

Research Journal of Pharmaceutical, Biological and Chemical Sciences

Features Reproductive Indicators Holstein Cows Depending On The Number Of Previous Lactations.

Zaitsev VV*, Savinkov AV, Ukhtverov AM, Ermakov VV, and Petryakov VV.

Samara State Agricultural Academy, st. Uchebnaya, 2, Kinel, Russia, 446442

ABSTRACT

During ontogenesis, cow productivity may vary. This is especially economically important in relation to highly productive cows capable of producing a large amount of milk and genetically valuable offspring. The study formed three groups of purebred pregnant cows on Holsteins, who had two or three previous lactation. In all cases, they had a milk productivity of 7000-8000 kg of milk. In each group there were 30 animals. It was noted that the optimal level of milk production and reproductive ability are possible in cows with fasting second and third lactation. These animals have fewer puerperal complications and shorter terms of genital involution after calving. This suggests that the recovery activity of the reproductive qualities of the cows after calving depends on the number of previous lactations. With a yield of 7000-8000 kg of milk in cows of Holstein breed after the second and third lactation, the reproductive qualities and ability to give viable offspring reach an optimum. In these animals, a high level of milk production is successfully combined with a high level of adaptive properties and the full realization of their genetic potential. Such animals are recommended to have the majority in the herd.

Keywords: highly productive cows preceding lactation, reproductive performance, reproductive ability, the level of milk production.

**Corresponding author*

INTRODUCTION

At the present time to intensify dairy cattle is required to account for the latest achievements of science, including the physiology of highly productive cattle [1, 2]. The main constraint in many countries, the development of dairy cattle breeding is the low fertility performance [3].

Increasing the productivity of cattle under production conditions is possible taking into account the peculiarities of their reproductive system in highly productive cows in conjunction with indicators of their physiology during ontogenesis [4,5,6]. Considering that calving in a cow determines the secretion of milk, milk production in her should be considered as a normal state and in conjunction with the reproductive function [7, 8].

Of course, the intensification of animal reproduction largely depends on the proper organization of their housing, feeding, veterinary control, diagnosis, treatment and prevention at different stages of the reproductive cycle [9]. At the same time, it is necessary to take into account the dynamics of the state of the animal in ontogenesis, which can also affect its economically significant qualities [10, 11].

Taking this into account will also help in solving the problem of reproduction, increasing the milk productivity of cows and obtaining viable repair young stock in highly productive cows [12, 13]. Of particular interest in this regard are the Holstein cows, which has a huge potential for milk production [14, 15]. In this regard, it is very promising to improve biotechnological methods of reproduction of cattle of high productivity in conditions of economic management with a temperate climate [16, 17, 18].

The purpose of the research is to assess the relationship of the reproductive ability of highly productive cows with the number of previous lactations.

MATERIALS AND METHODS

The research was conducted in strict accordance with ethical principles established by the European Convent on protection of the vertebrata used for experimental and other scientific purposes (adopted in Strasbourg in March 18, 1986, and confirmed in Strasbourg in June 15, 2006).

The material for research was served by 90 highly productive Holstein cows kept on the Kupinskoye dairy complex in the Bezenchuksky district of the Samara region, Russia. They were formed by three groups of cows: after the first lactation, the first group, after the second lactation, the second group, after the third lactation, the third group. All cows had a milk production level of 7000-8000 kg of milk. In each group there were 30 animals. For the control of metabolic cows, biochemical blood indices were studied according to generally accepted methods. Blood was taken 1.5-2 hours before feeding all the cows in the group 15 days before calving from the tail vein. All the methods used were traditional. The content of total protein in serum was determined using an RPL-3 refractometer (Russia). Nephelometrically carried out the separation and quantitative separation of the ratio of the protein fraction in the serum. The concentration of total calcium in the blood serum was determined. Also, traditional methods were used to assess the level of inorganic phosphorus and the alkaline reserve of blood.

The reproductive qualities of the studied groups of cows were studied in terms of the duration of the course of labor, the duration of the postpartum period, the restoration of the reproductive capacity of cows after calving (timekeeping methods, rectal examinations and using ultrasound KAIXIN-5200 VET).

