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Evaluation of Service, Perinatal Period and Milk Productivity of Fleckvieh Breed Cows in the Vamaks LLC Farm of the RA Syunik Region

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ABSTRACT

The data of the study indicate that the service period of the cows of the 4th-5th lactation is 5-58 days higher than the norm in the "Vamaks" LLC cattle farm of the Syunik region of the RA, and the coefficient of reproductive ability varies in the range of 86.3-98.6 %. Due to sterility, the loss of lactations in the 5th lactation is 16 and the loss of milk quantity is 126 tons.

We propose to identify and inseminate (mate) animals with sexual desire in a timely manner, as well as to establish strict veterinary control to monitor and regulate the service period of 4-5 calving cows.

Introduction

"Vamaks" LLC cattle farm in the Syunik region of the RA was built by the Federal Republic of Germany for breeding German breed Fleckvieh animals. It is equipped with modern facilities and a software control system. The departments are provided with the ideal conditions of livestock: hygiene and microclimate, year-round management conditions, and whole animal feeding (Berry, 2014). Farm animals' reproduction is guided by a complex hormone system. Knowledge of the animals age, sexual cycle, the timing of insemination, and the physiological processes of the organism allow to properly organize reproduction and increase economic efficiency (Anisimova, 2008; Milovanov, 1962; Koeck, et al., 2010).

The most complex and labor-intensive process in animal husbandry is herd reproduction, which accounts for animal breeding, food production, intensive use, longevity, and economic profitability (Bocharov, 1990; Dedov, et al.,

1988).

Materials and methods

The studies were carried out in 2020-2021 upon the data of the completed lactation of the 3rd, 4th, and 5th calving of Fleckvieh (Simmental) cows bred in the cattle farm of "Vamaks" LLC, Syunik region/Marz, RA. According to the summary data of the complex assessment (bonitation) of the farm's livestock, 279 cows were assessed, including 73 heads of 1st-calf generation, 103 heads of 2nd generation, 35 heads of 3rd generation, 53 heads of 4th-5th generations, and 15 heads of 6-7 generations. The average age of 1st generation cows was 789 days.

21 cows of the 3rd generation and 19 cows of the 4th-5th generation were included in the study scope. Cows were selected according to calving duration (3, 4, and 5) and the service period (30-70 days, 71-100 days, and 101-150 days). Cow mating season, length of service (from birth to insemination), sexual lust (flow), and perinatal periods were investigated (Crowe, 2018; Anokhin, et al., 2019).

The coefficient of reproductive ability (CRA) of cows was determined through the following formula:

$$CRA = \frac{365}{PP} \times 100 \ \%,$$

where 365 is the number of days in a calendar year, and *PP* is the perinatal period in days.

If the cow's coefficient is above 100 %, the reproductive ability is excellent, 95-100 % – good, 90-95 % – satisfactory, 85-90 % – poor, and below 85 % very bad (Marmaryan, et al., 2001).

Conditional loss of calves due to sterility per 100 cows was determined by the following formula:

$$CRA = \frac{(ASP - 80) \times 100}{365} \ \text{head},$$

where ASP is the actual service period in days, 80 is the guaranteed service period in days, and 365 is the guaranteed perinatal period in days.

The 305-day milk yield data taken from the complex evaluation (bonitation) book of cows were processed by the biometric method (Merkuryeva, 1970; Karymsakov, 2020).

Results and discussions

According to the electrical control data, during the examination of cows in the insemination room, the beginning and end of the breeding period were noted through daily observations. At the same time, the animals in lust are identified per the behavior mode, the genitals of cows swell, turn red and secrete mucus, the cow behaves restlessly, bells, appetite worsens, the milk gets reduced, and the animal becomes unable to protect himself from other cows jumping on it (Pantelic, 2011; Koriakina, 2019).

It is clear from the study that the average duration of autumn-winter lactation was 27.2 hours (variation of 24-32 hours), and the spring-summer calving cycle was 24.2 hours (variation of 20-30 hours). After insemination, sperm cells live in the cow's genital tract for 12-24 hours. 8-12 hours after the sexual desire occurs, ovulation happens. The ovum fertilizes within 6-10 hours after ovulation. After the cow's insemination, the sperm cells reach the upper third of the fallopian tube within 6-8 hours. To conceive, it is advisable to inseminate (mate) cows 10-12 hours after sexual desire (Ulimbashev, 2015; Schmeling, 2022). After parturition, cow conception occurs after the uterine has regrown. In most cows, uterine retrogression occurs within 28 days. Some authors estimate it at 42-50 days. The duration after birth to conception (service period) should not exceed 3 months on average, in which case the perinatal period will be 365 days, including service, lactation, pregnancy, and dry period (Troitskiy, 1961; Kozlo, 1984; Trimberger and Davis, 1943).

