.10	2	2.70
1071.10 – 1437.20	1	1.35
1437.21 – 1803.30	3	4.05
1803.31 – 2169.40	3	4.05
2169.41 – 2535.50	2	2.70
2535.51 – 2901.60	1	1.35
2901.61 – 3267.70	0	0
3267.71 – 3633.80	3	4.05
3633.81 – 3999.90	4	5.41
3999.91 – 4365.00	6	8.11
4365.01 – 4731.10	4	5.41
4731.11 – 5097.20	3	4.05
5097.21 – 5463.30	3	4.05
5463.31 – 5828.40	5	6.76
5828.41 – 6195.50	29	39.19
6195.51 – 6561.60	3	4.05
6561.61 – 6927.70	2	2.70

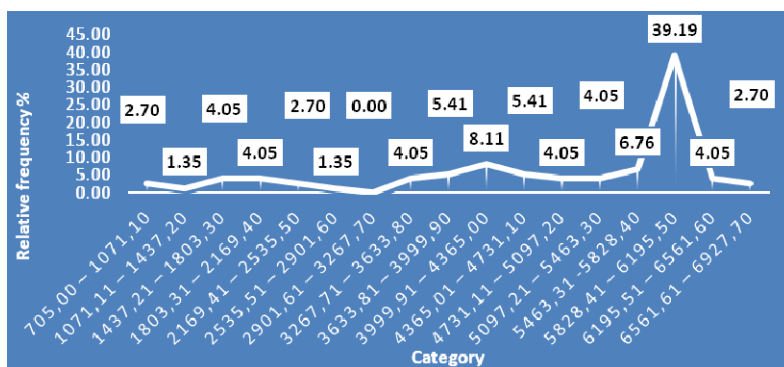


Fig. 2. The range of variation for the quantity of milk, at the first normal lactation, for the Brown breed from the Botosani country

The analysis of milk production on successive lactations highlights the fact that also in the Brown breed bulls from the area of Botosani county there is a good productive

precocity, given the fact that in the first lactation a percentage of 84.24% of the maximum lactation was achieved (fig. 3)

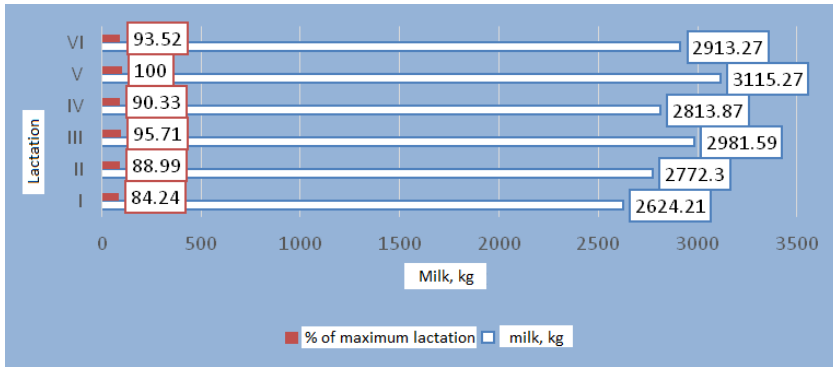


Fig. 3. Variability of the average milk productions per successive milking season

Fat content in normal lactation recorded values between  $3.74 \pm 0.04\%$  in the first lactation and  $3.55 \pm 0.04\%$  in the second lactation.

Therefore, the graphic analysis of fat content variability highlights the fact that in the population of Brown bulls from the area of Botosani county there is 32.43% plus variants

with a fat level higher than 4.07%, while among the individuals of the population that have a fat content between 3.31% and 4.06% are in the proportion of 29.37%; the difference up to 100% is represented by 35.13 plus variants that have a fat content of less than 3.7% (tab. 2. and fig. 4.)