The research results were processed by the method of variation statistics. The reliability of the differences in the indicators compared was used by the Student's criterion using the Microsoft Exel 7 software package adopted in biology and zootechnics. The degree of reliability of the differences in the indices of the first group from the second and the third are shown in the table with the appropriate notation $p < 0.05$ *; $p < 0.01$ **.

RESULTS

During the research we found that the duration of the current birth in Holstein cows is in correlation

with the previous number of births and lactation. So in the second and third groups, it was respectively less by 2.6 and 2.8 hours than in the first. This is probably the result of a better morphofunctional state of the genital organs of the second and third cows (Table 1). The duration of the separation of the afterbirth in the groups was also different: in the first group - 5.10±0.35 hours; in the second - 2.6±0.42 hours; in the third - 2.0±0.65 hours. In the first group of animals, one case of stillbirth was registered and one calf fell 2.0 hours after birth. In the first days, the most abundant discharge was observed in the heifers of the first group, compared with the second and third groups, which apparently indicates an increased contractility of the uterus in these animals, which was facilitated by their better readiness for calving. Usually, at 4-5 days after birth, lochia becomes dark cherry in color, at 10-12 days after birth, lochia in animals of the second and third groups become slimy and brighten. In animals of the first group, such changes were observed in 85% of animals for 3-4 days later (Table 1).

The duration of lochia discharge was in the groups: in the first - 15.3 ± 0.40 days; in the second - 12.2 ± 0.57 days; in the third - 12.0 ± 0.86 days. Using the rectal examination of the ovaries, the uterus (the condition of the cervix, the consistency of the uterus's horns, their size, the absence of excretions during uterine massage, and the absence of a yellow body in the ovaries) determined the timing of the end of the involution of the uterus in the animals observed. It was found that the duration of the involution of the uterus largely depends on the number of previous births, as well as on the preparedness of animals for calving.

Table 1. Parameters of calving and after the hotel period for the studied groups of cows

Recorded indicators	Animal groups		
	first one	second one	the third
Number of animals, heads	30	30	30
Duration of labor, hour	8.9±0.45	6.3±0.86**	6.10±0.68**
The duration of the separation of the placenta, hour	5.10±0.35	2.6±0.42**	2.0±0.65**
The detention of the placenta, %	20	-	-
Postpartum complications, %	40	15	-
End of the involution of the uterus, days:			
lochia discharge	15.3±0.40	12.2±0.57**	12.0±0.86**
rectal findings	27.2±0.39	21.3±0.63*	20.2±0.28*
Live weight of calves at birth, kg	33.0±0.51	36.1±0.77	36.9±0.49*
Received calves, heads	28	30	30

The duration of the end of the involution of the uterus was in the groups: in the first - 27.2 ± 0.39; in the second - 21.3 ± 0.63; in the third - 20.2 ± 0.28 days. It was observed that the live weight of the calves at birth was somewhat different in groups. So the body weight of calves in the first group was 33.0 ± 0.51 kg, which is 3.1 and 3.9 kg less, respectively, than in the second and third groups.

In view of the fact that postpartum complications are the main cause of impaired metabolic processes in the body of cows, the study of the parameters of hemodynamic changes in the studied animals is of great interest. To determine the relationship of postpartum complications with metabolic processes in the body of cows with different numbers of births and lactations, a biochemical blood test was studied in all groups of animals 15 days before calving (Table 2).

Table 2. Biochemical blood parameters of the studied groups of cows

Recorded indicators	Animal groups		
	first one, n=30	second one, n=30	the third, n=30
	15 days before calving		
Total protein, g / l	72.0±0.74	75.0±0.65	76.8±0.49*
Albumins, %	39.2±0.80	43.6±0.76*	44.8±0.63*
Globulins, %	56.3±0.60	55.4±0.79	56.5±0.80
including:			
α-globulins	16.2±0.32	13.7±0.46*	13.8±0.50*
β-globulins	15.2±0.36	12.0±0.68**	13.3±0.47*

γ - globulins	22.2±0.75	30.4±0.52**	29.3±0.68*
Total calcium, mmol / l	2.3±0.07	2.3±0.04	2.2±0.09
Inorganic phosphorus, mmol / g	0.62±0.06	0.99±0.27**	0.98±0.19**
Alkaline reserve, turnover%, CO ₂	44.13±0.52	47.9±0.74	48.2±0.86*

The content of total protein before delivery in cows of the first group, this indicator was lower than in the second and third groups of animals. In this case, in the cows of the first group, a decreased albumin content and an elevated β -globulin level were observed. The albumin content of cows after the first lactation was less than in the second and third groups of cows. This difference was statistically significant. The number of β -globulins before calving in the cows of the first group was higher than in the cows of the second and third group. The content of γ -globulin before calving in the cows of the first group was less in comparison with their peers in the second and third groups.