From the analysis of data in (Tables 1 and 2), it was found that the service period of the 3rd calving cows in case of 30-70 days duration was 63 days on average, the perinatal period was 349 days, the milk of 305 days was 6665 kg, the correlation of milk amount and service period indicators is -0.12, and regression coefficients are -12.0 and -0.001. The variability coefficients of milk quantity, milk fat, milk protein, milk fat+ milk protein, and service period in 305 days are consistent and range from 16.4 to 17.5, the CRA was 104.6 %, which is excellent, whereas due to sterility in 3rd generation cows, no calving loss was observed.

The service period of the 4th calving cows in the range of 71-100 days was 85 days, and the other indices were 370 days, 7495 kg, -0.19, -26.0, and -0.001, respectively. The coefficients of variation of 305-day milk quantity, milk fat, milk protein, milk fat + milk protein, and service period were normal and ranged from 9.6 to 15.9, and the CRA was 98.6 %, which is acceptable; due to infertility in 4th generation cows, the loss of calving makes 1 head.

The service period indices of the 5th calving cows with a duration of 101-150 days are 138 days, 423 days, and the other indices are 7877 kg, -0.21, -31.15, and -0.001, 305 days, respectively.

Table 1. Biometric processing of milk yield and reproductive ability indicators of Fleckvieh cows*

Indicators	Lim	M±m	σ	Cv
Service period in the 3rd calving animals, 30-70 days (n=21)				
Milk in 305 days, kg	4054…8543	6665±238.5	1093.0	16.4
Fat content in milk, %	3.8…4.1	3.9±0.02	0.09	2.3
Protein in milk, %	3.3…3.4	3.4±0.01	0.05	1.5
Milk fat, kg	154…325	258±9.46	43.3	16.8
Milk protein, kg	138…290	224±8.03	36.8	16.4
Milk fat + milk protein, kg	292…615	482±17.41	79.8	16.6
Perinatal period, day	322…357	349±2.45	11.23	3.2
Service period, day	35…70	63±2.4	11.0	17.5
Service period in the 4th calving animals, 71-100 days (n=19)				
Milk in 305 days, kg	6164…10831	7495±258	1125	15.0
Fat content in milk, %	3.7…4.1	3.9±0.02	0.09	2.3
Protein in milk, %	3.0…3.4	3.4±0.02	0.1	2.9
Milk fat, kg	246…444	290±10.6	46.2	15.9
Milk protein, kg	208…368	251±9.1	39.5	15.7
Milk fat + milk protein, kg	455…812	541±19.6	85.2	15.7
Perinatal period, day	358…385	370±1.9	8.2	2.2
Service period, day	73…100	85±1.9	8.2	9.6
Service period in the 5th calving animals, 101-150 days (n=19)				
Milk in 305 days, kg	5552…9836	7877±240.7	1049	13.3
Fat content in milk, %	3.7…3.9	3.8±0.02	0.08	2.1
Protein in milk, %	3.1…3.4	3.3±0.02	0.08	2.4
Milk fat, kg	217…374	300.2±8.5	36.9	12.3
Milk protein, kg	183…325	261±8.1	35.4	13.6
Milk fat + milk protein, kg	400…698	561±16.5	71.9	12.8
Perinatal period, day	412…436	423±1.5	6.7	1.6
Service period, day	127…150	138±1.6	7.0	5.1

Table 2. The correlative relationships between the milk yield and service period indicator, regression coefficients*

Indicators	Coefficients of correlative relationships (r) and regression (R)		
	r	$R_{1/2}$	$R_{2/1}$
Service period 30-70 day	-0.12	-12.0	-0.001
Service period 71-100 day	-0.19	-26.0	-0.001
Service period 101-150 day	-0.21	-31.15	-0.001

*Composed by the authors.

The coefficients of variability of milk quantity, milk fat, milk protein, milk fat + milk protein amounts, and service period are normal and range from 12.3 to 13.6, the CRA was 86.3 %, which is poor, the loss in calving due to sterility is 16 heads, and the loss of milk quantity is 126 tons.

The coefficients of variability in the amount of milk, milk fat, milk fat + milk protein, and the maintenance period are regular and range from 9.6-15.9, the coefficient of reproductive ability (CRA) was 98.6 %, which is good; in cows of the 4th calving, the calf loss makes 1 head due to sterility.

Conclusion

The data of the study prove that the service period of the cows of the 4th-5th calving is 5-58 days higher than the norm in the "Vamaks" LLC cattle farm of the RA Syunik region, while the coefficient of reproductive ability varies between 86.3-98.6 %. Due to sterility, the loss in lactations in the case of the 5th calving is 16, and the loss of milk quantity is 126 tons. It is recommended to identify and inseminate animals with sexual desire and to establish strict veterinary control to track and regulate the maintenance period of the 4th-5th lactation cows.

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