

RESEARCH ON PRODUCTION AND REPRODUCTION CAPACITY IN A GERMAN FLECKVIEH CATTLE BREED

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Abstract

In this paper we present the research results on a herd of 145 Fleckvieh cows with the aim of production and reproduction capacity. The objectives of the research were: duration of total and normal lactation, milk quantity, fat percent and quantity, protein percent and quantity, age of first calving (days), breast rest (days), calving-interval (days), service-period (days), duration of gestation (days) etc. The population had 5628.01 kg of milk per total lactation (in the second lactation), and the quality of milk had over 4% fat and over 3.4% protein. Following the evolution of milk production on successive lactations indicated 91.81% of normal lactation. For the studied herd, the age at first calving was 835.49 days (27 months and 25 days); the calving-interval (CI) on successive lactations ranged between 469.45 days (lactation II-III) and 397.17 days (lactation VII-VIII); breast rest (MRI) on successive lactations, ranged between 76.58 days (lactation II) and 64.67 days (lactation VIII), recording optimal values for all lactations; the service-period (SP) showed average values that far exceed the average values in a normal holding. Depending on lactation, they ranged from 186.45 days (lactation III) to 110.17 days (lactation VIII).

Key words: precocity, production, reproduction, cows, milk

INTRODUCTION

Young females intended for reproduction and milk production must undergo physiological puberty under normal conditions and reach the optimum age for introduction to reproduction. These aspects refer to: the normal development of the organism, the reproductive function, the level of the subsequent economic productions, the state of health [1], [3], [8]. The reproduction conditions the economic production of cattle.

Reproductive effects are significant on economic production. Thus a normal reproduction at farm level means more milk, more meat and implicitly higher profits. Reproduction is the tool by which the breeding process is carried out. Maximizing genetic progress is achieved through the intensive use of breeding bulls as artificial insemination and embryo transfer. Artificial inseminations increase the breeding level by selection pressure of high valuable breeders, and also the female load for every bull, the

establishment of gene banks with seminal biological material of high genetic value, international exchanges of breeders, substitution of a better breed etc. [9, 4, 5, 6, 7].

The breeding activity of the cattle influences the structure of the herd, the intensity of the selection, and the selection response, allowing the optimization of the selection plan. Regarding all these aspects, we overlooked the production and reproduction capacity of German Fleckvieh cattle breed [11, 12, 13].

MATERIAL AND METHOD

The research was carried out on a large herd in a half-intensive system for the exploitation of Fleckvieh dairy cows in Moldova area. The studied biological material consisted in registered cows of the official control of production in Bacău County. The studied flock was 145 Fleckvieh individuals. This group was analysed regarding the genetic value of the biological material, the technologies of reproduction, feeding, breeding and the management of the technological factors of exploitation. This paper highlights the results of production and

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reproduction capacity of the studied group, and it will be presented a series of indicators such as: duration of total and normal lactation, quantity and percent of fat and protein, age of first calving (days), breast rest (days), calving interval (days), service period (days), duration of gestation (days) etc. The data came from direct observations and determinations, as well as from the primary database of the farm, and also from the Official Control of Production system (COP) carried out by the Association of Cattle Breeders. All data were statistically processed and synthesized in tables and figures [10, 13, 14].

Increasing the genetic potential and productivity of cattle populations, while optimizing farming technologies in small and

medium-sized family farms, proper management and economic management, it is possible to have bigger milk and meat production.

RESULTS AND DISCUSSIONS

The average duration of total lactation ranged between 384.24 days, for the third lactation and 334.2 days for the eighth lactation, and it had a high individual variability. The analysis of the variation in lactation I (fig. 1) shows that 35.83% of the individuals had a total lactation duration of 291 to 362 days, and 64 individuals (29.2%) had a total lactation over 400 days, with a maximum limit of 680 days.

