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РЕСПУБЛИКИ КАЗАХСТАН

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V.G. Semenov[1], D.A. Baimukanov[2], V.G. Tyurin[3], N.I. Kosyaev[1], R.M. Mudarisov[4], D.A. Nikitin[1], Zh. K. Iskhan[5], M.B. Kalmagambetov[2], A.A. Tlepov[6]

[1]Chuvash state agricultural academy, Cheboksary, Chuvash Republic, Russian Federation;
[2]Kazakh Scientific Research Institute of Animal Breeding and Fodder Production, Almaty, Republic of Kazakhstan;
[3]All-Russian SRI of veterinary sanitation, hygiene and ecology, Moscow, Russian Federation;
[4]Bashkir state agricultural university, Ufa, Republic of Bashkortostan, Russian Federation;
[5] Kazakh National Agrarian University, Almaty, Republic of Kazakhstan;
[6]Taraz State University named after M.Kh. Dulati, Taraz, Kazakhstan

NONSPECIFIC PROTECTION OF THE ORGANISM OF COWS-MOTHERS AND CALVES IN REALIZATION OF REPRODUCTIVE AND PRODUCTIVE QUALITIES

Abstract. Improvement of reproductive qualities of the white-and-black cattle and realization of the productive potential of calves during the remote periods of growing and fattening by activation of nonspecific resistance of an organism by biological products is an urgent problem of the modern zootechnical science and practice. For the first time, on the basis of complex researches, the expediency of application of the Prevention-N-A developed biological product on the basis of the Saccharomyces cerevisiae polysaccharide complex of yeast cells and germicide of Aminoglycosides group in technology of receiving and growing of calves in comparison to earlier approved PS-2 medicine is evidence-based and experimentally proved It was established that the immunocorrection of the organism of down-calving cows and newborn calves under pressure of environmental and technological stress factors with new generation biopreparations prevents cows from gynecological diseases in the birth and postnatal periods, improving reproductive qualities, and in calves - promotes the prevention of diseases of the respiratory and digestive organs, activates growth and development, ensuring a more complete realization of the productive potential of the young stock in the periods of growing and fattening, with more expression effect of Prevention-N-A. The purity of meat carcasses by organoleptic, biochemical and spectrometric indicators and, consequently, the safety of the tested preparations were proved.

Keywords. Cows, calves, biological products, nonspecific resistance, gynecologic state, reproductive and productive qualities.

Introduction. In the Russian Federation, dairy cattle breeding is one of the most profitable animal breeding sectors, and the need for its further development is dictated by the satisfaction of the population's needs for food products of its own production, which plays an important role in the country's food security.

One of the most important factors determining the achievement of the genetic potential of productivity, reproductive ability, disease resistance, productive longevity of animals of modern highly productive breeds, enhancing their forage-conversive capacity, and therefore, the successful development of animal breeding, is the observance of zoohygienic requirements chain "forage → housing conditions → protection of farms from pathogens invasion → getting and preservation of calves → quality and processing of production → environment → human health". However, modern technologies often violate the relationships of the animal's organism with the environment and the traditional conditions of keeping, feeding and servicing that have developed during phylogenesis, tearing them away from the natural habitat and bringing them closer to a biological machine which task is to produce the target products. Animals cannot avoid the effects of stress factors, which leads to a decrease in the nonspecific resistance of the organism to various functional disorders and, as a consequence, to diseases. The organism is especially

sensitive to the effects of unfavorable environmental factors in the first and last months of intrauterine development, and the first months of the newborn. The physiological status of the maternal organism is reflected in fetal development and postnatal ontogeny of the newborn [1, 3, 7, 8, 9].

In the context of the foregoing, at the present stage of the development of cattle breeding, the problem of preventing the adverse effects on the organism of technological and environmental factors that cause a decrease in the reproductive and productive qualities of animals is of particular importance [2, 12, 16, 17, 18]. One of the ways of preventing the negative influence of stress factors, improving the reproductive and productive qualities of black-and-white cattle is the immunoprophylaxis of the organism with biological preparations [4, 5, 6, 10, 11, 13, 14, 15, 19, 20, 21], along with the improvement technologies for breeding work and raising young cattle [22 - 26].

