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Reproductive Indicators Of Cows With Varying Degrees Of Blood On Holstein.

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ABSTRACT

Significantly increase the productivity of cattle can be based on the continuation of a deep study of the physiology and genetics of highly productive cows. In the work were formed three groups of cows analogues (by age, duration of pregnancy, origin). After calving of cows due to the correction of insemination after delivery, the duration of lactation and with the help of single-stage start, three groups of cows were formed with a comparable level of milk production of 7000-8000 kg of milk. The first group consisted of purebred cows for Holsteins, in the second group there were cows with 75% blood content for Holsteins, and for the third group - for Holstein blood 50%. In each group there were 30 animals. It was noted that the optimum level of milk production and resistance of cows was observed in Russian conditions at 75% of blood content in Holstein breed. This level of blood is able to prevent postpartum complications in animals and reduce the time of involution of the genital organs. It is noted that the restoration of the reproductive qualities of high-beef cows after calving also depends on their genetics. It is optimal in Russian conditions with Holstein blood levels of 75%. This percentage contributes to an increase in reproductive qualities and to obtaining a sufficient amount of viable offspring from highly productive cows. It can be said that only in this case a high level of milk productivity is successfully combined with a high level of adaptation properties of cows in Russian complexes and ensures the full realization of their productive potential during the whole ontogenesis.

Keywords: high-yielding cows, holstein bloodiness, reproductive indicators, reproductive capacity, milk yield.

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INTRODUCTION

Dairy cattle breeding in the modern world is the most dynamic and knowledge-intensive industry, which very substantially provides food for the population of many countries of the world [1, 2]. Livestock products (milk and meat) are very significant for the food sector [3, 4]. The issues of herd reproduction are very important for the development of dairy cattle breeding [5, 6].

To increase production, it is necessary to increase the number of cattle with milk above the average [7]. For the practical implementation of this task, it is necessary to further study their physiology, taking into account the degree of blood flow in the most outstanding Holstein breed in dairy products [8-12].

Intensification of reproduction of cattle in many respects depends not only on the correct organization of their content, feeding, veterinary control, diagnosis, treatment and prevention at different stages of the reproductive cycle, but also on the genetics of the herd of cows [13]. In this regard, work in this direction should be systematic [14, 15].

For a rational solution to the problem of reproduction, increasing the milk productivity of the entire herd and obtaining a sufficient number of viable maintenance young stock, it is necessary to make a correction to the genetics of the livestock [16, 17]. This will ensure an increase in the overall productivity of the herd of dairy cows [18, 19].

Currently in Russia there is a decrease in the reproductive function of a large number of cows, a decrease in the birth and survival of calves. All this causes great economic damage to livestock [20]. Reproductive quality of thoroughbred Holstein cattle under Russian conditions after the first calving decreased sharply, which is due to a mass of objective reasons [21]. In this connection, it is necessary to determine the optimum of the cow's blood level in holstein and domestic breeds in order to optimize the productivity and viability of the herd [22, 23].

The purpose of the research is to evaluate the reproductive abilities of high-milk cows with different blood levels according to Holstein.

MATERIALS AND METHODS

The research was conducted in strict accordance with ethical principles established by the European Convention 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 the study was 90 cows kept at the Kupinskoye dairy complex in the Bezenchuksky district of the Samara region of Russia. Of these, three groups of cows of comparable age, term of pregnancy, origin with a milk production level of 7,000–8,000 kg of milk, but with different levels of blood flow in Holstein were formed. In the first group, cows had 100% blood, in the second - 75% blood, in the third - 50% blood. In each group there were 30 animals.

To assess the state of metabolism, we studied the biochemical blood parameters according to generally accepted methods. Blood from cows was taken 1,5-2 hours before feeding 15 days before calving from the tail vein. All the methods used in the work were traditional. The content of total protein in serum was determined using an RPL-3 refractometer (Russia); the quantitative separation of the ratio of the protein fraction in the serum was carried out nephelometrically; carotene content was set according to Carr-price; the concentration of total calcium in the serum was determined complexmetrically; the level of inorganic phosphorus was assessed, the alkaline reserve was ascertained, and the blood glucose concentration was assessed.

The reproductive qualities of the studied groups of cows were studied using such indicators as the duration of the course of labor, the length of the postpartum period, the restoration of the reproductive capacity of cows after calving (using the methods of timekeeping, rectal examinations and with the help of an ultrasound machine KAIXIN-5200 VET).