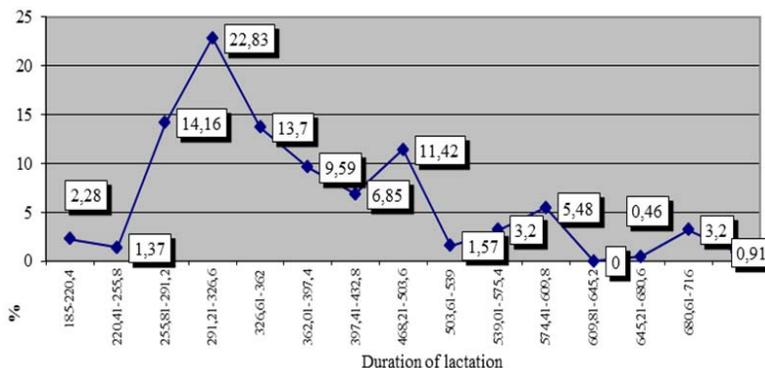


Fig. 1 Variability of total lactation duration in the first lactation

Depending on the sequence of lactations, it was observed that, as over time, there is a tendency of the lactations to get shorter and to approach the normal duration (of 305 days), due to the influence of the management applied in the farm. The duration of total lactation influenced milk production as it will be noticed below. The average amount of milk per total lactation ranged between 5628.01 kg, in the second lactation and 4237.5 kg in the VIII lactation. The total lactation curve registers an ascent in the first three lactations, followed by a descending phase until the VIII lactation, when the lowest production is registered. The maximum value of lactation, of 5628.01 kg of milk, was registered in the second lactation, which highlights a good productive precocity (84.6% in the first lactation) of the

Fleckvieh breed nucleus. However, the individual variability was high, the coefficient of variation exceeding 42%, and the individual performances having the maximum value of 14,320 kg of milk in the second lactation. Milk quality analysis based on fat and protein content shows that Fleckvieh cows produced quality milk with more than 4% fat and over 3.4% protein. Thus, the average fat content had a maximum value of 4.18% in the 5th lactation and a minimum of 4.07% in the 7th lactation. The individual variability was high in the population there being individuals with a minimum content of 2.94% fat and a maximum of 5.16%. The existence of a significant number of surpluses, with a content of over 4% fat is favourable to the improvement of this qualitative feature by

selection considering the high heritability. The average protein content was between 3.44% and 3.39%, which attests to the superior quality of the milk obtained. The data obtained are very useful in the process of selection and genetic improvement of milk quality, given the strong genetic determinism of this trait. The individual variability was accentuated, with limits between 2.26% and 4.55%. Corresponding to the amount of milk and the fat and protein content, respectively, the average amount of fat was between 235.2 kg (I lactation) and 173.86 kg (VIII lactation), and the average amount of protein between 188.11 kg (III lactation) and 131.96 kg (VIII lactation). The analysis of milk production indices based on normal lactation highlights aspects similar to total lactation. The average duration of normal lactation ranged between 300.87 days (I lactation) and

277.74 days (VII lactation), which means that the variability of this index was high, as it results from the estimated values of variability (s and $V\%$). The average amount of milk per normal lactation ranged between 4755.37 kg (II lactation) and 3924.3 kg (VIII lactation); a very pronounced individual variability was observed (table 1). In the analysed population there were cows with performances of over 8000 kg of milk, and even with 9131 kg of milk (maximum production was in the second lactation). The existence of these examples proves the high genetic potential for milk production of the Fleckvieh group from the Șerbești farm and also the possibility of genetic improvement using skilfully the genotypic and phenotypic selection. If we compare milk production by total and normal lactation, we will find significant differences as shown in table 1.

Table 1 Milk production on total lactation and normal lactation

Lactation	Total	Normal	The difference	
	Milk, kg	Milk, kg	Absolutely, kg	Relative, %
I	4761.70	4007.88	753.82	15.83
II	5628.01	4755.37	872.64	15.50
III	5566.32	4717.61	848.71	15.24
IV	5052.62	4483.77	568.85	11.25
V	4919.39	4217.59	401.80	8.69
VI	4543.49	3896.39	647.10	14.24
VII	4709.16	4177.16	532.00	11.29
VIII	4237.50	3924.30	313.20	7.39