The research was carried out within the framework of international cooperation of scientists of the Russian Federation (headed by Doctor of Biological Sciences, Professor Vladimir Grigoriyevich Semenov) and the Republic of Kazakhstan (headed by the corresponding member of the National Academy of Sciences of the Republic of Kazakhstan, Doctor of Agricultural Sciences Dastanbek Asylbekovich Baimukanov) in the period 2015 -2017 on priority branches of productive animal husbandry.

The aim of this work is to improve the reproductive qualities of black-and-white cattle and to realize the productive potential of calves in remote periods of growing and fattening by activating nonspecific resistance of the organism with PS-2 and Prevention-N-A biological preparations.

To achieve the aim, the following ***objectives*** were set:

1. To study the hygienic conditions of keeping and feeding of nonmilking (incalvers) and milking cows, calves from birth to 180 days (including the prophylactic period up to 25 days), the young stock in the periods of growing up to 360 days and fattening up to 540 days.

2. To conduct studies of the gynecological condition and reproductive qualities of black-and-white cattle against the background of immunocorrection of the organism with PS-2, previously approved, and Prevention-N-A, developed and tested for the first time.

3. To reveal the influence of biological preparations on the growth and development, morbidity and safety of calves.

4. To evaluate the meat productivity of young stock and the quality of beef.

5. To characterize the physiological state, morphological and biochemical profiles of blood, the nonspecific resistance of the organism in the biological chain "cow - calf - young stock".

6. To determine the economic feasibility of the use of the PS-2 and Prevention-N-A biopreparations in the technology of obtaining and growing calves.

Materials and methods of research. Experimental studies were carried out in the conditions of the commercial-dairy farm of the Ulyanov IAPC, Alikovsky district, the Chuvash Republic, in accordance with the plan of scientific research of the Chuvash State Agricultural Academy, and the processing of materials was carried out in the Chuvash Republican Veterinary Laboratory of the State Veterinary Service of the Chuvash Republic, in the bio- and nanotechnology laboratory of the Department of Morphology, Obstetrics and Therapy at the Chuvash State Agricultural Academy in the period from 2012 to 2016.

The subjects of the research were the incalvers (45 days before calving) and the newly calved (3-5 days after calving) cows of the black-and-white breed, calves from birth and young stock up to 540-days old. In the scientific and economic experience, three groups of nonmilking cows were selected according to the principle of para- analogues, taking into account the clinical and physiological state, age and live weight of 10 animals in each group. A similar principle was used to select groups of newborn calves.

In order to improve the reproductive qualities of black-and-white cattle and realize the productive potential of calves, the biopreparations developed by scientists from the Chuvash State Agricultural Academy: PS-2 and Prevention-N-A (V.G. Semenov, etc.) were used in remote periods of growth and fattening of young animals. Cows of the 1st experimental group were injected intramuscularly with PS-2 at a dose of 10 ml three times for 45-40, 25-20 and 15-10 days before calving, of the 2nd test group - Prevention-N-A at the indicated dose and time, of the control group - no biopreparations were injected. The calves of the 1st and 2nd groups were injected intramuscularly with PS-2 and Prevention-N-A, respectively, two times on the 2nd ... 3rd and 7...9th days of life in a dose of 3 ml.

PS-2 – a preparation for increasing non-specific resistance and immunogenesis of animals, is an aqueous suspension containing a polysaccharide complex of yeast cells immobilized in an agar gel with the addition of a benzimidazole derivative (2,3,5,6-tetrahydro-6-phenylimidazo-(2,1, -β)-tiazole hydrochloride). On the PS-2 biopreparation, the patent of the Russian Federation for invention No. 2332214 was received, registered in the State Register of Inventions of the Russian Federation on August 27, 2008, published in the official bulletin "Inventions. Useful Models", 27.08.2008, № 24.

