3. There is no negative effect found on the biochemical and morphological blood values of poultry with the feed additive "Feed Bioprotein" introduced into the diet of broiler chickens in the form of powder in both maximum and minimum concentrations recommended by the manufacturer.

***Список литературы.*** *1.Околелова, Т. М. Научные основы кормления содержания сельскохозяйственной птицы : монография / Т. М. Околелова, С. В. Енгашев. – М. : РИОР, 2021. – 439 с. 2.Троицкая, Е. В. Пути получения кормового белка методами биотехнологии [Электронный ресурс] / Е. В. Троицкая, И. В. Артамонов // Агрозоотехника. – 2021. – Т. 4, № 1. – С. 1–14. – Режим доступа : http://azt-journal.ru/article/28817/full. – Загл. с экрана. – Дата доступа: 12.05.2022. 3. Биотехнология получения и перспектива использования альтернативного кормового белка / А. С. Ковтунова [и др.] // Актуальная биотехнология. – 2015. – № 14. – С. 102–103. 4. Хелинг, А. Протеины из вторичного сырья - инновационные компоненты в экологичном промышленном производстве / А. Хелинг, В. В. Волков // Известия КГТУ. – 2015. – № 38. – С. 83–92. 5. Болотников, И. А. Гематология птиц / И. А. Болотников, Ю. В. Соловьев. – Л. : Наука, 1980. – 114 с. 6. Кавардаков, Ю. Я. Лабораторные исследования в ветеринарной диагностике / Ю. Я. Кавардаков. – Абакан : ХГУ им. Н.Ф. Катанова, 1998. – 128 с. 7. Ленинджер, А. Основы биохимии / А. Ленинджер. – М. : Мир, 1985. – 1056 с. 8. Черкасова, В. В. Гематологические и биохимические показатели крови цыплят-бройлеров в онтогенезе / В. В. Черкасова, К. С. Зеленский // Известия Оренбургского государственного аграрного университета. – 2009. – № 4 (24). – С. 60–63. 9. Erythropoiesis regulation during the development of ascites syndrome in broiler chickens : a possible role of corticosterone / D. Luger [et al.] // J. Anim. Sci. – 2003. – 81 (3). – P. 784–790. 10. Evaluation of the hematological and clinical biochemical markers of stress in broiler chickens / U. Chioma [et al.] // Vet World. – 2020. – Oct.13 (10). – P. 2294–2300. 11. Методические рекомендации по применению наборов реагентов «ДиаВетТест» для биохимических исследований сыворотки (плазмы) крови животных на автоматических и полуавтоматических анализаторах. – М. : ФГБУ ЦНМВЛ; Россельхознадзор, 2018. – 26 с. 12. Наборы биохимических реагентов для ветеринарии «ДиаВетТест» [Электронный ресурс] // ДИАКОН-ВЕТ: Всё для успешного ветеринарного бизнеса. – Режим доступа: https://diakonvet.ru/biohimicheskie-reagenty-diavettest. – Загл. с экрана. – Дата доступа: 12.05.2022.*