The obtained numerical values were processed by the method of variation statistics using Student's criterion, by applying the Microsoft Excel 7 software package. The degree of reliability of differences in the data with the first group of animals is reflected in the tables by the corresponding symbols $p < 0.05$ *; $p < 0.01$ **.

RESULTS

In the process of research it was established that the duration of labor is interrelated with the genetics of the animal. So in the second and third groups it was less by 1.35 and 1.37 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 separation of the afterbirth in the groups was also different: in the first group, 5.6 ± 0.84 hours; in the second – 2.5 ± 0.46 hours; in the third – 2.0 ± 0.63 hours. In the first group after the birth of 4 calf fell. In the first days, the most abundant discharge was observed in cows of the second and third groups, compared with the first one, which indicates an increased contractility of the uterus in animals of the second and third groups, which was facilitated by their better readiness for calving. On days 4-5 after birth, lochia becomes dark cherry in color, and on days 10-12 after birth, lochia in animals of the second and third groups become slimy and brighter. In animals of the first group, such changes were observed in 80% of animals for 3-4 days later (Table 1).

The duration of lochia discharge was in the groups: in the first - 15.3 ± 1.12 days; in the second - 12.2 ± 0.82 days; in the third - 12.0 ± 0.65 days. A rectal examination of the ovaries, uterus (the state of the cervix, the consistency of the uterine horns, their size, the absence of excretions during uterine massage, and the absence of a yellow body in the ovaries) determined the end of the involution of the uterus in the study groups of animals. It turned out that the duration of the uterus involution largely depends on the duration of the dry period, and also correlates with the duration of the birth, which largely depends on the readiness of animals for calving.

Table 1. Calving and after the hotel period in the cows studied

Recorded indicators	Animal groups		
	first one	second one	the third
Number of animals, heads	30	30	30
Duration of labor, hour	8.5 ± 0.46	$6.3 \pm 0.61^{**}$	$6.2 \pm 0.54^{**}$
The duration of the separation of the placenta, hour	5.6 ± 0.84	$2.5 \pm 0.46^{**}$	$2.0 \pm 0.63^{**}$
The detention of the placenta, %	20	-	-
Postpartum complications, %	36	10	-
End of the involution of the uterus, days:			
lochia discharge	15.3 ± 1.12	$12.2 \pm 0.82^*$	$12.0 \pm 0.65^*$
rectal findings	28.6 ± 0.36	$21.3 \pm 0.57^{**}$	$20.4 \pm 0.72^{**}$
Live weight of calves at birth, kg	34.3 ± 1.04	36.2 ± 0.72	36.7 ± 0.90
Received calves, heads	26	30	30

The duration of the process of involution of the uterus was in the groups: in the first - 28.6 ± 0.36 ; in the second - 21.5 ± 0.51 ; in the third - 20.4 ± 0.72 days. It was noted that an increase in the duration of the dry period reduces the duration of the course of labor and the postpartum period, and apparently has a positive effect on the intrauterine development of newborn calves. The live weight of calves at birth was different in groups, so the calves' body weight in the first group was 34.3 ± 1.04 kg, which is 1.9 and 2.4 kg less, respectively, than in the second and third groups.

Considering postpartum complications as one of the main causes of impaired metabolic processes in the body of cows, the study of the parameters of hemodynamic changes in the studied animals is of interest. To determine the relationship of postpartum complications with metabolic processes in the body of cows with different blood levels according to Holstein, the biochemical parameters of the blood of the observed groups of animals were studied 15 days before calving (Table 2).

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

Recorded indicators	Animal groups, M±m		
	first one, n=30	second one, n=30	the third, n=30
Total protein, g / l	71.2±0.82	73.0±0.59	72.1±0.74
Albumins, %	39.4±0.82	43.4±0.72	43.2±0.51*
Globulins, %	56.4±0.74	55.2±0.56	56.2±0.60
α-globulins	15.4±0.33	13.9±0.47	13.7±0.57*
β-globulins	15.2±0.32	12.3±0.92*	13.7±0.42*
γ-globulins	21.0±0.82	29.2±0.42**	29.0±0.40**
Total calcium, mmol / l	2.3±0.06	2.3±0.06	2.2±0.07
Inorganic phosphorus, mmol / g	0.62±0.07	1.45±0.54**	1.44±0.12**
Alkaline reserve, turnover%, CO ₂	44.1±0.92	47.4±0.73	47.9±0.82

The content of total protein before giving birth in cows of the first group was lower by 1.8 g/l and by 0.9 g/l, respectively, than in 2 and 3 experimental groups of animals. In cows of the first group, a reduced albumin content was observed with an elevated level of β-globulins.