Prevention-N-A – complex preparation for activation of nonspecific resistance of the organism of cattle, it is a 2.5% aqueous suspension of saccharomyces cerevisiae immobilized in agar gel with the addition of benzimidazole derivative and bactericidal preparation of aminoglycoside group - (S)-0-3-Amino-3-deoxy-alpha-D-glucopyranosyl-(1-6)-0- [6-amino-6-deoxy-alpha-D-glucopyranosyl-(1-4)-N1-(4-amino-2-hydroxy-1-oxobutyl)-2-deoxy-D-streptamine. On the Prevention-N-A biopreparation, a patent of the Russian Federation for invention No. 2602687 was received, registered in the State Register of Inventions of the Russian Federation on October 26, 2016.

Results of the research. Research work was carried out in accordance with the zoohygiene standards for the main parameters of the microclimate in cowsheds and maternity ward, premises for growing calves, growing and fattening of young stock (Table 1).

Table 1 - Microclimate in the premises for animals

Indicator	Premises					
	cowshed	maternity ward	preventative clinic	calfshed	growing premise	fattening premise
T, ^{o}C	10.1±0.25	15.0±0.39	15.6±0.18	13.9±0.10	12.7±0.14	10.9±0.15
R, %	70.3±1.14	67,3±0.76	73.4±0.89	76.1±0.4	75.6±0.51	74.6±0.50
ν, m/s	0.31±0.02	0.28±0.02	0.19±0.01	0.21±0.01	0.22±0.01	0.24±0.01
CK	1:14	1:13	1:13	1:13	1:13	1:15
KEO, %	0.63±0.04	0.68±0.02	0.75±0.02	0.80±0.02	0.81±0.04	0.73±0.04
NH_3, mg/m^3	13.5±0.60	8.7±0.52	6.0±0.19	8.8±0.21	8.6±0.37	9.4±0.30
H_2S, mg/m^3	7.2±0.26	4.8±0.29	3.2±0.16	5.6±0.18	4.7±0.23	5.0±0.17
CO_2, %	0.20±0.01	0.14±0.01	0.16±0.00	0.22±0.00	0.16±0.01	0.18±0.01
BC, thous/m^3	43.7±1.56	30.3±1.02	23.1±0.72	34.0±0.79	28.6±0.63	30.9±0.55
Dust, mg/m^3	4.2±0.31	2.7±0.25	1.3±0.09	2.9±0.12	2.3±012	2.5±0.15

Thus, the parameters of the air pool in the autumn-winter period in the maternity ward and the winter period in the preventative clinic had correspondingly the following values: temperature - 15.0 and 15.6 °C, relative humidity 67.3 and 73.4%, air velocity - 0.28 and 0.19 m/s, bacterial contamination - 30.3 and 23.1 thousand/m3, the content of ammonia - 8.7 and 6.0 mg/m^3, hydrogen sulphide - 4.8 and 3.2 mg/m^3, carbon dioxide - 0.14 and 0.16%, no carbon monoxide was detected, dust - 2.7 and 1.3 mg/m^3. The luminous coefficient was 1:13 with the coefficient of natural illumination of 0.68 and 0.75%.

Animals were fed on the rations accepted in the farm, their balance in energy and nutrients, mineral elements and vitamins were coordinated with detailed feeding standards.

The daily ration for sterile nonmilking cows included 6.0 kg of hay from the alfalfa-rump, 7.5 kg of hay from timothy-clover, 12.5 kg of corn silage, 5.0 kg of beet fodder, 3.0 kg of mixture of concentrates, 0.3 kg treacle, 0.7 kg of PVMC for cattle (nonmilking) K+. The diet for dairy cows with a live weight of 500 kg and a yield of 20 kg during the winter period included 3.5 kg of hay from the alfalfa-rump, 9 kg of hay from timothy-clover, 21 kg of corn silage, 10 kg of beet fodder, 5.0 kg of mixture of concentrates, 0.9 kg of feed treacle, 0.8 kg of PVMC for cattle (milking herd).

The calf feeding scheme is designed to achieve live weight at the 90-day-old age of 90 kg at a consumption of 175 kg of pure milk and 120 kg of calf starter. Granulated starter-concentrate for calves K+ includes grain part (70%), oilseed concentrate (15%), fodder yeast (5%), monocalcium phosphate (1%), vitamin-mineral premix (1%), chalk (1.5%), a substitute for low-fat milk (6%) and table salt (0.5%), as well as carotenoids. In the diet for calves, hay and haylage are also provided.