***References.*** *1. Okolelova, T. M. Nauchnye osnovy kormleniya soderzhaniya sel'skohozyajstvennoj pticy : monografiya / T. M. Okolelova, S. V. Engashev. – M. : RIOR, 2021. – 439 s. 2.Troickaya, E. V. Puti polucheniya kormovogo belka metodami biotekhnologii [Elektronnyj resurs] / E. V. Troickaya, I. V. Artamonov // Agrozootekhnika. – 2021. – T. 4, № 1. – S. 1–14. – Rezhim dostupa : http://azt-journal.ru/article/28817/full. – Zagl. s ekrana. – Data dostupa: 12.05.2022. 3. Biotekhnologiya polucheniya i perspektiva ispol'zovaniya al'ternativnogo kormovogo belka / A. S. Kovtunova [i dr.] // Aktual'naya biotekhnologiya. – 2015. – № 14. – S. 102–103. 4. Heling, A. Proteiny iz vtorichnogo syr'ya - innovacionnye komponenty v ekologichnom promyshlennom proizvodstve / A. Heling, V. V. Volkov // Izvestiya KGTU. – 2015. – № 38. – S. 83–92. 5. Bolotnikov, I. A. Gematologiya ptic / I. A. Bolotnikov, YU. V. Solov'ev. – L. : Nauka, 1980. – 114 s. 6. Kavardakov, YU. YA. Laboratornye issledovaniya v veterinarnoj diagnostike / YU. YA. Kavardakov. – Abakan : HGU im. N.F. Katanova, 1998. – 128 s. 7. Lenindzher, A. Osnovy biohimii / A. Lenindzher. – M. : Mir, 1985. – 1056 s. 8. CHerkasova, V. V. Gematologicheskie i biohimicheskie pokazateli krovi cyplyat-brojlerov v ontogeneze / V. V. CHerkasova, K. S. Zelenskij // Izvestiya Orenburgskogo gosudarstvennogo agrarnogo universiteta. – 2009. – № 4 (24). – S. 60–63. 9. Erythropoiesis regulation during the development of ascites syndrome in broiler chickens : a possible role of corticosterone / D. Luger [et al.] // J. Anim. Sci. – 2003. – 81 (3). – P. 784–790. 10. Evaluation of the hematological and clinical biochemical markers of stress in broiler chickens / U. Chioma [et al.] // Vet World. – 2020. – Oct 13 (10). – P. 2294–2300. 11. Metodicheskie rekomendacii po primeneniyu naborov reagentov «DiaVetTest» dlya biohimicheskih issledovanij syvorotki (plazmy) krovi zhivotnyh na avtomaticheskih i poluavtomaticheskih analizatorah. – M. : FGBU CNMVL; Rossel'hoznadzor, 2018. – 26 s. 12. Nabory biohimicheskih reagentov dlya veterinarii «DiaVetTest» [Elektronnyj resurs] // DIAKON-VET: Vsyo dlya uspeshnogo veterinarnogo biznesa. – Rezhim dostupa: https://diakonvet.ru/biohimicheskie-reagenty-diavettest. – Zagl. s ekrana. – Data dostupa: 12.05.2022.*

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## CLINICAL AND HEMATOLOGICAL PROFILE OF COWS IN TREATMENT OF PURULENT PODODERMATITES WITH PROBIOTIC "VETOSPORIN"

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*The article presents the data of our own research on the general blood analysis of cattle with purulent pododermatites. The data are presented on the general blood analysis of cows subjected to a complex treatment with the probiotic "VETOSPORIN". The data obtained can prove the efficacy of the drug in the complex treatment of cows with purulent pododermatites.* ***Keywords:*** *general blood analysis, cow, feet disease, purulent pododermatitis, probiotic.*

# КЛИНИКО-ГЕМАТОЛОГИЧЕСКИЙ СТАТУС КОРОВ ПРИ ЛЕЧЕНИИ ГНОЙНЫХ ПОДОДЕРМАТИТОВ ПРОБИОТИКОМ «ВЕТОСПОРИН»

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*В статье отражены данные собственных исследований общего анализа крови крупного рогатого скота с гнойными пододерматитами. Отражены данные общего анализа крови коров, подвергшихся комплексному лечению с использованием пробиотика «ВЕТОСПОРИН». Полученные данные могут говорить об эффективности данного препарата в комплексном лечении коров с гнойными пододерматитами.* ***Ключевые слова:*** *общий анализ крови, корова, заболевание конечностей, гнойный пододерматит, пробиотик.*

**Introduction.** In modern conditions of the development in the agrarian sector of the economy of the Republic of Belarus, including restructuring and intensification of animal husbandry, scientists and practitioners of veterinary medicine have important tasks to ensure a decent level of prevention and treatment of various diseases on farms, including noncontagious etiology, in particular, surgical pathologies [1, 7].

