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Complex Therapy of Application of the Sorbent With Antiseptic Powder in Purulent-Necrotic Ulcers on the Fingers and Hooves in Cows.

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ABSTRACT

The purpose of the study was to study the therapeutic effectiveness of the use of the sorbent in a mixture with powders against the background of intramuscular injection of the immunomodulator "Azoxivet" with purulent necrotic ulcers in the region of fingers and hoofs in cows. The experiments were carried out in the educational and scientific farm of the Gorsky State University and the SK«Raduga» of the Prigorodny District of the Republic of North Ossetia-Alania on cows of black and motley breed. For this purpose, two experimental groups (experimental and control) for 8 goals in each were formed. To the control group cows, mixtures of powders (boric acid, potassium permanganate and streptocid) were applied to the fingers and claws in the hydration phase, tetracycline ointment was used in the dehydration phase. The animals of the experimental group - dolomite flour with copper sulfate powders, zinc oxide and furacilin in the hydration phase and peach ointment in the dehydration phase. Intramuscularly injected immunomodulator "Azoxivet" in a dose of 24 ml 1 time per day for 6 days. In the course of the experiment, clinical signs were studied in animals, planimetric studies of ulcer area, hematologic, biochemical and immunological studies of blood serum were carried out. On the basis of the conducted scientific studies, we found that the cows of the control group had complete clinical recovery on day 35, whereas in the experimental group - on the 25th day after the start of treatment. The index Popova AN in the process of treatment was less than 4, but the decrease in the area of the ulcer in the direction of healing it occurred more quickly in the cows of the experimental group. It was established that the use of complex therapy accelerates the correction of hematologic, biochemical and immunological indices in the blood of cows of experimental groups, in comparison with the control group.

Keywords: cow, purulent-necrotic finger ulcers and hooves, blood tests, dolomite flour, copper sulfate, zinc oxide, furacilin, boric acid, potassium permangonate, streptocid, immunomodulator "Azoxivet".

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INTRODUCTION

Purulent necrotic lesions in the area of fingers and hoofs in agricultural animals are one of the reasons that hinder the intensity of livestock development, as they cause great economic damage to farms due to a decrease in body weight gain, unjustified expenses for feeding, keeping, nursing and treating animals, as well as premature culling of high-value animals.

It has been established that the lesions of the fingers and the hooves in agricultural, in particular cattle, make up 55-60% of all limb diseases or 14-20% of surgical pathology [1, 2, 3, 4].

The emergence of primary lesions of the fingers and hoofs is directly dependent on the breed of animals, the setting of limbs, deformation of the hooves and the state of natural resistance of the body and skin in the area of fingers and hooves. These include bruises, wounds, ulcers, which serve as a trigger mechanism for the development of complications and the emergence of severe surgical pathology.

Despite a comprehensive study of pathogenesis, clinical signs, prevention, development of effective treatment methods, the number of animals with this pathology does not decrease [5, 6, 7, 8, 9, 10].
In this regard, highly effective methods of treating animals with purulent necrotic lesions in the area of the fingers and the hoof is an actual problem

Purpose of the research:

The purpose of this study was to study the therapeutic effectiveness of the use of sorbent dolomite flour in a mixture with powders against the background of the immunomodulator "Azoxivet" with purulent necrotic ulcers in the region of fingers and hooves in cows.

MATERIALS AND METHODS

The experiments were carried out in the educational and scientific farm of the Gorsky State University and the SK «Raduga» of the Prigorodny District of the Republic of North Ossetia-Alania on cows of black and motley breed.To study the therapeutic effectiveness of the drugs used in purulent-necrotic ulcers in the region of the fingers and the hooves, we formed experimental groups with purulent-necrotic ulcers in the region of the fingers and hooves (control and experimental) with 8 heads in each.

To the cows of the control group, after a general and local anesthesia with a 2% xylazine solution and 0.5% solution of novocaine, a toilet was performed in the area of the fingers and the hoof, surgical treatment, irrigation of the ulcer with a 0.5% solution of the verocida, dried the ulcer with sterile cotton-gauze swabs and superimposed on it napkin in powders of boric acid, potassium permanganate, streptocide in the hydration phase and tetracycline ointment in the dehydration phase.

The animals of the experimental group were treated in the same manner, a cloth was applied to the ulcer with a sorbent - dolomite flour and copper sulfate, zinc oxide, furacilin in the hydration phase and peach ointment (Patent for invention No. 2640823, January 12, 2018) in the dehydration phase. Intramuscular injection of the immunomodulator "Azoxivet" in a dose of 24 ml 1 time per day for 6 days.