When growing calves of 90 to 180 day-old age, growing and fattening of young stock, a mixed fodder consisting of 80% of ground grain and 20% of PVMC was used. PVMC contains 87.4% of dry matter,

274.2 g of crude protein, 10.2 MJ/kg of exchange energy, 80.8 g of crude fiber, 31 g of calcium, 20.4 g of phosphorus, 250 mg/kg of carotene, 19.5 g of lysine, 13.7 g of methionine. Vitamin and mineral composition is as follows: 80 thousand IU of vitamin A, 8 thousand IU - D3, 8 mg - E, 1.2 mg - B1, 40 mg - B2, 80 mg - B3, 80 mg - B5, 0.08 mg of vitamin B12, 60 mg of Fe, 40 mg of Mn, 20 mg of Cu, 80 mg of Zn, 2.0 mg of Co, 2.4 mg of J, 80 mg of Mg, 0.4 mg of sodium selenite, 20 mg of oxynyl, 2000 mg of Bio-Mos.

The supply of rations in energy and protein is presented in Table. 2.

Table 2 - Provision of diet in energy and protein

Indicator	In practice	Norm	Provision, %
	av. dly	av. dly	
interlactation period			
EFU	14.6	13.2	110.3
Crude protein, g	1931.3	1845.0	104.7
Digestible protein, g	1289.5	1265.0	101.9
Days in milk period			
EFU	18.97	17.0	111.6
Crude protein, g	2312.9	2320.0	99.7
Digestible protein, g	1551.1	1560.0	99.4
Under 90 days old calves growing period			
EFU	3.01	2.65	113.4
Crude protein, g	472.9	470.5	100.5
Digestible protein, g	407.5	390.0	104.5
90 to 180 days old calves growing period			
EFU	4.07	3.9	104.3
Crude protein, g	525.2	581.0	90.4
Digestible protein, g	341.4	392.0	87.1
180 to 360 days old young animals growing period			
EFU	6.04	5.9	103.2
Crude protein, g	841.2	796.0	105.7
Digestible protein, g	507.1	515.0	98.5
360 to 540 days old young animals fattening period			
EFU	8.15	8.0	101.9
Crude protein, g	1117.5	979.0	114.1
Digestible protein, g	676.1	691.0	97.8

Thus, the conditions of keeping and feeding during periods before calving and days in milk of cows, calves management, growing and fattening of young stock corresponded to zoohygienic standards and detailed feeding standards.

The results of studies of the gynecological state of cows are given in Table. 3.

Under the influence of PS-2 and Prevention-N-A, in cows, the time for membrane sweep was reduced by 6.0 and 6.4 h, the retention of placenta was eliminated, postpartum complications and breast diseases were prevented. The risk of subinvolution of uterus and endometritis during intramuscular injection of PS-2 decreased by 3.0 and 2.0 times, respectively, and at Prevention-N-A, it was excluded ($P<0.05$). Against the background of immunoprophylaxis, the cows were reduced in terms of the onset of heat on 11.6 and 14.2 days, the conception rate decreased in 1.6 and 1.8 times, the service period was shortened on 22.4 and 28.4 days, and fertilization was increased in 1 heat in 2.5 and 3.0 times ($P<0.05$-0.01).

In such a way, intramuscular injection of cows with biopreparations prevented gynecological diseases and increased reproductive function, with a more pronounced effect of Prevention-N-A.

It was established that the body temperature, pulse rate and respiratory movements in cows of the experimental groups were within physiological norms. Increase in the number of erythrocytes and hemoglobin concentration in the blood of animals of the experimental groups against the background of

intramuscular injection of PS-2 and Prevention-N-A preparations on the 3-5 day after calving by 0.56 and 0.62x1012/l and by 4.4 and 6.4 g/l (P<0.05-0.01) indicates the improvement in hemopoiesis in them, and an increase in the number of leukocytes by 0.26 and 0.42x109/l (P>0.05), respectively, on the activation of cellular protective factors organism. In this case, the CI and CHC in cows of the experimental groups did not change significantly.

