

Comparative Study on Milk Production Dynamics and Precocity in Brown Cows of Brown Swiss Type and Romanian Spotted Cows of Fleckvieh Type

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Abstract

The aim of this study was to assess the milk production dynamics in one dairy farm rearing both Brown and Romanian Spotted breed cows. The study was carried out at the Research and Development Station for Bovine Raising Arad, on 321 lactations obtained from Romanian Spotted cows and 117 lactations from Brown cows. These lactations were classified according to the age of cows in first, second, third, fourth and fifth lactation. The milk yield in the first lactation was the lowest both in Romanian Spotted and Brown cows (5745.86 kg and 7117.00 kg, respectively), while the maximum milk yield per lactation was produced in the fourth lactation by the Romanian Spotted cows (6692.81 kg) and in the fifth lactation by Brown cows (7898.19 kg). Romanian Spotted cows produced 85.85% milk in the first lactation from the maximum lactation, while the Brown cows produced 90.11% in the first lactation from the highest lactation. There was concluded that there are differences regarding the precocity for milk production and the dynamics from one lactation to another between the two breeds.

Keywords: Brown, cows, milk production, precocity, Romanian Spotted.

1. Introduction

Milk is a physiological secretion of the mammary gland, being considered the perfect food due to its fat, protein, vitamins and minerals content [1]. Each milk chemical component has an essential role in organism development and health [2]. The fat and protein content of milk is affecting the milk price. Chemical composition of the milk is influenced by a great number of internal and external factors such as parity, feeding level, ration composition, genetic potential of cows, breed, type etc. [3].

Milk production differs from one lactation to another, being influenced by a number of factors [1,2]. A great influence on the milk production has

the genetic potential of the cows, the type of metabolism and breed. During the productive life, milk production increase from lactation to lactation up the maximum lactation, then decrease until the cow is culled [3]. Thus, the lowest milk production is observed at the first lactation. The local genetic improved breeds reach the maximum production at lactations 3 to 5. In practice we would like to obtain the highest possible production in the first lactation, very close to the maximum lactation, to reach the maximum lactation at an early age, and then the drop in milk production to be minimal as cows get older.

Causes of the milk production variation from one lactation to another are metabolism intensity, udder volume and structure, digestive tract capacity [4].

The aim of this paper was to evaluate the differences regarding the precocity for milk

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production between two dairy cattle breeds reared in the same conditions.

2. Materials and methods

The study was carried out at the Research and Development Station for Bovine Arad on two breeds Romanian Spotted of Fleckvieh type and Brown of Brown Swiss type.

A number of 321 lactations were taken into consideration from the Romanian Spotted cows, distributed according to the parity as follows: 52 first lactations, 66 second lactations, 81 third lactations, 79 fourth lactations, and 43 fifth lactations [5]. For Brown cows a number of 117 lactations were studied as follows: 15 first lactations, 22 second lactations, 26 third lactations, 28 fourth lactations, and 26 fifth lactations [6].

Data regarding milk production per normal lactation was statistically computed and differences between the two breeds, as well as among lactations were tested using *t* (Student) test.

3. Results and discussion

Milk production dynamics by lactation number in Romanian Spotted cows is presented in Table 1. On average, the Romanian Spotted cow population produced 6081.2 kg milk. The lowest milk production was observed in the first lactation, 5745.8 kg, increased to 5821.0 kg in the second lactation, in the third lactation was 5980.1 kg and reached the maximum production in the fourth lactation 6692.8 kg. After the fourth lactation the milk production decreased to 6166.2

kg in the fifth lactation. Differences from one lactation to another were statistically significant ($p < 0.05$), except for the difference between the first and second lactation. This was somehow in contrast with what we know from the literature [4] that the highest production increase is observed between the first and the second lactation.

The maximum production was attained in the fourth lactation, which was very good for this breed, showing a high precocity for milk production. Also, the cows in first lactation produced 85.85% of the maximum lactation demonstrating a very high precocity for milk production, because usually in this breed the first/maximum lactation ratio is 65-70%. This should be the reason that the difference between the first and the second lactation did not reached the significance level.

After the maximum lactation, the milk production decrease, but to a lower ratio compared to production increase up to the maximum lactation. This decrease in production after reaching a maximum level is due to the ageing process, reducing the intensity of the vital functions, the fed intake capacity, digestion capacity and reducing the epithelial cells capacity to re-establish the alveolar system of the mammary gland [4].

Table 2 presents the averages in dynamics for milk production in Brown cow population. The average milk production of the Brown cows was 7511.6 kg. Again, the lowest production was obtained in the first lactation, 7117.0 kg, and then the production increased to the maximum production observed in the fifth lactation 7898.2 kg. Differences among lactations were statistically significant ($p < 0.05$), except for the production between the fourth and fifth lactation.

Table 1. Means and dispersion indices for milk production (kg) per normal lactation in Romanian Spotted cows

Lactation	n	Average \pm SEM	SD	V%	% of maximum lactation
1	52	5745.86 \pm 69.26 ^a	499.45	8.69	85.85
2	66	5821.06 \pm 58.97 ^a	479.06	8.22	86.92
3	81	5980.11 \pm 52.24 ^b	470.18	7.86	89.36
4	79	6692.81 \pm 55.08 ^c	489.61	7.31	100.00
5	43	6166.20 \pm 54.58 ^d	357.93	5.8	92.14
Total	321	6081.21 \pm 25.63	459.25	7.58	-

Averages with different letter superscript were statistically significant ($p < 0.05$)

Table 2. Means and dispersion indices for milk production (kg) per normal lactation in Brown cows

Lactation	n	Average \pm SEM	SD	V%	% of maximum lactation
1	15	7117.06 \pm 42.61 ^a	165.01	8.98	90.11
2	22	7460.00 \pm 42.43 ^b	199.03	12.51	94.45
3	26	7237.07 \pm 30.04 ^c	153.19	10.79	91.63
4	28	7846.00 \pm 37.89 ^d	200.50	13.52	99.34
5	26	7898.19 \pm 46.39 ^d	236.57	15.27	100.00
Total	117	7511.65 \pm 17.65	190.86	12.21	-

Averages with different letter superscript were statistically significant ($p < 0.05$)

Regarding the precocity for milk production a different situation was observed in Brown cows compared to Romanian Spotted cows. Thus the milk production in the first lactation was 90.1% compared to the maximum lactation, but the maximum lactation was produced later in the cow's life, in the fifth lactation. These differences between the two breeds come from the fact that Romanian Spotted breed is focused mainly on beef while the Brown cows are reared, mainly for milk production, although both are dual-purpose breeds.

Differences between the two breeds regarding the milk production in each lactation are presented in Table 3.

Table 3. Differences between the Brown (+) and Romanian Spotted (-) breeds for milk production (kg) by parity

Lactation	Difference and statistical significance
1	1371.20**
2	1638.94***
3	1256.96***
4	1153.19***
5	1731.99***

In all lactations, the Brown cows produced significantly more milk than Romanian Spotted cows, by an average of 23%, this production superiority ranging from 17% in fourth lactation to 28% in the second and fifth lactations.

4. Conclusions

In both breeds, Romanian Spotted and Brown, the lowest milk production was obtained in the first lactation.

The maximum production was obtained in the fourth lactation in Romanian Spotted cows and in the fifth lactation in Brown cows.

Generally, the milk productions among lactation were significantly different in both breeds.

Brown cows produced, on average, 23% more milk per lactation than Romanian Spotted cows.

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