The albumin content of purebred cows for Holsteins was less than in 2 and 3 experimental groups of cows, the difference is not statistically significant. The number of beta globulins before calving in cows of the first group is greater than in cows of groups 2 and 3. The number of γ-globulins before calving in cows of the first group is lower compared with their peers 2 and 3 of the experimental groups by 39.0% and 38.0%.

In cows of the first group before calving there was a tendency to acidotic state, as evidenced by a low alkaline reserve. The difference compared with the 2 and 3 groups of animals was 7.5% and 8.6%. At the same time, in cows of the first group there was a decrease in the level of inorganic phosphorus in the blood, by an average of 0.83 and 0.82 mmol/l compared with animals 2 and 3 (Table 3).

Table 3. The reproductive ability of 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	41.2±0.38	26.6±0.45**	22.8±0.39**
Fertilization through sexual hunting, including, %:			
In the first	39.7	66.7	70.1
In the second	17.6	23.2	20.1
In the third	10.5	6.5	6.4
In the following	9.2	-	-
Total inseminated, %	83.3	96.7	96.7
Interval between sexes cycles, days	30.2±0.72	22.2±0.26**	21.4±0.45**
Service period, days	147.8±10.6	114.2±4.22**	112.5±2.75**

The effectiveness of insemination depending on the group of animals was different. So the fertility of cows in the first insemination was 39.7% in the first group, 66.7% in the second group, and 70.1% in the third group. In the first group, 67.8% of the animals were fertilized after 3 insemination. Animals of groups 2 and 3 were inseminated in a greater percentage of cases after three insemination. The interval between the sexual cycles in the first group was 30.2 ± 0.72 days, which indicates the arrhythmicity of the sexual cycles in comparison with the animals of groups 2 and 3, where single cases of arrhythmicity of the sexual cycles were noted. The interval between the sexual cycles was 22.2 ± 0.26 days in the second group, and 21.4 ± 0.45 days

in the third group. The duration of the service period was 147.8 ± 10.6 days in the first group of animals, which is 33.6 and 35.3 days more, respectively, than in groups 2 and 3.

DISCUSSION

The reproductive ability of cows largely depends on genetics [22]. It is recognized that the Holstein breed, which has outstanding dairy performance, does not always show good reproductive qualities. In purebred cows, the duration of the course of labor is more than 1.92 hours compared with other groups of cows. This seems to be the result of a better morphofunctional state of the genital organs in hybrid cows before birth [24].

The authors agree with the opinion [5] that the level of feeding is not always the cause of low indicators of the reproductive function of cows. High milk production is more influenced by the genetics of cows [25]. Duration of labor and the postpartum period are associated with the degree of blood content in the Holstein breed. A blood level of 75% for this breed, apparently, provides the maximum preparedness of animals for calving, which creates the optimum recovery of reproductive qualities in these cows.

When the level of milk productivity of cows is 7000-8000 kg and more, the restoration of reproductive ability depends on the length of the dry period. An increase in the dry period for 20 days increases the recovery of the reproductive capacity of cows, the duration of fruitful insemination in animals is reduced, and fertilization in the first sexual hunting increases, which is consistent with the opinion [26] that increasing the fertility of cows in the first sex hunting indicates their preparedness for dry period [27].

A decrease in alkaline reserve, a low albumin level with an increased content of beta-globulins in purebred, highly productive Holstein cows indicates a lower resistance of their body and is a predisposing factor to the pathology of the childbirth and the postpartum period [28,29].

The obtained results of the research and the analysis of the literature [30, 31] indicate that in the conditions of intensive technology of milk production among the herd of milk cows, it is preferable to have the majority of cows with a blood content of about 75% in Holstein breed.

CONCLUSION

Optimization of the reproductive ability of cows and the level of their milk production is possible primarily due to the correction of their genetics. This provides an increase in the reproductive qualities of animals, prophylactically postpartum complications and reduces the time of involution of their genital organs. Births in hybrids with 75% blood through Holstein proceed faster and without complications. Restoration of the reproductive qualities of purebred cows after calving is longer and less complete. At the same time, these indicators are highly preferred in cows with a yield of 7000–8000 kg of milk with a blood volume of 75% in Holstein. In this case, the cow has an optimum in reproductive qualities, and is also almost always capable of producing viable offspring with a high degree of blood content in the Holstein breed. In order to achieve a high level of milk production in the herd and high adaptive properties in cows that make it up, it is recommended to have in it the majority of cows with a Holstein blood rate of 75%.

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