Table 2 Variability of fat content, per first normal milking season, for the Brown breed population from Botosani county

Min. – Max.	Absolute frequency	Relative frequency
2.90 – 3.00	2	2.70
3.01 – 3.10	3	4.05
3.11 – 3.20	3	4.05
3.21 – 3.30	3	4.05
3.31 – 3.40	5	6.76
3.41 – 3.50	4	5.41
3.51 – 3.60	3	4.05
3.61 – 3.70	5	6.76
3.71 – 3.80	22	29.73
3.81 – 3.90	9	12.16
3.91 – 4.00	8	10.81
4.01 – 4.10	7	9.46

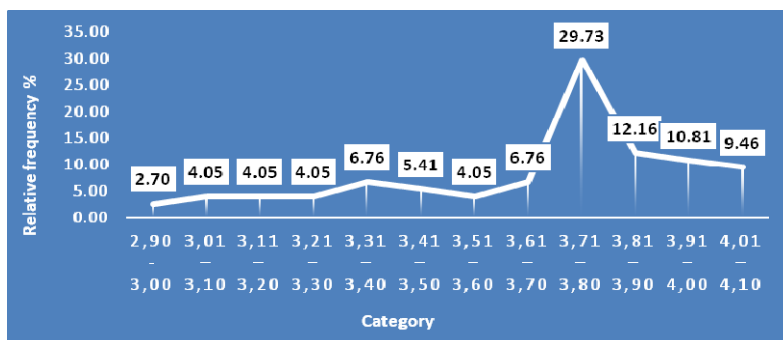


Fig. 4 The range of variation for the fat content, at the first normal lactation, for the Brown breed from the Botosani county

The results regarding the protein content of the Brown breed taurine population from the area of Botosani county are highlighted by milk rich in proteins, which is a characteristic of the breeds from the Schwyz strain.

Table 3 shows the variability of the protein content in lactation I; from the data presented, the marked variability of the population can be highlighted, there are also variants with a protein content between 3.81% and 3.90% (fig. 5.).

Also, 32.43% of the analyzed individuals recorded protein content values between 2.30% and 3.20%; 12.16% of the studied population presented values for the protein level between 3.21% and 3.30%, respectively 21.62% had values that varied between 3.31% and 3.40%, respectively 28.27% of the studied population presented values of protein content between 3.41 and 3.90%.

Table 3 Variability of the protein content per first normal milking season, for the Brown breed population from Botosani country

Min. – Max.	Absolute frequency	Relative frequency
2.30 – 2.40	1	1.35
2.41 – 2.50	2	2.70
2.51 – 2.60	1	1.35
2.61 – 2.70	2	2.70
2.71 – 2.80	3	4.05
2.81 – 2.90	4	5.41
2.91 – 3.00	4	5.41
3.01 – 3.10	5	6.76
3.11 – 3.20	6	8.11
3.21 – 3.30	9	12.16
3.31 – 3.40	16	21.62
3.41 – 3.50	7	9.46
3.51 – 3.60	6	8.11
3.61 – 3.70	3	4.05
3.71 – 3.80	3	4.05
3.81 – 3.90	2	2.70

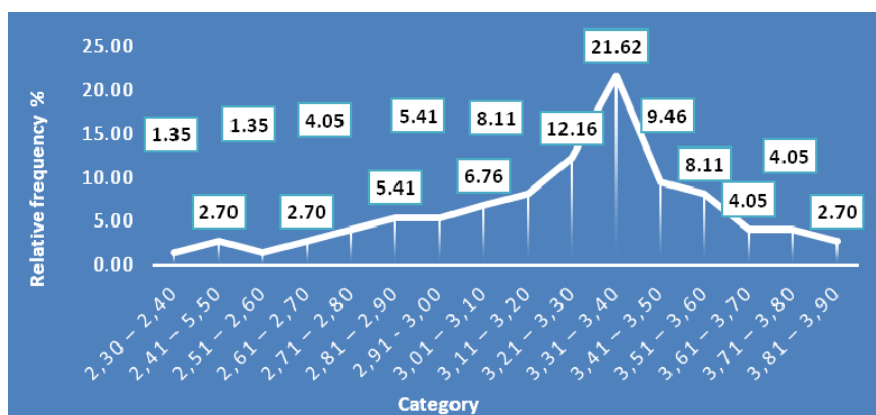


Fig. 5. The range of variation for the protein content, at the first normal lactation, for the Brown breed from the Botosani country

## CONCLUSIONS

Summarizing the results of the conducted research, the conclusion emerges that the Brown bulls are relatively well adapted to the environmental conditions specific to the area, but the productive performances are often modest and highly differentiated from one farm to another. The wide variability of productive and reproductive traits offers increased possibilities for genetic improvement using modern criteria and methods.

