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Variability of Hematological Indices of Brown Swiss Cattle with Different Technologies of Keeping.

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ABSTRACT

Given that among the main causes leading to diseases of animals caused by metabolic disorders are the conditions of detention, the relevance of the studies performed is related to the study of the metabolism of cows in different periods of pregnancy in connection with the method of maintenance. The investigations were carried out on cows of brown Schwitz breed in the agricultural enterprise "Psynadaha" of Zolsky district of the Kabardino-Balkarian Republic. It was established that the number of erythrocytes in the blood of all groups of cows increased during the course of pregnancy-an average of 1.5-1.7 × 10^{12} / l (P> 0.999), of leukocytes by 17.2-22.2% (P> 0.999), sugar - by 11-14 mg% (P> 0.999), the total amount of protein - by 8.8-9.2% (P> 0.99), the cholesterol content decreased by 20-22 mg% (P> 0.999), calcium by 1.7-2.4 mg% (P> 0.999) and phosphorus by 1.2-1.4 mg% (P> 0.999). Regardless of the method of keeping the brown Swiss breeds in cows, the concentration of red blood cells, leukocytes, sugar, total protein, including gamma globulins with simultaneous decrease in cholesterol, calcium, phosphorus, alpha and beta globulin levels, increases with the course of pregnancy.

Keywords: cows, brown Schwitz, pregnancy, hematologic indices, terms of pregnancy.

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INTRODUCTION

The state of any biological system, regardless of its structural and functional level, depends on the complex of influences. This set of factors both external with respect to the system itself, and located within it, or formed as a result of processes occurring in it [1, 2]. One of the most powerful internal factors affecting the constancy of the internal environment of the female organism is pregnancy.

Pregnancy is a special physiological state of females, accompanied by significant stresses on the mother's body, in connection with the formation of the placenta, as well as the organs and systems of the developing fetus. In healthy animals, homeostasis and metabolic rates reflecting its condition are maintained at a constant level, regardless of the gestational age, other influences from the external and internal environment of the organism, which can be very diverse [3-5].

Some animals are able to maintain the optimal level and quality of life processes in all physiological periods of life, others do not have enough internal reserves to maintain them and therefore develop changes in homeostasis during pregnancy, up to subclinical metabolic disorders. The nature and depth of metabolic disorders in the body of animals with different physiological states well reflect the morphological, biochemical and other characteristics of blood [6, 7].

Determination of morphological, biochemical and other indicators allows us to reliably determine the state of metabolic processes in the body of animals, to establish with high accuracy not only the general state of the organism, but also to predict the outcome of the disease, adjust therapy, study the influence of certain medications, etc. [8, 9]. This is especially important for monitoring the metabolic changes in the animal organism and predicting the development of obstetric diseases already at the initial stages of pregnancy [2, 6, 10].

The primary task in the organization of profitable intensive dairy cattle breeding is the receipt of repair calves adapted to the harsh conditions of industrial technology of economic activity. There is no doubt that the calf's health is determined long before its birth and is largely due to the immunobiochemical status of the mother's body. However, in conditions of industrial production technology for livestock products, immunodeficiencies and metabolic disorders develop for various reasons (incompatibility of the level and type of feeding, conditions of maintenance, technological, ecological, epizootic factors). 11 Therefore, the issue of monitoring the metabolism and immune system in sterile cows in conditions of industrial production technology becomes very important, especially in the conditions of year-round single-type feeding.

The high level of functioning of organs and systems in combination with the intensive flow of all types of metabolic processes in them, allowing for a long and complete compliance with the developed technologies to obtain a maximum of biologically complete livestock products, reproduce in the corresponding biological species the time-frame viable offspring, is defined as the productive health of animals [12].

Under the influence of various factors on the organism, the function of reproduction of animals is violated, the fertilization decreases, the embryos die, the newly-born young grows malo-viable and undergoes various diseases [13-15].

Along with the development of these disorders, the resistance of the organism to pregnant animals is reduced due to their inadequate adaptation to environmental conditions, which adversely affects the immune system and neurohumoral mechanisms of the regulation of the reproductive function. In females, even a short-term effect of unfavorable environmental factors leads to inhibition of sexual processes, changes in their general state and a decrease in productivity [16, 17].