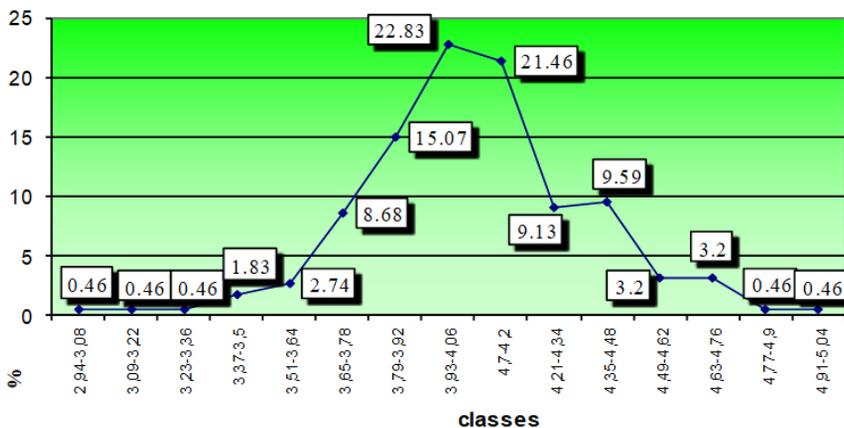


Fig. 2 Variability in fat content at first lactation

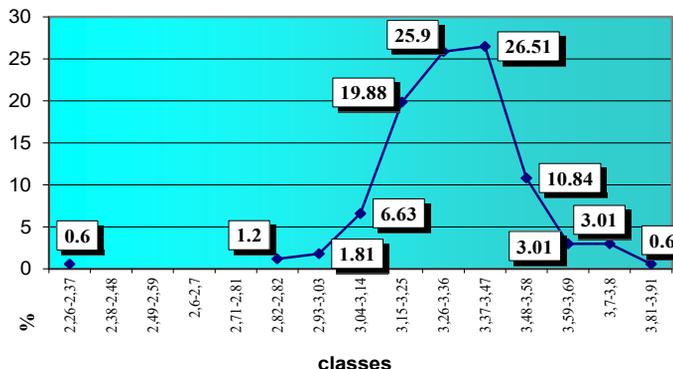


Fig. 3 Variability in protein content at first lactation

Regarding milk quality, fat content does not differ significantly between total and normal lactation depending on number of lactation. Similarly happens with the protein content, even if there are no significant differences, the two components of milk quality have slightly lower values on normal lactation than on total lactation. The variability of fat and protein content is shown in figure 2 and 3. Corresponding to the fat and protein content, the amount of fat and protein in normal lactation differs significantly compared to total lactation, the differences having the same order of magnitude as for the amount of milk. For the analysed farm, at the Fleckvieh breed nucleus, the reproduction indices on successive lactations are presented in table 2 and figure 4 to 7. The analysis of the age at first calving (VPF) showed that it was 835.49 days (27 months and 25 days), with limits between 579 and 990 days. The average

value of age at the first calving shows a good reproductive precocity of the studied population, but the variability of this indicator is very high, as it is observed from the graphical representation. Most cows at first foal (60.08%) were aged at the first calving between 761 days and 944 days (table 2 and figure 4), proving a good reproduction precocity. At the same time in the analysed population, there were 23 cows (7.99%) that had at the age of first calving over 31 months, with a maximum limit of 990 days (33 months), which shows a normal increase in female breeding youth, and also proper management. The existence of two cows that gave birth at the age of 19 months and 9 days, is a particular situation that can be considered accidental. However, the results for this main reproductive indicator prove a good reproductive precocity and a superior genetic quality of the young breeding females.

