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RESULTS OF CLINICAL, HEMATOLOGICAL AND IMMUNOLOGICAL STUDIES OF COWS IN DIFFERENT PERIODS OF LACTATION

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The article presents the states of metabolic processes in the body of cattle, ensuring the realization of the genetic potential of animals. The object of the study were Holstein cows aged 4 to 6 years. Hematological and immunological studies, indicators of cellular immunity were determined. As a result of the conducted studies, a certain relationship between immunological indicators and the level of milk productivity was revealed. In cows with a productivity of more than 7 thousand kg of milk per lactation, the hemoglobin content is 10% higher than in cows with a productivity level of less than 5 thousand kg. With an increase in productivity, a decrease in the number of immunocompetent cells and a slowdown in phagocytosis reactions in cows were observed. In cows with milk yield for lactation of 5 thousand kg of milk, the content of immunocompetent cells was at the level of average normative indicators. With an increase in productivity from 5 thousand kg, cows showed a decrease in the number of T-lymphocytes by 25.4%. The T/B lymphocyte index is 12.6% lower, and the phagocytic activity of neutrophils is 5.4% lower compared to low-productivity animals and average normative indicators. The indicator of T-lymphocytes of group 1 is higher than the indicator of group 2 and 3 by 7.3% and 10.6%, respectively. Accordingly, there was an increase in the index of monocytes of group 1 than in groups 2 and 3. Thus, it was found that with an increase in the level of dairy productivity in cows, quantitative indicators of the immune system decrease, which indicates the development of immunodeficiency conditions in them.

Key words: cattle, immune status, hematology, productivity, diagnostics.

РЕЗУЛЬТАТЫ КЛИНИЧЕСКИХ, ГЕМАТОЛОГИЧЕСКИХ И ИММУНОЛОГИЧЕСКИХ КОРОВ В РАЗНЫЕ ПЕРИОДЫ ЛАКТАЦИИ

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В статье приведены состояния обменных процессов в организме крупного рогатого скота, обеспечивающим реализацию генетического потенциала животных. Объектом исследования были коровы голштинской породы в возрасте от 4 до 6 лет. Определяли гематологические и иммунологические исследования, показатели клеточного иммунитета. В результате проведенных исследований выявлена определенная зависимость между иммунологическими показателями и уровнем молочной продуктивности. У коров с продуктивностью более 7 тыс. кг молока за лактацию содержание гемоглобина на 10% выше, чем у коров с уровнем продуктивности менее 5 тыс. кг. С увеличением продуктивности наблюдали снижение количества иммунокомпетентных клеток и замедление реакций фагоцитоза у коров. У коров с удоем за лактацию 5 тыс. кг молока содержание иммунокомпетентных клеток находилось на уровне средних нормативных показателей. При повышении продуктивности от 5 тыс. кг у коров выявлено снижение количества Т-лимфоцитов на 25,4%. Индекс Т/В-лимфоцитов меньше на 12,6%, показатель фагоцитарной активности нейтрофилов – на 5,4% по сравнению с низко продуктивными животными и средними нормативными показателями. Показатель Т-лимфоцитов 1 группы выше показателя 2 и 3 группы на 7,3% и 10,6% соответственно. Соответственно отмечено увеличение показателя моноцитов 1 группы, чем во 2 и 3 группах. Таким образом, было установлено, что с повышением уровня молочной продуктивности у коров снижаются количественные показатели иммунной системы, что свидетельствуют о развитии иммунодефицитных состояний у них.

Ключевые слова: крупный рогатый скот, иммунный статус, гематология, продуктивность, диагностика.