The effect of environmental factors exerts a stronger influence on the productivity and reproductive capacity of the heifers compared to full-aged cows, which is usually due to a violation in energy metabolism, increased secretion of cortisol by the adrenal cortex, hepatic disorders and insufficient reserves of the body's plastic substances. Thus, the inclusion of the feed additive - CCD EcoKor, biocorrecting lipid metabolism, and therefore energy metabolism, liver functional status and free radical lipid oxidation, positively affected the duration of the service period and the insemination index [18].

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Metabolic disorders in pregnant animals have a negative effect on the work of the fetoplacental system, and subsequently lead to the appearance of pathologies of fetal development, childbirth and the postpartum period are indicated in a number of studies [12-14].

The aim of the study was to study the morphological and biochemical changes in the blood of pregnant cows of the brown Schwitz breed in different periods of pregnancy at year-round stall and mountain-pasture maintenance in the pasture period.

MATERIALS AND METHODS

Studies were carried out on cows of brown Swiss breed on the farm "Psynadaha" of Zolsky district of the Kabardino-Balkarian Republic. Two groups of cows of the third calving group were formed with 15 heads each, taking into account the origin, physiological state and productivity. The first group included cows, which were kept on a leash during the stall period, were pastured to pastures in the pasture period (May-September), and the same year-old coevals of the year-round stall. The summer pasture period of keeping cows matched 4-7 months of pregnancy.

Blood for research was taken before the morning feeding and drinking of cows from the jugular vein for 2-3, 5-6 and 8-9 months of pregnancy. In the blood, the content of the total protein (refractometrically) and its fractions - albumins and globulins (by the method of agar gel electrophoresis), concentration of sugar, cholesterol, calcium and phosphorus, erythrocytes and leukocytes were determined by conventional methods [16]. The resulting digital material was biometrically processed.

RESULTS AND DISCUSSION

The data presented in the table indicate that although all the hematologic indices were within the physiological norm, there were certain differences between the compared groups of cows.

So, with the course of pregnancy, the number of erythrocytes in the blood of all groups of cows increased - on average by 1.5-1.7 × 10^{12} / l (P> 0.999). The cows of the 1st group differed in the highest values, their superiority over the year-round stall-takers was 0.4 × 10^{12} / l (P> 0.95) at the beginning of pregnancy, 1.1 × 10^{12} / l (P > 0.999) and by the end of the physiological period - 0.6 × 10^{12} / l (P> 0.95).

Table 1: Hematologic parameters of pregnant cows with different types of keeping, ($X \pm m_x$)

Pregnancy period, month	Erythrocytes, 10^{12}/l	Leucocytes, 10^9/l	Glucose, mg%	Cholesterol, mg%	Calcium, mg%	Phosphorus, mg%	Total protein, g / l	Albumins,%	Globulins, %			A/G ratio
									alpha	beta	gamma	
I group												
2-3	5,5±0,13	6,3±0,13	56,0±0,8	92,0±1,6	9,8±0,23	5,8±0,13	79,0±1,5	41,8	15,1	11,5	31,6	0,72
5-6	6,9±0,16	7,2±0,20	58,0±0,9	90,0±1,4	6,7±0,14	3,7±0,06	84,0±1,7	39,3	14,3	11,9	34,5	0,65
8-9	7,2±0,18	7,7±0,25	67,0±1,2	72,0±1,3	7,4±0,18	4,4±0,09	86,0±2,0	40,7	14,0	9,3	36,0	0,68

I group												
2-3	5,1±0,10	6,4±0,15	55,0±0,7	87,0±1,5	9,2±0,20	5,5±0,11	76,0±1,4	40,8	14,5	14,4	30,3	0,69
5-6	5,8±0,12	6,6±0,18	59,0±0,8	78,0±1,4	8,1±0,19	4,6±0,08	79,0±1,6	41,8	13,9	14,0	30,4	0,72
8-9	6,6±0,14	7,5±0,22	69,0±1,3	65,0±1,1	7,5±0,17	4,3±0,07	83,0±1,8	41,0	13,2	12,1	33,7	0,69

In the dynamics of leukocyte content, there was a general upward trend, which increased in the 1st group by 22.2% (P> 0.999), in the 2nd group - by 17.2% (P> 0.999). It should be noted a sharp increase in the concentration of leukocytes in the blood of cows of the 1st group in the period of 5-6 months of pregnancy, which is due to the beneficial effect of pasture content on the body's protection indices of this group of animals.