Today, to increase the production of livestock products, special attention is focused on the intensification of production and the development of high-yielding breeds of cattle. High-yielding animals are known to become diseased much more often. This is caused by the removal of large amounts of nutrients with milk, thus reducing the resistance of their body [1, 2].

The musculoskeletal system plays an extremely important role in the life cycle of the cow and responds quickly to pathogens and injuries also. Pathologies in the distal part of limbs, especially digits, in dairy cows are second only to obstetrical and gynaecological diseases. As a result of their occurrence, changes in the leukocyte profile occur in the animal, which affects further productivity [3, 4, 5].

The concentration of a large number of cows in confined areas of modern complexes and the introduction of comprehensive mechanization of the main technological processes lead to an increase in the number of surgical pathologies detected. In most cases, the emergence and development of pathological processes in wounds are derived from a complex of factors. The major causes are: mechanical injuries, softening of the hoof horn and maceration of the skin, disturbances in the finger skin protective function, surgical infection, allergic diseases and intoxications. Conditions contributing to trauma include: littering of paddocks and pastures with foreign objects, unsuitable paths to watering points and feeding troughs. Skin maceration and injuries can occur due to overcrowding, breach in housing technology, and structural deterioration of buildings. Predisposing causes include prolonged hypodynamia and improperly balanced diets [2, 4, 6, 7].

The main causes of purulent-necrotic lesions in animals, according to the authors, are the two interrelated etiological factors: mechanical injuries and the development of surgical infection at the site of the lesion [2, 6, 7].

Noncompliance with the requirements for sanitary and hygienic conditions in animal housing leads to overstraining of protective and adaptive functions, and is one of the causative aspects in the etiopathogenesis of purulent-necrotic lesions in farm animals. Poor conditions of elementary animal housing and feeding, untimely manure removal contributing to the permanent skin maceration in the distal part of limbs, impaired horn-formation and penetration of microflora, all this can be attributed to the major causes of the development of wound lesions [2,6,8]. Housing animals in damp, cold and polluted premises with a high bactericidal contamination and draughts leads to increased morbidity rate of feet diseases.

The analysis of findings shows a fairly significant prevalence of diseases in the distal limbs. Of all examined animals 23.7% were cows with the surgical foot pathology.

A significant proportion of this involve purulent necrotic processes in the distal limbs, that were diagnosed in 19.3% of the total number of animals examined, and 61% of those recorded with feet diseases [2, 6, 7].

In particular, purulent pododermatitis is the most common disease in the distal limbs.

Based on these results, it can be stated that this disease causes considerable economic damage, not only in terms of direct costs for veterinary drugs and veterinary fees, but also in terms of indirect costs such as a reduced meat, skin and milk quality. As a result, about 15-20% of milk is lost from each cow, and cows are prematurely culled [1, 6, 9].

With quite a large choice of veterinary drugs for treatment of purulent pododermatitis, there is a number of negative aspects such as: a long-term use leads to restrictions on the use of animal products, both during and sometimes after the course of animal treatment, sometimes ineffective treatment [7, 8]. In connection with the said above, it is relevant to search for new, environmentally friendly preparations with no negative impact on livestock products while having a pronounced therapeutic effect.

In veterinary pharmacology, probiotics are widely used because of their proven environmental friendliness. Most of the medicines in this group have been developed for internal use in the treatment of gastroin-

testinal diseases, but the evidence of their external application, including skin lesions, is already known in medicine [8].

**Materials and methods of research.** The clinical and practical part of the research was carried out on the farms of the Vitebsk region in 2020-2021, in the clinic of the Department of Surgery of the EE "Vitebsk State Academy of Veterinary Medicine".

Eighteen animals with purulent pododermatitis were selected for the trial. The cows were formed into two groups – experimental and control (9 animals in each), according to the principle of conditional clinical analogues (same weight, breed, age, productivity).

In the experimental group with purulent pododermatitis, after orthopaedic treatment and mechanical antiseptics, "Vetosporin" gel-probiotic was applied to the wound surface with the bandage applied, and re-bandage performed every 2 days until the animals fully had recovered.