**ЛАКТАЦИЯНЫҢ ӘРТҮРЛІ КЕЗЕҢДЕРІНДЕГІ КЛИНИКАЛЫҚ, ГЕМАТОЛОГИЯЛЫҚ
ЖӘНЕ ИММУНОЛОГИЯЛЫҚ СИЫРЛАРДЫҢ НӘТИЖЕЛЕРІ**

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Мақалада жануарлардың генетикалық әлеуетін іске асыруды қамтамасыз ететін ірі қара мал ағзасындағы метаболикалық процестердің жай-күйі келтірілген. Зерттеу нысаны 4 жасан 6 жасқа дейінгі холштейн тұқымды сиырлар болды. Гематологиялық және иммунологиялық зерттеулер, жасушалық иммунитеттің көрсеткіштері анықталды. Зерттеулер нәтижесінде иммунологиялық көрсеткіштер мен сүт өнімділігі деңгейі арасындағы белгілі бір байланыс анықталды. Лактация кезінде өнімділігі 7 мың кг-нан асатын сиырларда өнімділік деңгейі 5 мың кг-нан аз сиырларға қарағанда гемоглобиннің мөлшері 10% - ға жоғары.өнімділіктің жоғарылауымен иммунокомпетентті жасушалар санының төмендеуі және сиырлардағы фагоцитоз реакцияларының баяулауы байқалды. Лактация кезінде 5 мың кг сүт сауатын сиырларда иммунокомпетентті жасушалардың құрамы орташа нормативтік көрсеткіштер деңгейінде болды. 5 мың кг-нан өнімділіктің артуымен сиырларда Т-лимфоциттер санының 25,4% - ға төмендегені анықталды. Т / В-лимфоциттердің индексі төмен өнімді жануарлармен және орташа нормативтік көрсеткіштермен салыстырғанда 12,6% – ға, нейтрофилдердің фагоцитарлық белсенділігінің көрсеткіші 5,4% - ға төмен. 1-топтағы Т-лимфоциттердің көрсеткіші тиісінше 2 және 3-топтағы көрсеткіштен 7,3% - ға және 10,6% - ға жоғары. Тиісінше, 1 және 2 топтарға қарағанда 3 топтың моноциттерінің өсуі байқалды. Осылайша, сиырлардың сүт өнімділігі деңгейінің жоғарылауымен иммундық жүйенің сандық көрсеткіштері төмендейтіні анықталды, бұл олардағы иммун тапшылығы жағдайларының дамуын көрсетеді.

Түйінді сөздер: ірі қара мал, иммундық мәртебе, гематология, өнімділік, диагностика.

At the present stage of agricultural development, the issues of scientific support for increasing the efficiency of agricultural production are of particular relevance, in particular, the development of dairy farming and the production of high-quality dairy products are of great importance. The productivity of cows is closely related to the level of metabolism, including the intensity of physiological and biochemical metabolic processes associated with the transformation of a significant amount of energy and nutrients from feed into milk. At different stages of lactation of cows, the intensity of metabolic processes is different. The study of the mechanisms of such changes, as well as their relationship with the chemical composition of milk can significantly help in the regulation of metabolic processes through feeding and will make it possible to get more high-quality products and increase the age of productive use of cows [1, p. 275].

The activity of the immune system and the resistance of the organism depend on many factors: genetic, age and physiological characteristics of the organism, the conditions of feeding and keeping cows, the season of the year, the effects of microorganisms, stress [2, p.28].

The main goal of the development of farming is to increase the productivity of cattle at the lowest economic costs [3, p.18;]. However, with an increase in the level of productivity in cows, a violation of metabolic processes, a decrease in reproductive function, natural resistance and immunological reactivity are noted, which leads to the premature culling of especially valuable animals [4, p.21].

Highly productive cows are susceptible to even minor changes in keeping conditions and react to this with a more pronounced metabolic disorder affecting their immunobiological status [5, p.23]. In this regard, there is a need for early diagnosis of immunopathologies and targeted immunocorrection [6, p.18].

Blood in the body performs different functions: transport, gas exchange, excretory, thermoregulatory, humoral-endocrine, protective, maintaining water-salt balance. For the harmonious performance of the listed functions, the blood composition in a healthy body is maintained in a relatively dynamic constancy. However, with a general tendency to maintain the constancy of its composition, blood is very sensitive to changes in organisms [7, p. 56].

As noted by M.T. Taranov, it is important to assess not abrupt pathological changes in the metabolism of animals, but insignificant changes occurring precisely within the physiological norm of the studied parameters. It is important to indicate by a slight change in the levels of blood biochemical parameters in which direction the studied methods of influencing the animal's body shift the metabolism - to desirable or undesirable, and on this basis to strive to strengthen or weaken the tested factors or to abandon them [8, p.73].

In this regard, the need to conduct research to assess the immune status of animals, especially highly productive animals, for early diagnosis of immunopathology and timely organization of measures to correct the identified disorders, becomes more urgent.

In this regard, the purpose of the research was to study the clinical, hematological and immunological indicators of cows in different periods of lactation in LLP "Sadchikovskoe" of Kostanay region.