A decrease in the number of eosinophils in the blood of cows 10-5 days before calving and 3-5 days after calving indicates that they experienced stress, and an increase in these granulocytes in the blood of animals under the influence of PS-2 and Prevention-N-A biopreparations 10-5 days before calving by 0.8 and 0.6% and 3-5 days after calving by 0.6 and 0.8% is caused by the activation of nonspecific resistance of the organism.

If the number of stab neutrophil forms in the blood of cows of the 1st and 2nd test groups was lower than in the control, for 35-30 days before calving - by 1.2 and 1.6%, 15-10 days - by 2.2 and 2.4%, 10-5 days before calving - by 1.4 and 1.6% and on the 3-5th day after calving - by 1.8 (P<0.05) and 1.8% (P<0.05), then segmented neutrophils turned out, on the contrary, to be higher for 30-25 days before calving by 0.6 and 1.0%, for 15-10 days - by 0.6 and 0.4%, for 10-5 days before calving - by 0.4 and 0.2%, but 3-5 days after calving was lower by 0.2 and 0.6% (P>0.05), respectively. Considering that neutrophils have a pronounced phagocytosis, the established qualitative changes in the stages of development of these granulocytes and the shift of the neutrophilic nucleus to the right indicate activation of the nonspecific resistance of the organism. Biopreparations stimulate the production of lymphocytes by hematopoietic organs, i.e. cellular factors of nonspecific resistance. The amount of this type of agranulocytes in the blood of the animals of the experimental groups was higher by 0.2-1.0 and 0.6-1.4% (P<0.05) than in the control.

It was established that PS-2 and Prevention-N-A increase protein metabolism, production of albumins (plastic material) and γ-globulins (humoral factor of nonspecific resistance). These biochemical parameters in animals of the 1st and 2nd experimental groups on 3-5th day after calving were higher than the control values by 3.2 and 2.8 g/l, 1.4 and 1.3 g/l, 2.7 and 2.1 g/l, respectively (P<0.05-0.01). The decrease in the γ-globulin fraction of protein in the blood serum of the experimental cows after calving may be assumed to be due to the production of colostrum lactoglobulins, which is aimed at the formation of colostral immunity in newborn calves. A significant increase in γ-globulins in the blood serum of cows in experimental groups during nonmilking and milking periods testifies to the activation of the humoral link of the nonspecific resistance of the organism under the influence of biological preparations.

Table 3 - Indicators of gynecological condition of cows

Indicator	Groups of animals		
	Control	1st experimental	2nd experimental
Number of animals	10	10	10
Terms of expulsion of afterbirth, h	13.2±1.02	7.2±0.58*	6.8±0.66*
Retention of placenta	4	-	-
Subinvolution of uterus	3	1	-
Endometritis	2	1	-
Mastitis	2	-	-
Beginning of the 1st estrus, days	43.2±1.36	31.6±0.93*	29.0±0.71*
Conception rate	2.6±0.43	1.6±0.24*	1.4±0.19**
Сервис-период, сут	87.0±3.05	64.6±1.94**	58.6±1.50**
Fertilized cows:			
during the 1st estrus	2	5	6
during the 2nd estrus	3	4	4
during the 3rd estrus	5	1	-

* P≤0.05; ** P≤0.01.

Intramuscular injection of PS-2 and Prevention-N-A to down-calving cows increased the alkaline blood reserve by 3.8 and 5.2 vol% of CO2 (P<0.05-0.01) due to activation of buffer systems, glucose level

by 0.36 and 0.30 mmol/l (P<0.05-0.01), total calcium by 0.18 and 0.20 mmol/l (P<0.05) and inorganic phosphorus by 0.27 and 0.19 mmol/l (P<0.05), respectively. It should be noted that PS-2 had a more pronounced stimulating effect on protein and carbohydrate metabolism, and Prevention-N-A normalized the acid-base state of the organism and mineral metabolism. It was revealed that the preparations did not affect the metabolism of provitamin A.

The dynamics of the main hematological indices of the nonspecific resistance of the cow's organism is graphically shown in Fig. 1-4.