In the control group, traditional treatment was applied, using, after orthopaedic and primary surgical treatment, 10% ichthyol ointment, every 2nd day until the animals had fully recovered.

To make an objective judgment on the efficiency of the treatment applied, monitoring of the local and general status of the studied animals was carried out. With this purpose, local temperature and tissue sensitivity, hyperemia, size and timing of inflammatory edema resorption, its consistency, exudate character, time of formation and character of granulation development were determined daily in animals of each group.

At the same time, before the trial (experimental, control), as well as on the day 1, 3, 7 and 12 after the start of the treatment, the morphological blood test was carried out. All digital material was subjected to statistical processing on a PC using the "Stadia" program and the "Excel" table processor.

The results were subjected to a mathematical processing using the standard statistical analysis software for IBM PC. The validity of the results was determined by the parametric Student test and the nonparametric Wilkinson-Mann-Whitney test.

**Research findings.** Our investigations revealed that before treatment, all animals of both experimental and control groups had general body temperature, pulse, respiration and rumination within the physiological norm. Practically all animals of the experimental and control groups had a local body temperature increase as well as pronounced local hyperaemia, painfulness, inflammatory edema and purulent exudate secretion. In the experimental group, where the gel-probiotic "Vetosporin" was used for treatment. Hyperemia, inflammatory swelling and painfulness in the affected tissues disappeared on the 5th day on the average, in the control group these indicators recovered to normal on the 8th day of treatment. The effusion of purulent exudate in the experimental group decreased by the 5th day of treatment, and completely stopped on the 7th day. In the control group it decreased by the 7th day of treatment and completely stopped on the 10th day of treatment.

In addition to the above-mentioned changes in the course of production trials, we also found changes in the general blood analyses of patients with purulent pododermatitis, which are shown in Table 1.

**Table 1 - Results of general blood tests of cows with purulent pododermatitis, (M±m)**

| Indicators | Days of research | | | | |
|---|---|---|---|---|---|
| | 1 | 3 | 7 | 12 | The healing process |
| RBCs, $x10^{12}$/L | 6,5±0,29 | 6,17±0,23 | 6,7±0,15 | 6,4±0,39 | 6,44±0,40 |
| Haemoglobin, g/l | 108,1±3,06 | 106,0±2,81 | 113,0±5,03 | 109,1±4,40 | 109,05±3,30 |
| WBC, $x10^{9}$/L | 12,1±0,25 | 11,2±0,25 | 10,5±0,33 | 10,1±0,14 | 10,9±024 |
| Basophils | 0,1±0,14 | 0,2±0,18 | 0,2±0,18 | 0 | 0,12±0,14 |
| Eosinophils | 5,0±0,63 | 4,7±0,64 | 5,1±0,80 | 4,4±0,40 | 4,8±0,57 |
| Juvenile | – | – | – | – | – |
| group | 5,2±0,31 | 3,9±0,34 | 4,1±0,44 | 3,7±0,42 | 4,2±0,26 |
| Segmented | 37,9±0,75 | 35,6±0,57 | 28,7±0,92 | 26,6±1,24 | 32,2±1,01 |
| Lymphocytes | 48,1±1,26 | 51,8±1,02 | 57,4±1,30 | 60,2±1,46 | 54,4±0,97 |
| Monocytes | 3,2±0,81 | 4,3±0,29 | 3,7±0,34 | 4,4±0,65 | 3,9±0,42 |

Analyzing the data of the blood morphological tests, it should be noted that the erythrocyte count and haemoglobin content of the cow blood in the group where the "Vetosporin" was used, was within the norm throughout the study period. A significant increase in the number of leukocytes in the animals of this group above the norm typical for the species was observed on the first day of treatment, and by the 7th day this indicator was normalized.

The changes observed in the leukogram on the first day of treatment were characterized by an increase in the total percentage of neutrophils. Simultaneously with the increase in the segmented neutrophils, there was a slight decrease in the percentage of lymphocytes. On the first day of treatment, the content of the segmented neutrophils was 37.90.75%, and on the third day it was 35.60.57%. Thereafter, the trend was reversed, i.e. the percentage of neutrophils returned to the initial level and the number of lymphocytes increased.