In cows of the first group, an acidotic state was observed before calving, as evidenced by a low alkaline reserve. The difference compared with the 2 and 3 groups of animals was small. The cows of the first group showed a tendency to a decrease in the blood level of inorganic phosphorus, compared with animals of the 2nd and 3rd groups (Table 3).

Table 3. Reproductive ability in the studied groups of cows

Recorded indicators	Animal groups		
	first one	second one	the third
Number of animals, heads	30	30	30
The manifestation of 1 sexual cycle after calving, days	40.6±0.33	26.5±0.25**	23.0±0.20**
Fertilization through sexual hunting, including, %:			
In the first	39.4	66.8	70.0
In the second	17.6	23.2	20.0
In the third	4.4	6.6	6.4
In the following	7.1	-	-
Total inseminated, %	85.6	96.7	96.7
Interval between sexes cycles, days	29.2±0.92	22.3±1.05*	21.8±1.10*
Service period, days	130.7±0.94	111.9±0.81*	114.5±0.67*

The effectiveness of insemination depending on the group of animals was different. So fertility of cows in the first insemination was in the first group - 39.4%, in the second group - 66.8%, in the third group - 70.0%. Animals of groups 2 and 3 were inseminated by 96.7% after three insemination. The interval between sexual cycles in the control group was 29.7 ± 3.76 days, which indicated the arrhythmia of sexual cycles compared with animals of groups 2 and 3, where isolated cases of arrhythmia of sexual cycles were noted. The interval between the sexual cycles was 22.3±1.05 days in the second group, and 21.8±1.10 days in the third group, which is correspondingly lower than in the animals in the first group. The duration of the service period in the first group of animals was -130.7±0.94 days, which is 12.8 and 16.2 days more, respectively, than in 2 and 3 groups.

DISCUSSION

The state of reproductive ability of cows in the Russian conditions of intensive technology of milk production can be associated with the number of previous lactations [19, 20]. Pregnancy after the second lactation provides a reduction in the duration of childbirth by 2.6 hours compared with the first group of cows, and in the third it was even shorter (by 2.8 hours), which apparently is the result of the optimal morphofunctional state of the genitals in the second and third groups of cows before birth [21, 22].

There is reason to believe that the level of feeding is not always the cause of low reproductive function of cows [3, 23]. Serious influence here has a high milk production and the number of previously transferred lactation. The duration of delivery and the course of the postpartum period are interrelated with the previous number of pregnancies. The second calving is apparently still functionally difficult for animals, which still makes it difficult to realize the reproductive qualities of cows.

In cows with a milk production of 7,000–8,000 kg or more, the restoration of reproductive ability also depends on previous lactation. Calving after the second and third lactation has more preferable indicators of restoration of the reproductive ability of cows. They shorten the period of fruitful insemination and increase fertility in the first sexual hunting, which increases the fertility of the herd as a whole [24, 25].

The low state of the alkaline reserve, the low level of albumins with the increased content of beta globulins before calving after the first lactation in highly productive cows, indicates a decreased resistance of the organism and is a predisposing factor to the pathology of labor and the postpartum period [26,27]. We agree with earlier studies on improving the reproductive ability of cows after the second birth [28,29].

The obtained results of the research and the analysis of the literature [30, 31] indicate that under the conditions of intensive technology of milk production in highly productive cows, cows that are calfed after the second and third lactation are more effective in terms of indicators taken into account [32].

CONCLUSION

In highly productive cows, reproductive ability may change during ontogenesis. The hotel after the second and third lactation improves the reproductive qualities of animals, prevents them from postpartum complications and reduces the timing of the involution of the genital organs compared with the control. Births in these animals are faster and without complications. The rate of recovery of the reproductive qualities of cows after calving also depends on the number of calves previously transferred. We found that with milk yield of 7000-8000 kg of milk in cows, the optimal indicators are observed after the second and third lactation. In this case, the reproductive qualities of the Holstein cattle become most optimal and from them it is almost always possible to obtain a viable offspring. To ensure high productivity of the herd, it is most preferable to have in it a significant number of cows after the second and third lactation.