It was found that the phagocytic activity of blood leukocytes in cows of the control group varied during the final period of pregnancy from 48.0 ± 2.35% to 49.2 ± 1.50%. In the first and second experimental groups, it consistently increased from 48.2 ± 2.31 to 52.8 ± 1.93% and from 51.2 ± 0.86 to 53.2 ± 1.46%. After calving, the activity of phagocytes decreased in the control group to 44.6 ± 1.69%, in the 1st and 2nd experimental groups - up to 50.8 ± 2.22% and 51.6 ± 1.69%, respectively. The level of the investigated indicator of nonspecific resistance was higher in cows of the 1st and 2nd experimental groups by 6.2 and 7.0% compared to the control (P<0.05), respectively.

If the phagocytic index of the blood of the control group cows was reduced before calving from 8.8 ± 0.37 to 7.8 ± 0.37, in the 1st experimental group, on the contrary, it increased steadily from 9.0 ± 0.32 to 10, 0 ± 0.32. In animals of the 2nd group, the specified index of the cellular link of the nonspecific resistance of the organism also increased from 9.2 ± 0.37 to 10.2 ± 0.49 when observed in the period from 35-30 to 15-10 days before calving; however, for 10-5 days before calving, its reduction was established to 9.8 ± 0.80. It should be noted that the phagocytic index was higher in cows of the 1st and 2nd experimental groups by 1.4 (i.e., 16.6%) and 1.5 (or 21.4%) for 15-10 days before calving and by 2.2 (ie by 28.2%) and 2.0 (or by 25.6%) for 10-5 days before calving, respectively, compared with the control (P<0.05-0.01). After calving, the phagocytic index was higher in animals of the experimental groups than in the control group by 1.8 (ie, by 23.7%) and 2.0 (or by 26.3%), respectively (P<0.05).