The blood testing showed no significant abnormalities. For example, the erythrocyte count and haemoglobin content in the blood of the animals remained within the normal range.

With inflammation, the body also develops general changes associated with the activation of protective systems of the whole organism, i.e. various morphofunctional, biochemical and immunobiological processes underlie the dynamics of healing. Since the leukocytic reaction is the most sensitive and quantitatively expressed, there was a sharp increase in the number of leukocytes in the blood of animals even within the first day after wounding [11,12].

We found that the increase in the number of leukocytes in the blood was mainly due to the segmented neutrophils. In the period of further observation, the number of leukocytes returned to the background level, but it should be noted that it occurred more rapidly in the animals of the experimental group. This trend indicates a more favourable healing process of purulent pododermatitis in the animals of the group where a probiotic gel was used.

**Conclusion.** "Vetosporin", the probiotic of the Belarusian produce for external application, has a pronounced therapeutic effect in the treatment of purulent pododermatites in cattle, suppressing the manifestation of inflammatory reaction, reduces the duration of the inflammatory process. This has a positive effect on the dynamics of the leukogram.

***References. 1.*** *Veremej, E. I. Lechebno-profilakticheskie meropriyatiya dlya krupnogo rogatogo skota pri hirurgicheskoj patologii na molochnyh kompleksah Vitebskoj oblasti : rekomendacii / E. I. Veremej, V. M. Rukol', V. A. ZHurba ; Vitebskaya gosudarstvennaya akademiya veterinarnoj mediciny. – Vitebsk : VGAVM, 2011. – 27 s. 2. Vliyanie ekzogennyh faktorov na sostoyanie zdorov'ya i produktivnost' korov / E. I. Veremej, V. M. Rukol', V. A. ZHurba, A. P. Volkov, A. A. Stekol'nikov, B. S. Semenov // Aktual'nye problemy veterinarnoj hirurgii : materialy Mezhdunarodnoj nauchnoj konferencii (g. Ul'yanovsk, 6-7 oktyabrya 2011 g.). – Ul'yanovsk : GSKHA, 2011. – S. 20–30. 3. ZHurba, V. A. Kliniko-gematologicheskie pokazateli pri lechenii gnojnyh ran v oblasti venchika u krupnogo rogatogo skota gel'-oksidatom-2 i SV-2 / V. A. ZHurba // Issledovaniya molodyh uchenyh v reshenii problem zhivotnovodstva : materialy III Mezhdunarodnoj nauchno-prakticheskoj konferencii, (g. Vitebsk, 30 maya 2003 g.) / Vitebskaya gosudarstvennaya akademiya veterinarnoj mediciny : sbornik nauchnyh trudov. – Vitebsk, 2003. – S. 100–102. 4. ZHurba V. A. Kliniko-gematologicheskij status korov s gnojnymi pododermatitami / V. A. ZHurba // Voprosy normativno-pravovogo regulirovaniya v veterinarii. – 2013. – № 3. – S. 47–48. 5. Kovalyov, I. A. Izmenenie lejkocitarnogo profilya pri lechenii krupnogo rogatogo skota s gnojnymi pododermatitami / I. A. Kovalyov, V. A. ZHurba // Mezhdunarodnyj vestnik veterinarii. – Sankt-Peterburg, 2020. – № 3. – S. 124–129. 6. Prognozirovanie ortopedicheskih boleznej u vysokoproduktivnogo krupnogo rogatogo skota / E. I. Veremej, V. A. Luk'yanovskij, A. A. Stekol'nikov, B. S. Semenov, V. A. ZHurba // Sovremennye problemy veterinarnoj hirurgii : materialy mezhdunarodnoj nauchno-prakticheskoj konferencii, posvyashchennoj 100-letiyu so dnya rozhdeniya SHakalova Karpa Iovicha. – Sankt-Peterburg, 2004. – S. 10–12. 7. Reglamentnye usloviya po uhodu za kopytcami krupnogo rogatogo skota : rekomendacii / E. I. Veremej, V. A. ZHurba, V. M. Rukol', V. A. Komarovskij, P. V. Sol'yanchuk ; Vitebskaya gosudarstvennaya akademiya veterinarnoj mediciny. – Vitebsk : VGAVM, 2017. – 24 s. 8. Hodas, YU. V. Gematologicheskie pokazateli u krupnogo rogatogo skota pri primenenii probiotika "Vetosporin" s lechebnoj cel'yu / YU. V. Hodas ; ruk. raboty V. A. ZHurba // Studenty - nauke i praktike APK : materialy 96 Mezhdunarodnoj nauchno-prakticheskoj konferencii (g. Vitebsk, 25-26 maya 2011 g.) / Vitebskaya gosudarstvennaya akademiya veterinarnoj mediciny. – Vitebsk, 2011. – S. 43–44.*