Table 2 Average values and variability of reproductive indices on successive lactations of the Fleckvieh population, from the studied farm

Sample statistics		n	\bar{X}	$S^2_{\bar{X}}$	s	V%	Min	Max
Age of first calving, days		288	835.49	4.578	77.692	9.299	579	990
CI days	I-II	185	459.89	9.108	123.886	26.938	285	894
	II-III	130	469.45	11.576	131.981	28.114	313	953
	III-IV	93	433.46	10.021	96.639	22.295	328	881
	IV-V	45	427.18	13.262	88.966	20.826	322	779
	V-VI	26	421.38	16.984	86.601	20.551	302	634
	VI-VII	16	419	26.83	107.322	25.614	270	702
	VII-VIII	6	397.17	15.743	38.561	9.709	358	445
RM days	II	192	76.58	3.954	54.785	71.536	3	209
	III	131	71.19	1.784	20.418	28.68	10	105
	IV	94	72.44	2.238	21.694	29.949	13	117
	V	42	70.67	3.127	20.264	28.675	35	129
	VI	26	76.38	5.617	28.641	37.496	12	128
	VII	16	68.56	7.745	30.982	45.187	25	118
	VIII	6	64.67	8.168	20.007	30.938	47	91
SP days	I	185	176.84	9.833	133.739	75.626	35	815
	II	185	176.84	9.833	133.739	75.626	35	815
	III	130	186.45	11.575	131.977	70.785	29	662
	IV	94	154.26	11.493	111.427	72.235	45	676
	V	43	110.47	10.582	69.388	62.814	40	294
	VI	26	136.31	16.057	81.874	60.066	21	343
	VII	16	138.44	24.942	99.768	72.067	34	422
	VIII	6	110.17	17.013	41.672	37.826	71	166

Legend=CI-calving interval, SP-service-period, RM-breast rest

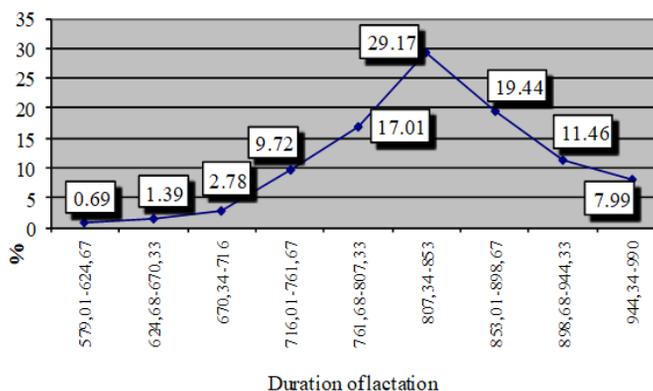


Fig. 4 Age at first calving variability (VPF) in the present Fleckvieh population

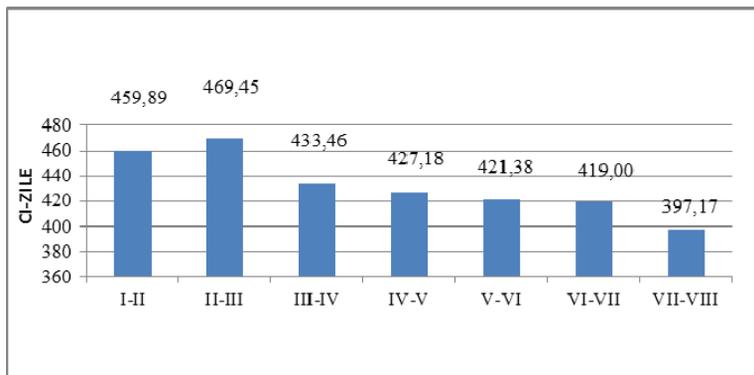


Fig. 5 Variability of the calving-interval parameter, in successive lactations

The calving-interval (CI) on successive lactations (table 2 and 5) ranged between 469.45 days (II and III lactation) and 397.17 days (VII and VIII lactation), exceeding the optimal values in a normal operation. The individual variability for this reproduction index was very high, with extreme values of the standard deviation $s = 131.98$ days (II and III lactation) and $V\% = 28.11$; the limits ranged from 285 days to 894 days (I and II lactation) (table 2). The analysis of the range

of variation showed that 78 cows (42.16%) had the calving-interval parameter underneath 400 days, of which 4 heads (2.16%) under 300 days. The presence in the studied flock of a high percentage of individuals with a calving-interval parameter higher than 400 days, betrays some deficiencies in exploitation, especially the failure to detect optimal oestrus moment, the loss of heat cycles or some reproductive disorders.