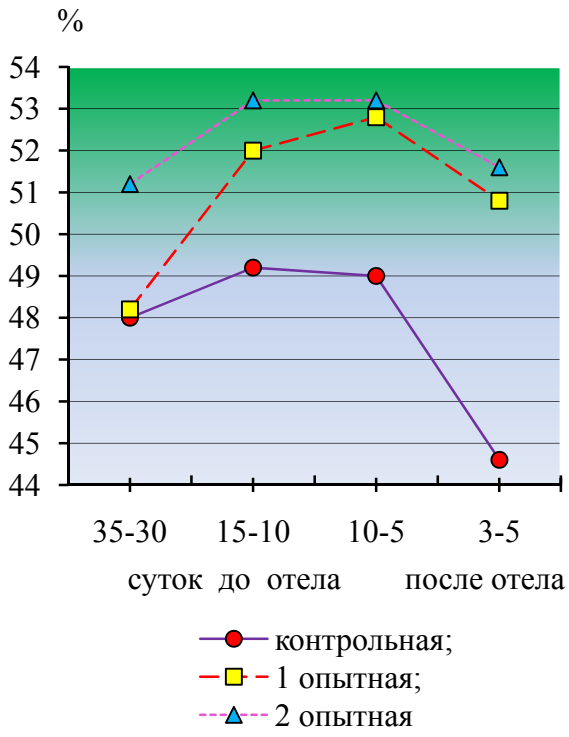

Figure 1 - Dynamics of phagocytic activity

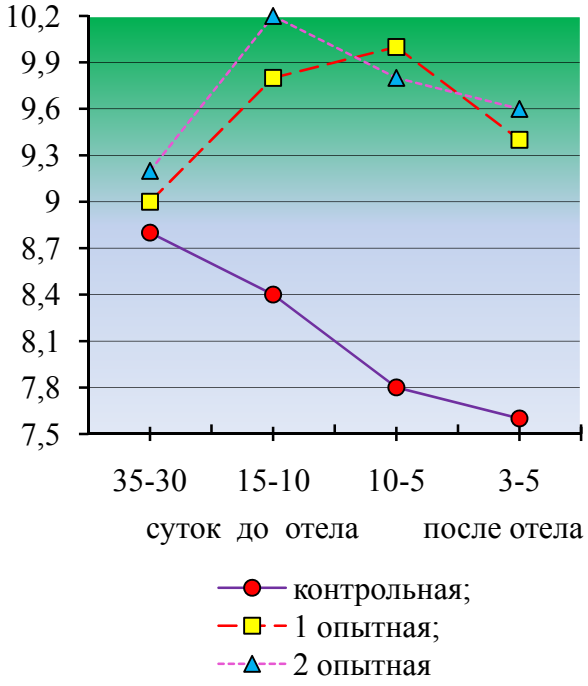

Figure 2 - Dynamics of the phagocytic index

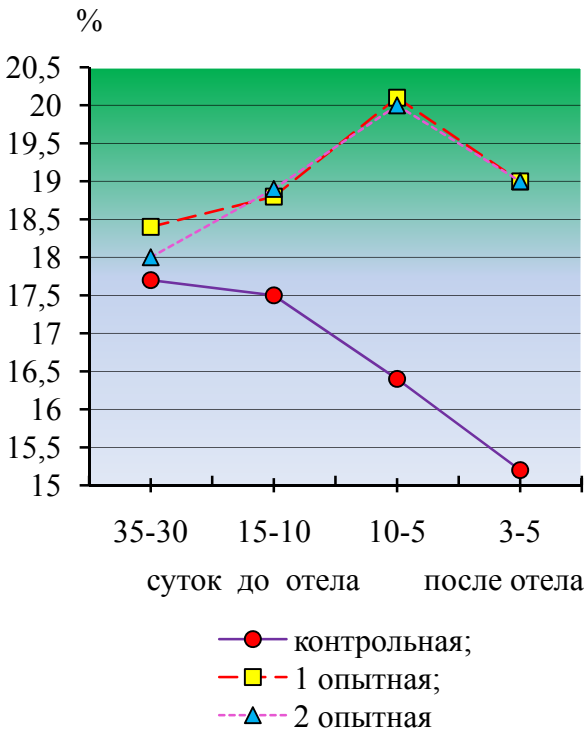

Figure 3 - Dynamics of lysozyme activity

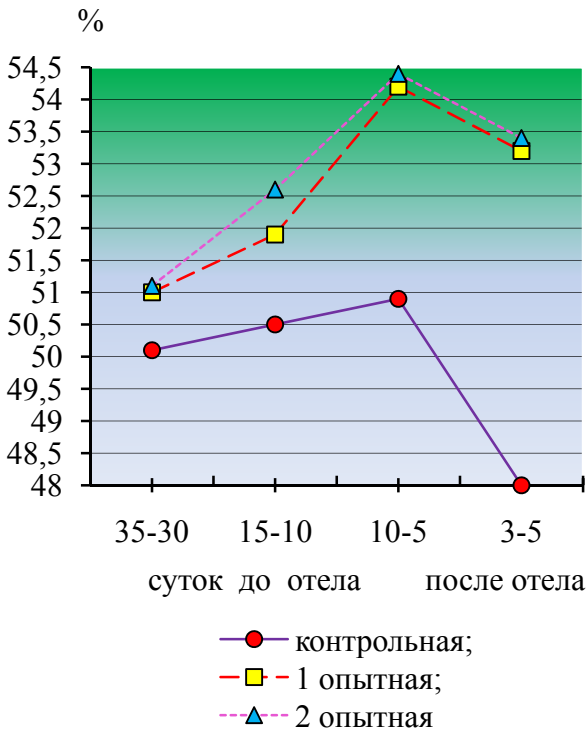

Figure 4 - Dynamics of bactericidal activity

The activity of lysozyme in the blood plasma of down-calving cows of the control group decreased, while in animals of the 1st and 2nd experimental groups it increased, and 10.4 days before calving it was 16.4 ± 0.27%, 20.1 ± 0.24 and 20.0 ± 0.54%, respectively. The indicated activity in animals of the experimental groups was significantly higher by 3.7 and 3.6% compared to the control (P<0.001). After calving, the lysozyme activity of the blood plasma decreased both in the control and in the 1st and 2nd experimental groups of animals and amounted to 15.2 ± 0.37%, 19.0 ± 0.21 and 19.0 ± 0.66%, respectively, that is, it was higher in both experimental groups by 3.8% (P<0.001).