***Список литературы.*** *1. Веремей, Э. И. Лечебно-профилактические мероприятия для крупного рогатого скота при хирургической патологии на молочных комплексах Витебской области : рекомендации / Э. И. Веремей, В. М. Руколь, В. А. Журба ; Витебская государственная академия ветеринарной медицины. – Витебск : ВГАВМ, 2011. – 27 с. 2. Влияние экзогенных факторов на состояние здоровья и продуктивность коров / Э. И. Веремей, В. М. Руколь, В. А. Журба, А. П. Волков, А. А. Стекольников, Б. С. Семенов // Актуальные проблемы ветеринарной хирургии : материалы Международной научной конференции (г. Ульяновск, 6–7 октября 2011г.). – Ульяновск : ГСХА, 2011. – С. 20–30. 3. Журба, В. А. Клинико-гематологические показатели при лечении гнойных ран в области венчика у крупного рогатого скота гель-оксидатом-2 и СВ-2 / В. А. Журба // Исследования молодых ученых в решении проблем животноводства : материалы III Международной научно-практической конференции, (г. Витебск, 30 мая 2003 г.) / Витебская государственная академия ветеринарной медицины : сборник научных трудов. – Витебск, 2003. – С. 100–102. 4. Журба В. А. Клинико-гематологический статус коров с гнойными пододерматитами / В. А. Журба // Вопросы нормативно-правового регулирования в ветеринарии. – 2013. – № 3. – С. 47–48. 5. Ковалёв, И. А. Изменение лейкоцитарного профиля при лечении крупного рогатого скота с гнойными пододерматитами / И. А. Ковалёв, В. А. Журба // Международный вестник ветеринарии. – Санкт-Петербург, 2020. – № 3. – С. 124–129. 6. Прогнозирование ортопедических болезней у высокопродуктивного крупного рогатого скота / Э. И. Веремей, В. А. Лукьяновский, А. А. Стекольников, Б. С. Семенов, В. А. Журба // Современные проблемы ветеринарной хирургии : материалы международной научно-практической конференции, посвященной 100-летию со дня рождения Шакалова Карпа Иовича. – Санкт-Петербург, 2004. – С. 10–12. 7. Регламентные условия по уходу за копытцами*

*крупного рогатого скота : рекомендации / Э. И. Веремей, В. А. Журба, В. М. Руколь, В. А. Комаровский, П. В. Сольянчук ; Витебская государственная академия ветеринарной медицины. – Витебск : ВГАВМ, 2017. – 24 с. 8. Ходас, Ю. В. Гематологические показатели у крупного рогатого скота при применении пробиотика «Ветоспорин» с лечебной целью / Ю. В. Ходас ; рук. работы В. А. Журба // Студенты - науке и практике АПК : материалы 96 Международной научно-практической конференции (г. Витебск, 25-26 мая 2011 г.) / Витебская государственная академия ветеринарной медицины. – Витебск, 2011. – С. 43–44.*

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