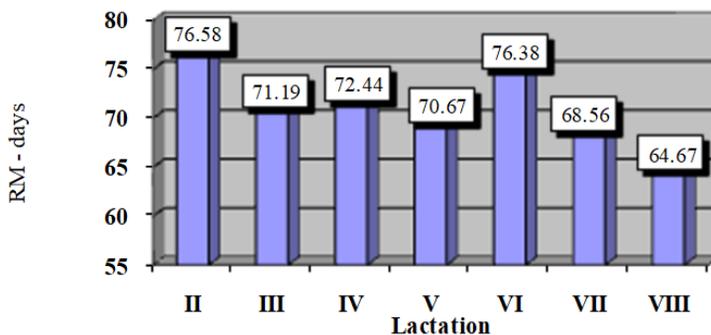


Fig. 6 Breast rest (lactation)

Breast rest (MRI), on successive lactations, ranged between 76.58 days (II lactation), and 64.67 days (VIII lactation), as shown in table 2 and fig. 6 This reproduction index recorded optimal average values for all lactations, but the individual variability was particularly accentuated, with the minimum variation limits between 3 days (II lactation) and maximum of 209 days (III lactation), which means there are sterile cows that did

not produce a calf or milk for more than a year (the cows were barren). There is also a tendency for breeders to extend the duration of lactation due to high daily milk production and the difficulty of weaning, especially in high-performance cows. It is a wrong practice that has negative consequences on the subsequent performance and on the entire productive life (milk and calves) of a cow.

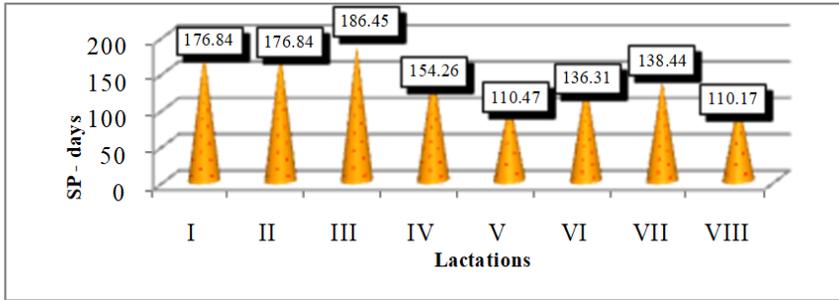


Fig. 7 Service-period on successive lactations

The service-period (SP) shows average values that exceeded the average values. Depending on lactation, the average values ranged from 186.45 days (III lactation) to 110.17 days (VIII lactation) (figure 7). The individual variability was particularly high, with extreme values of the dispersion indices, $s = 133.73$ days and $V\% = 75.62$ (table 2 and figure 7). Far exceeding the optimal term for sowing cows after calving (maximum four sexual cycles) has led to significant economic losses by the lack of achieving the number of calves and milk production, but also by additional costs for feeding and maintenance.

CONCLUSIONS

Following the study, the following conclusions can be drawn:

1. The population of imported Fleckvieh cows proved a good productive precocity (84.6% at the first lactation) - the maximum value was 5628.01 kg of milk per total lactation (in the second lactation). There were also cows with performances of over 8000 kg of milk and even with 9131 kg of milk. The quality of milk based on fat and protein content shows that Fleckvieh cows produced quality milk, with over 4% fat and over 3.4% protein.

2. Following the evolution of milk production on successive lactations, a first relevant aspect refers to the precocity of milk production, which is very good, at the first lactation achieving 91.81% of normal lactation.

3. For the studied herd, the age at first calving was 835.49 days (27 months and 25 days) which indicates a good reproductive

precocity of the studied production, but the variability of this indicator is very accentuated; the interval between calving's (CI) on successive lactations was between 469.45 days (lactation II-III) and 397.17 days (lactation VII-VIII) exceeding the optimal values in a normal operation; breast rest (MRI) on successive lactations, was between 76.58 days (lactation II) and 64.67 days (lactation VIII), recording optimal values for all lactations; the service period (SP) showed average values that far exceed the average values in a normal holding. Depending on lactation, they ranged from 186.45 days (lactation III) to 110.17 days (lactation VIII).

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