The amount of glucose in the blood corresponded during the entire pregnancy cycle at the lower limit of the norm and increased to calving (by 11-14 mg%, P> 0.999). There were no significant intergroup differences in the concentration of this component in the blood of the experimental groups of cows.

The content of cholesterol in the blood of healthy cows is in direct correlation with the dairy productivity of animals. Cholesterol, as an important structural element of the cell membrane, participates in the formation of complexes with proteins of the inner mitochondrial membrane (25). Its content in the blood of cows, regardless of the method of maintenance, was the maximum at the beginning of pregnancy (87-92 mg%), which corresponded to the period of the highest daily milk yield. Later, its amount decreased and reached the end of pregnancy 65-72 mg%, which, apparently, is associated with an increase in the formation of estrogenic and corticosteroid hormones, which are inducers of the generic process. In all periods of pregnancy, a higher concentration of cholesterol was distinguished by blood taken from cows that were exploited by the distillation-mountain content system, whose advantage over year-round stallions was 5.0 mg% (P> 0.95), 5 -6 - 12.0 mg% (P> 0.999) and 8-9 months - 7.0 mg% (P> 0.999).

Ensuring the productivity of cows with a sufficient number of macro- and microelements helps to increase their productivity, improve reproductive capacity and preserve animal health [8].

To assess the balance of mineral nutrition in different phases of lactation, it is necessary to use indicators of the content of total calcium and inorganic phosphorus in the blood serum.

The concentration of calcium in the blood of the experimental herd with the course of pregnancy decreased, and most of all among the animals of the 1st group in the middle of pregnancy, which is due to their content during this period in pastures poor in this soil element. With the exchange of calcium, the exchange of phosphorus is closely connected, the optimum ratio of which is at the level of 2: 1. At the beginning of pregnancy, the content of phosphorus in the blood in all the groups was higher by 1.2-1.4 mg% (P> 0.999) compared with the figures obtained before calving. It should be noted that the low values of phosphorus observed in the blood of cows of the 1st group observed at 5-6 months of pregnancy are associated with their low content in pasture vegetation [19, 20].

In all groups of cows, a significant increase in the amount of protein in the blood was observed by the end of pregnancy with the completion of fetal growth, i.e. in the dry period: in the first-aid groups of the 1st group by 8.8% (P> 0.99), the 2nd - by 9.2% (P> 0.99). Other conditions being equal, the higher concentration of protein in the blood was distinguished by cows that were kept at distillation and mountain content, the advantage of which over year-old stallions made up 3-5 g / l depending on the period of pregnancy, which characterizes the higher protein metabolism of cows 1 group.

With both methods of content, there were no significant differences in the dynamics of albumin content, depending on the period of pregnancy of the experimental cows. Another situation in the content of different classes of globulins: the level of alpha and beta globulin to calving decreased, while the values of gamma globulins increased. The highest albumin-globulin coefficient was observed in the cows of the first group at the beginning of pregnancy - 0.72, in the middle of the girls of the second group (0.72), by the end of pregnancy, there were no significant differences between the groups according to the analyzed coefficient.

CONCLUSION

The results of our research have led to the following conclusions:

- regardless of the method of keeping the brown Swiss breeds in cows with the course of pregnancy, the concentration of erythrocytes, leukocytes, sugar, the total protein, including gamma globulins with a simultaneous decrease in cholesterol, calcium, phosphorus, alpha and beta globulin levels, increases in the blood;

- Operation of cows by technology of mountain-pasture cattle breeding causes more intensive morphological composition and protein blood metabolism in comparison with year-round stall content.

Thus, given the close relationship of the fetus with the mother's, the results of the research will allow to predict the course of pregnancy, childbirth, and the quality of offspring in cows.

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