In the course of the experiment planimetric studies of the area of the ulcer in the dynamics before and on the 3rd, 5th, 10th, 15th, 20th, 25th day after the beginning of the treatment were carried out according to the method Vasilyeva LS(2009). The clinical characteristics of the ulcerative process were supplemented by cytological studies of wound prints (MF Kamaev, 1970). Hematologic studies were carried out on the automatic hematological analyzer RFE 90 VET NOTE

In the blood serum, biochemical indices were determined by the photometric method on a semi-automatic analysis of the "Bionik SAC" theory using reagents from Diakon DS and Vitan before and at 3, 5, 10, 15, 20, 25 days after the start of treatment.

Studies of immunological parameters of blood serum of cows of experimental groups were carried out according to generally accepted methods:

- lysozyme activity of blood serum (LABS), bactericidal activity of blood serum (BABS) (OV Smirnova, TA Kuzmina, 1966);
- phagocytic activity of neutrophils (FAN) (NV Vasilieva, YuNOdintsov, YuVFedorov, 1972);
- cellular immunity (T-system) - T-lymphocytes (MJondall et al., 1972);
- The number of active T-lymphocytes - by the method of spontaneous rosette formation with erythrocytes of a ram (BKertiel et al., 1974);
- humoral immunity (B-systems) (CBianco et al., 1970);
- Quantitative determination of immunoglobins - by the method of radial immunodiffusion (G Mancini, 1965);
- circulating immune components in blood serum (YA Grikevich, AN Alferov, 1984).

RESULTS AND DISCUSSION

It was established that the clinical picture of cows of experimental groups prior to treatment was characteristic of purulent-necrotic ulcers in the region of fingers and hoofs in cows. Their general condition was depressed in the area of rudimentary fingers, corolla and crumb of hoofs observed ulcer, covered with a thin coating of purulent exudate with an unpleasant odor. The ulcer was reddish-red. When palpation revealed soreness and increased local temperature, a swelling of the fingers and hooves in the cows. During movement, lameness of a strong degree of supporting type was observed. Animals relied on the hooked part of the hooves. Milk productivity in cows was reduced by 50-60%.

In cows of the control group, on the fifth day after the start of treatment, the general condition was depressed, appetite and milk productivity were lowered. The ulcer was dry purple-red. On the tenth day after the beginning of treatment, puffiness in the area of fingers and hoofs decreased, appetite became satisfactory, milk productivity recovered by 70%. Tetracycline ointment was applied to the ulcer. On the fifteenth day of treatment, the general condition of the cows was satisfactory, the appetite was restored, the puffiness in the area of the fingers and the hoofs subsided, the ulcer became dry, and the growth of the young granulation tissue was observed from the edges of the ulcer.

On the twenty-fifth day after the start of treatment, the general condition of the control group cows was good, the animals eagerly took food. Dairy productivity recovered by 80%. At movement in animals the lameness of an average degree of basic type was observed. Complete clinical recovery with the formation of granulation, epidermisation and scarring came on the thirty-fifth day after the start of treatment.

In the treatment of experimental group cows, the general condition and appetite were satisfactory already on the fifth day. Dairy productivity has been restored by 60%. The ulcer is dry. On the tenth day the general condition of the animals was satisfactory, the appetite recovered. When palpation manifested soreness, and during the movement observed lameness of an average degree. On the fifteenth day of treatment, the general condition of the cows was good, the swelling in the area of the fingers and the hooves were asleep. The lameness of the middle degree of the supporting type was noted. Dairy productivity recovered by 80%.

On the twentieth day of treatment, the general condition and appetite were good. From the edges of the ulcer appeared a young granulation tissue. Dairy productivity in cows was restored by 90%. Complete clinical recovery in the cows of the experimental group occurred on the 25th day after the start of treatment.

Planimetric studies of ulcers revealed that before the start of treatment in the cows of experimental groups, the area of the ulcer averaged 358 cm^2. In the cows of the control group on the 3rd day of treatment, the average area of the ulcer was 350 sm^2, for the 5th day it was 340 sm^2, for 10 310 sm^2, for 15-300 , for 20-250 sm^2, for 25-200 sm^2, 30-30 sm^2, and on the 35th day - 0 sm^2. There was a complete clinical recovery.