Raising the productive genetic potential will be done through the intensive use of bulls of high genetic value, as the main source of genetic progress in bull populations. It is necessary to improve the technology and the level of growth of the replacement youth, the reproduction management, the exploitation technology and the management of the technological and economic factors.

## REFERENCES

1. Acatincăi, Stelian, Csiszter, L. T., (2010). Animal productions - Cattle productions Guide to practical works, Agroprint Publishing, Timișoara.
2. Bielfeldtak, J.C., Tölle, H., Badertscher, J., (2006). Longevity of Swiss Brown cattle in different housing systems in Switzerland, *Livestock Science*, vol. 101, issues 1–3, pages 134-141.
3. Cecchinato, A, Chessa, S., Ribeca, C., Cipolat, C., Bobbo, T., Casellas, J., Bittante, G. (2015). Genetic variation and effects of candidate-gene polymorphisms on coagulation properties, curd firmness modeling and acidity in milk from Brown Swiss cows. *Animal*, vol. 9, no. 7, p. 1104 – 1112.
4. Confederate, Margareta, Bazgan, Olimpia, Maciuc, V. (2005). Practical manual for animal hygiene, Tehnopress Publishing, Iași.
5. Dascălu, C., Bogdan, A.T., Șonea, A, Tăpăloagă, P.R., Chelmu, S.S., Șonea, C, Burlacu, R., Constantinescu, I., Ilie C., Dascălu, Elisabeta, Claudia, Nastasie, Ș., Tapus, D. (2011). The influence of technological factors on cow milk production in zootechnic ecosystems from Vrancea County in Romania. *Recent Researches in Energy and Environment*, pag. 248 – 254.
6. Gîlcă, I., (2006). Comparison of milk yield between Romanian Brown breed and Braunvieh breed imported from Germany, in different small private exploitation in the North-East of Romania. *Universitatea de Științe Agricole și Medicină Veterinară Iași, Lucrări științifice, seria Zootehnie*, vol. 49.
7. Ledinek, Maria, Gruber, L., Steining, F., Zottl, K., Krimberger, K.. (2018) Analysis of lactating cows in commercial Austrian dairy farms: diet composition, and influence of genotype, parity and stage of lactation on nutrient intake, body weight and body condition score. *Italian Journal of Animal Science*, vol. 18, no. 1, p. 202-214.
8. Marchiș, Z., Muresan G., Ladosi, D., Negrea, O., Câmpean, A., Vlasin, I., (2010). Study on the main milk production phenotypic traits in Brown cattle breed reared in Maramures Count, *Bulletin of University of Agricultural Sciences and Veterinary Medicine Cluj-Napoca. Animal Science and Biotechnologies*, vol. 67, no.1/2, p. 243-248.
9. Mihalache, Roxana Georgiana, Rațu, Roxana Nicoleta, Ciobanu, M.M., Gîlcă, I. (2019).. Characterization of qualitative performances obtained by Brown breed exploited in Neamț county, Romania. *Journal of Biotechnology*, vol. 305, pp. S49 Valencia, Spain.
10. Santus, E., Ghiroldi, S. (2005). Milkability genetic evaluation in Brown Swiaa: an international approach. *ANARB – Italian Brown cattle breeders Association*, p. 25-27.
11. Scurtu, I., Blaj, A.V., (2005). Cercetări privind calitatea furajului și prelucrarea superioară a laptelui, *Analele IBNA* vol. 21, p. 22-27.
12. Șonea, C., Roșu, I., Nistor, C., Dolîș, M., Costea, D., Dascălu, C., Stoican, Mirela, Gheorghîță, Maria, Enache, Carmen, Șonea, Cristina, Mirea, Camelia (2016). Preservation of the biodiversity of domestic animals in Romania in a European context. *Biodiversity in the context of climate change*, First edition, p. 93-97.
13. Wiggans, G., Cole, J. Hubbard, Suzanne, Sonstegard, T. (2017). Genomic Selection in Dairy Cattle: The USDA Experience. *The Annual Review of Animal Bioscience*, vol. 5, p. 309-327.
14. \*\*\*Brown Breed Association, <https://www.brownswissusa.com/>