REFERENCES

- [1] Glagoleva TI, Medvedev IN. (2018) Physiological Features Of Anti-aggregational Control Of Blood Vessels Over The Shaped Elements Of Blood In Calves At The Onset Of Ontogenesis. Research Journal of Pharmaceutical, Biological and Chemical Sciences. 9(5) : 440-447.
- [2] Bikbulatova AA, Karplyuk AV, Medvedev IN. (2018) Methodical Bases Of The Help To Young Invalids In A Choice Of Sphere Of Their Future Professional Activity. Research Journal of Pharmaceutical, Biological and Chemical Sciences. 9(4) : 571-577.
- [3] Andree E, O'Hara AE, Omazic A, Olsson I, Bage R, Emanuelson U, Holtenius K. (2017) Effects of dry period length on milk production and energy balance in two cow breeds. Animal, 1-7. doi : 10.1017/S1751731117001987.
- [4] Zavalishina SYu. (2018) Functional Properties Of Coagulation Hemostasis In Calves During The Phase Of Dairy-Vegetative Nutrition. Research Journal of Pharmaceutical, Biological and Chemical Sciences. 2018; 9(5) : 784-790.
- [5] Zavalishina SYu. (2018) Functioning Of Mechanisms Of Hemocoagulation Restriction In Calves At Change Of Methods Of Nutrition. Research Journal of Pharmaceutical, Biological and Chemical Sciences. 9(5) : 800-806.
- [6] Zavalishina SYu. (2018) Functional Activity Of Anticoagulant System In Calves During Early Ontogeny. Research Journal of Pharmaceutical, Biological and Chemical Sciences. 9(5) : 837-843.
- [7] Zavalishina SYu. (2018) Functional Properties Of Fibrinolysis In Calves Of The First Year Of Life. Research Journal of Pharmaceutical, Biological and Chemical Sciences. 9(5) : 870-876.
- [8] Zavalishina SYu. (2018) Physiological Features Of Coagulation In Calves Of Plant Nutrition. Research Journal of Pharmaceutical, Biological and Chemical Sciences. 9(5) : 899-904.
- [9] Binelli M, Pugliesi G, Hoeck VV, Mesquita FS, Membrive CMB. (2014) The role of proestrus on fertility and postovulatory uterine function in the cow. Animal Reproduction. 11(3) : 246-253.