In cows of the experimental group on day 3, the area of the ulcer decreased and amounted to 340 sm^2, for 5 days, 10, 15, 20 and 25 days - 300 sm^2, 250 sm^2, 200 sm^2, 80 sm^2 and 0 sm^2, respectively. There was a complete clinical recovery on the 25th day after the start of treatment.

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In the control group, the decrease in the ulcerous surface on day 3 was 8%, for the 5th day, 10, 15, 20, 25, 30 and 35 days - 4.8%, 6.9, 13, 19, 21.6, 36 , 52 and 100% respectively. Cows of the experimental group - 8%, 18, 30, 54, 80 and 100% respectively.

The index Popova AN during the treatment in all experimental animals was negative and less than 4, however, the decrease in the area of the ulcer towards acceleration of healing of it occurred faster in the animals of the experimental group than in the control group.

To qualitatively evaluate the blood properties of cows in experimental groups in the process of complex therapy, we conducted a study of hematological, biochemical and immunological indicators of blood.

It was established that in cows of experimental groups there was an increase in the number of erythrocytes, hemoglobin content during the entire study period from 2 to 11.8%. The average hemoglobin content in erythrocyte, mean red blood cell volume, average hemoglobin concentration in erythrocyte tended to increase throughout the study period. However, a more pronounced tendency to increase of these parameters was observed in the animals of the experimental group.

Table - Hematologic indices of cows of experimental groups (M ± m; n = 6)

Indicators	Terms of study (days)						Clinically healthy animals
	Before treatment	from the beginning of treatment					
		3	5	10	15	20	
Control group							
Erythrocytes, 10^{12}/l	5,6±0,46	6,0±0,16	6,2±0,12	6,4±0,36	6,6±0,28	7,0±0,48	7,0±0,82
	100%	106,3%	103,3%	103,2%	103,1%	102,0%	
Hemoglobin, g/l	74,0±0,60	80,4±1,00	82,2±1,00	86,5±2,00	88,0±2,00	94,0±3,00	105,4±0,73
	100%	113,3%	102,2%	105,2%	101,7%	106,8%	
The average volume of red blood cells, fl	44,2±1,20	44,4±0,92	44,6±1,20	44,8±1,64	45,0±1,82	45,6±0,92	58,7±1,09
	100%	100,4%	100,4%	100,5%	104,6%	101,3%	
Mean hemoglobin in erythrocyte, pg	15,5±0,40	15,7±0,28	16,0±0,44	16,2±0,46	16,4±0,52	16,6±0,18	17,0±0,18
	100%	101,2%	101,9%	101,2%	101,4%	101,2%	
The average concentration of hemoglobin in erythrocyte, g/αL	34,4±0,20	35,5±0,19	35,8±0,18	36,1±0,56	36,4±0,64	37,0±0,32	37,0±0,32
	100%	103,1%	100,8%	100,9%	100,8%	101,0%	
Experienced group							
Erythrocytes, 10^{12}/l	5,4±0,32	5,8±0,12	6,2±0,18	6,5±0,38	7,0±0,12	7,5±0,82*	7,0±0,82
	100%	107,4%	106,8%	104,8%	107,6%	107,1%	
Hemoglobin, g/l	75,5±0,92	76,8± 0,92*	78,0± 1,00*	90,5± 2,00**	98,0± 1,00**	100,0± 2,00***	105,4±0,73
	100%	101,7%	107,1%	103,2%	108,2%	107,1%	
The average volume of red blood cells, fl	42,5±1,12	42,0± 0,34*	42,6± 0,38*	42,8± 0,38*	43,0± 0,34*	45,0±0,32	58,7±1,09
	100%	98,8%	101,4%	100,4%	100%	104,6%	
Mean hemoglobin in erythrocyte, pg	16,2±2,00	14,8±0,18	15,2±0,16	15,4±0,12	16,0±0,12	16,2±0,44	17,0±0,18
	100%	91,4%	102,7%	101,3%	103,8%	101,2%	
The average concentration of hemoglobin in erythrocyte, g/αL	32,4±0,80	37,8±0,28	35,2±0,24	36,0±0,92	36,4±0,86	38,0± 0,82*	37,0±0,32
	100%	116,7%	101,1%	102,7%	101,1%	105,5%	

* - p <0.05, ** - p <0.01, *** - p <0.001

It was found that during the treatment, on day 20, the number of leukocytes decreased in the animals of the experimental group by 26.7%.