Materials and research methods. The studies were conducted from 2020 to 2021. The object of the study was Holstein cows, aged 4 to 6 years. Groups of animals were formed according to the principle of analogues, depending on the level of productivity (with a milk yield per lactation less than 5 thousand kg ($n = 15$), 5-6 thousand kg ($n = 15$), 6-7 thousand kg ($n = 15$), over 7 thousand kg ($n = 15$)), physiological state.

Hematological and immunological studies were carried out according to generally accepted methods. Determined indicators of cellular immunity: the content of T-lymphocytes. The determination of B-lymphocytes was used to characterize the humoral link. Determined the ratio of T- and B-lymphocytes (index T / B).

A clinical examination was carried out twice a year in the experimental farm. When assessing the clinical status of animals to determine the main symptoms of non-infectious pathology, the following indicators were taken into account: appearance and fatness; the external condition of the mucous membranes and skin, lymph nodes, the state of the respiratory and digestive organs, the musculoskeletal system.

Research results. Currently, the enterprise LLP "Sadchikovskoe" provides meat and dairy products for the internal need of the Kostanay region and other regions of the country, has a steadily developing economic indicators of farming

The state of metabolic processes in the body of cows is known to be the main factor that ensures the realization of the genetic potential of animals. Quite a lot of studies have been carried out to assess the metabolism in cows at different periods of lactation. However, homeostasis and immunological reactivity in highly productive animals against the background of lactation to factors of the body's defense systems is insufficiently studied.

We, together with employees of the farm, carried out a comprehensive clinical examination of cows.

Comprehensive clinical examination of cows made it possible to identify clinical signs of pathological processes: changes in the coat (dullness, delayed shedding, alopecia in the neck, spinal column, sacrum), obstetric and gynecological diseases.

When studying the immune system of cows, it was found that hematological parameters in different physiological periods did not differ significantly.

To assess the quantitative composition of the immunohematological indicators of animals with different levels of milk productivity, groups of cows were formed with a milk yield per lactation from 5 to 6 thousand kg, from 6 to 7 thousand kg, over 7 thousand kg.

As a result of the studies, a definite relationship was revealed between immunological parameters and the level of milk production. In cows with a productivity of more than 7 thousand kg of milk per lactation, the hemoglobin content is 10% higher than in cows with a productivity level of less than 5 thousand kg.

With an increase in productivity, a decrease in the number of immunocompetent cells and a slowdown in phagocytosis reactions in the body of cows were observed. It was found that in cows with a milk yield per lactation of 5 thousand kg of milk, the content of immune cells was at the level of average normative indicators.

With an increase in productivity of cows from 5 thousand kg a decrease in the number of T-lymphocytes by 25.4% was revealed. The T / B-lymphocyte index becomes 12.6% lower, the neutrophil phagocytic activity indicator - by 5.4% compared to low-productive animals and the average normative indicators given in literary sources (I.A. Shkuratova, 2002; N. A. Vereshchak, 2005; Yu.N. Fedorov).

Compared with cows with a productivity level of 5 thousand kg of milk, the content of erythrocytes was more than 2 and 3 groups of cows by 7.1% and 7.7%, respectively.

The number of leukocytes is less by 20.9% and 20.5%, respectively.

The index of T-lymphocytes of the 1st group is higher than the index of the 2nd and 3rd groups by 7.3% and 10.6%, respectively, which ensure the recognition and destruction of cells carrying foreign antigens, enhance the effect of monocytes. Accordingly, there was an increase in the indicator of monocytes of the 1st group (5 thousand kg) than in the 2nd and 3rd groups by 13.3% and 28.2%.

The indicator of B-lymphocytes in cows with a productivity of 5 thousand kg and 6 thousand kg, significant changes have not been established. This indicator decreased in cows with a productivity of more than 7 thousand kg.

The lymphocyte count in all three groups was at the same level.

The average indicator of basophils in cows with a productivity of over 7 thousand kg is higher than group 1 (5 thousand kg) and group 2 (6 thousand kg) by 28.3% and 41.7%, respectively. The main function

of basophils is to maintain an allergic reaction triggered by mast cells. Together with eosinophils and neutrophils, they migrate to the focus of allergic inflammation from the bloodstream.

Thus, it was found that with an increase in the level of milk production in cows, the quantitative indicators of the immune system decrease, which indicates the development of immunodeficiency states in them.

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