- [10] Zavalishina SYu. (2018) Functional Activity Of Thrombocytes In Newborn Calves. Research Journal of Pharmaceutical, Biological and Chemical Sciences. 9(5) : 919-924.
- [11] Zavalishina SYu. (2018) Functioning Of Platelets In Milk And Vegetable Nutrition Calves. Research Journal of Pharmaceutical, Biological and Chemical Sciences. 9(5) : 943-949.
- [12] Zavalishina SYu. (2018) Deficiency Of Iron As A Cause Of Dysfunction In Calves And Piglets. Research Journal of Pharmaceutical, Biological and Chemical Sciences. 9(5) : 978-983.
- [13] Zavalishina SYu. (2018) Functional Properties Of Hemocoagulation In Calves Of Dairy Nutrition. Research Journal of Pharmaceutical, Biological and Chemical Sciences. 9(5) : 1016-1022.
- [14] Zavalishina SYu. (2018) Physiology Of Vascular Hemostasis In Newborn Calves. Research Journal of Pharmaceutical, Biological and Chemical Sciences. 9(5) : 1037-1044.
- [15] Zavalishina SYu. (2018) Functional Properties Of Anticoagulation And Fibrinolysis In Calves Of Plant Nutrition. Research Journal of Pharmaceutical, Biological and Chemical Sciences. 9(5) : 1082-1087.
- [16] Zavalishina SYu. (2018) Functional Antiaggregatory Properties Of Blood Vessels In Calves During Transition From Dairy To Plant Type Of Nutrition. Research Journal of Pharmaceutical, Biological and Chemical Sciences. 9(5) : 1110-1116.
- [17] Zavalishina SYu. (2018) Physiological Features Of Vascular Hemostasis In Calves Of Dairy-Vegetative Food. Research Journal of Pharmaceutical, Biological and Chemical Sciences. 9(5) : 1137-1143.
- [18] Zavalishina SYu. (2018) Functional Features Of Platelets In Newborn Calves With Iron Deficiency. Research Journal of Pharmaceutical, Biological and Chemical Sciences. 9(5) : 1153-1158.
- [19] Zavalishina SYu. (2018) Functional Activity Of Plasma Hemostasis In Neonatal Calves With Iron Deficiency, Who Received Ferroglucin And Glycopin. Research Journal of Pharmaceutical, Biological and Chemical Sciences. 9(5) : 1186-1191.
- [20] Bikbulatova AA, Andreeva EG, Medvedev IN. (2018) Restoration of erythrocyte microrheological peculiarities in 5-6-year-old children with scoliosis after daily usage of medioprophyllactic clothes for six months. Bali Medical Journal. 7(2) : 431-435. DOI:10.15562/bmj.v7i2.960
- [21] Bikbulatova AA, Karplyuk AV, Medvedev IN. (2018) The Problem Of Vocational Guidance Work With Young People, Who Have Limited Health Opportunities In Modern Russia. Research Journal of Pharmaceutical, Biological and Chemical Sciences. 9(4) : 586-590.
- [22] Oshurkova JuL, Medvedev IN, Tkacheva ES. (2018) Functional Features Of Platelet Aggregation In Heifers Of The Ayrshire Breed, Which Are Being Prepared For Insemination. Research Journal of Pharmaceutical, Biological and Chemical Sciences. 9(3) : 1155-1160.
- [23] Oshurkova JuL, Medvedev IN, Fomina LL. (2018) Physiological features of platelet aggregation in calves of Ayrshire breed during the phase of plant nutrition. Research Journal of Pharmaceutical, Biological and Chemical Sciences. 9(2) : 1008-1013.
- [24] Crespilho AM, Papa FO, Guasti PN, Novaes JLC, Martins A. (2014) The influence of insemination dose on pregnancy per fixed-time artificial insemination in beef cows is affected by semen extender. Animal Reproduction. 11(1) : 3-10.
- [25] Oshurkova JuL, Medvedev IN, Fomina LL. (2018) Physiological Indices of Platelet-Coagulation Hemostasis in Purebred Irish Cows in The Course of Lactation. Research Journal of Pharmaceutical, Biological and Chemical Sciences. 9(2) : 419-426.
- [26] Kirst E. (2009) Zu einigen Aspect en der Reproduction in industriemassiss produzierenden Milchviehanlagen. Tierzucht, 224-227.
- [27] Oshurkova JuL, Medvedev IN, Fomina LL. (2018) Physiological Peculiarities of Platelet-Coagulative Hemostasis in Dead-Wood Cows of Irish Breed. Research Journal of Pharmaceutical, Biological and Chemical Sciences. 9(1) : 817-822.
- [28] Makhov AS, Medvedev IN. (2018) Problems Of Epilepsy And Cognitive Activity Of The Brain. Research Journal of Pharmaceutical, Biological and Chemical Sciences. 9(5) : 532-537.
- [29] Medvedev IN, Savchenko AP, Zavalishina SYu, Krasnova EG, Kumova TA, Gamolina OV, Skoryatina IA, Fadeeva TS. (2009) Methodology of blood rheology assessment in various clinical situations. Russian Journal of Cardiology. 5 : 42-45.
- [30] Moretti P, Paltrinieri S, Giordano A, Ferrari A, Minuti A. (2015) Early postpartum hematological changes in Holstein dairy cows. Animal Reproduction Science. 158 : 25-30.
- [31] Yotov SA, Atanasov AS, Georgiev GB, Dineva JD, Palova NA. (2014) Investigation on some biochemical parameters and effect of hormonal treatment in anoestrous dairy cows with cystic ovarian follicle. Asian Pacific Journal of Reproduction. 3(1) : 41-45.



- [32] Bikbulatova AA, Andreeva EG, Medvedev IN. (2018) Hematological Features Of Patients With Osteochondrosis Of The Spine. Research Journal of Pharmaceutical, Biological and Chemical Sciences. 2018; 9(3) : 1089-1095.