Consequently, the use of sorbent dolomite in the mixture with powders and ointments peach with necrotic ulcers in toe and hooves on the background immunomodulator "Azoxivet" cows speed correction hematological parameters compared to the control group.

Studies of blood biochemical parameters showed that the reserve alkalinity in the control group cows was low - 99%, the experimental group - 104%. The calcium content increased in the animals of the control group to 104%, in the experimental - to 107%; inorganic phosphorus - up to 93% and 118.7%, respectively. The concentration of glucose is up to 104% and 107%; total protein - up to 58.0% and 103.5%; albumins - up to 97.0% and 105.0%; globulins - up to 96.0% and 106.6%, respectively.

Consequently, increasing reserve alkalinity, total calcium, inorganic phosphorus, total protein and globulin indicates an increase of natural resistance of the organism, redox and thermal condition in the test group cows compared with the control.

Studies of bactericidal (BABS) and lysozyme (LABS) serum activity in the cows of the experimental groups showed that before the treatment began, these indicators were lowered. On the third day after the beginning of treatment and until the end of the studies, in the experimental cows of the experimental groups BABS and LABS increased from 103.5% to 113%, the control group increased from 100.8% to 105.5%.

Analysis of cellular immunity in cows of the experimental groups show that in animals of the control group the number of lymphocytes in the end of the experiment (20 hours) decreased by 94%, T-active (E-current) - 96% T-common (E-current) - 95.3%, T-total - 93.3%, T-helpers (E-TOC) - 94.7%, T-helpers - 87.5%, T-suppressors (E-TOC) - by 87.5% and T-suppressors - by 90.9%. In the cows of the experimental group - by 90%, 95, 96, 71.4, 99, 75, 96 and 81%, respectively.

On the basis of the data obtained, it can be concluded that the animals of the experimental group recovered more rapidly cellular immunity, compared with the control group. Consequently, increasing immunobiological reactivity when applying impurity sorbent powders and hydration phase and peach ointment dehydration phase promotes the formation of granulation tissue and complete healing of necrotic ulcers in toe and hooves of cows.

Investigations of the humoral immunity of cows with purulent-necrotic finger ulcers and hoofs showed that at the beginning of treatment the indices of humoral immunity of the animals of the experimental groups were elevated.

It was established that before the treatment of cows with purulent-necrotic ulcers in the area of fingers and hooves, the parameters of humoral immunity were increased. In the control group, the B-lymphocyte content decreased from 87.6% to 95% and from 85.3% to 85.7% from 5 days until the end of the study, the CEC increased from 97.4% to 100%. The content of immunoglobulins decreased: Ig G - from 102% to 97%, Ig A - from 100% to 100%, Ig M - from 110% to 104%.

In cows of the experimental group, the content of B-lymphocytes - from 100% to 92.3% and from 133% to 66%, the CEC increased from 99% to 102%. The content of immunoglobulins: Ig G - from 105% to 103.8%, Ig A - from 150% to 200%, Ig M - from 110% to 115%.

Based on the results obtained can be done separately, that in animals of experimental group scientific data at application impurity sorbent powders and hydration phase and peach ointment dehydration phase promotes correction of humoral immunity in the end of the study (day 20).

Summary:

1. The use of sorbent-dolomite flour in a mixture with copper sulfate, zinc oxide and furacilin powder in the hydration phase and peach ointment in the dehydration phase against the background of the

immunomodulator"Azoxivet" accelerates the normalization of clinical signs in purulent necrotic ulcers in the region of fingers and hoofs in experimental cows groups

2. The use of etiopathogenetic therapy in combination with the immunomodulator "Azoxivet" (dolomitic flour with powders) accelerates the recovery of purulent necrotic ulcers in the region of fingers and hooves in the cows of the experimental group for 10 days compared to the control one.

3. Planimetric studies found that the index Popova was negative, less than 4, however, the decrease in the area of the ulcer in the direction of accelerating the healing of it occurred in the animals of the experimental group more rapidly than in the control group.

4. Etiopathogenetic therapy in combination with immunomodulator "Azoxivet" accelerates the normalization of hematological, biochemical and immunological indices of the experimental group cows with purulent-necrotic ulcers in the region of fingers and hoofs, in comparison with the control group.

5. In conclusion, we suggest using purulent necrotic lesions in the area of fingers and hoofs in cows to use a sorbent with a mixture of powders and the immunomodulator "Azoxivet".

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