The bactericidal activity of the blood serum of down-calving cows was increased both in the control and in the accepted variants of the experiments, and for the 10-5 days before calving it was 50.9 ± 0.90%, 54.2 ± 1.30 and 54.4 ± 1.11% respectively. It was higher in animals of the 1st and 2nd experimental groups by 3.3 (P>0.05) and 3.5% (P<0.05). After calving, bactericidal activity of blood serum of animals decreased and on the 3-5th day it was: 48.0 ± 0.85% in the control, 53.2 ± 1.07% in the first group, and in the 2nd experimental group - 53.4 ± 1.43%. That is, in cows of experimental groups it was significantly higher by 5.2 and 5.4% (P<0.05).

Based on the conducted studies, it can be generalized that intramuscular injection of PS-2 to cows, tested even earlier, and Prevention-N-A, developed and approved for the first time, in a dose of 10 ml for 45-40, 25-20 and 15-10 days before calving contributed to an increase in the nonspecific resistance of the body.

As a result of intramuscular administration of calves, PS-2 and Prevention-N-A have been found to increase their growth and development.

By the end of the growing period, the animals of the 1st and 2nd experimental groups exceeded the control peers in live weight by 4.6 and 7.0 kg, in growing - by 13.8 and 17.0 kg and in fattening - by 19.4 and 24.2 kg respectively (P<0.05-0.01). The average daily growth in animals of the experimental groups was higher than in the control group, during the growing period by 22.3 and 34.5 g, in the complete growing period - by 52.0 and 55.0 g and fattening by 31.0 and 40.0 g respectively (P<0.05-0.001). It should be noted that the most pronounced growth-stimulating effect was provided by the Prevention-N-A developed and tested by us, rather than the previously tested PS-2.

Exterior measurements of young stock in dynamics are presented in Table. 4.

Table 4 - Dynamics of exterior measurements of young stock

Group of animals	Age, days	Measurements, cm			
		oblique body length	height at withers	chest girth behind the shoulder blades	girth of pastern
Control	1	69±0.93	68±0.71	72±0.73	10.0±0.09
	30	80±0.92	77±0.93	85±0.86	10.3±0.08
	60	92±0.92	85±1.12	91±0.40	12.4±0.10
	90	102±1.03	86±1.07	100±0.24	13.0±0.10
	120	111±0.37	88±0.86	106±0.24	13.5±0.07
	150	115±0.51	92±0.86	111±0.45	14.1±0.09
	180	122±0.68	97±1.08	117±0.51	14.9±0.04
	360	146±0.84	113±0.93	147±0.60	15.2±0.07
	540	168±1,.16	125±0.86	170±0.80	15.9±0.07
1st experimental	1	71±0.89	69±0.66	73±0.58	10.1±0.13
	30	82±0.68	80±0.86	87±0.93	10.6±0.10
	60	94±0.75	86±0.93	92±0.55	12.6±0.10
	90	103±0.81	87±0.97	101±0.60	13.2±0.10
	120	111±0.63	90±0.68	106±0.58	13.6±0.10
	150	117±0.93	94±0.68	112±0.51	14.1±0.07
	180	123±0.51	99±0.58	118±0.51	15.1±0.09
	360	147±1.16	116±1.30	150±0.51**	15.4±0.08
	540	172±0.66*	128±1.14	172±0.20*	16.0±0.05
2nd experimental	1	71±0.97	69±0.71	73±0.68	10.1±0.14
	30	83±1.03	80±0.71	87±0.98	10.6±0.11
	60	95±0.66*	87±1.02	92±0.49	12.7±0.13
	90	105±0.51*	88±0.86	101±0.49	13.2±0.11
	120	112±1.21	90±0.66	107±0.55*	13.7±0.06
	150	117±1.41	94±0.71	113±0.75	14.3±0.08
	180	123±0.97	99±0.87	120±1.03	15.2±0.09*
	360	150±0.75*	117±0.86**	151±0.75**	15.4±0.07
	540	172±1.29	130±0.71*	173±0.51*	16.1±0.14

* P≤0.05; ** P≤0.01.

The characteristics of the exterior and constitutional features of experimental animals allow us to conclude that under the influence of biological preparations zootechnical measurements were increased. An analogous regularity is revealed in the character of changes in the growth rate of animals of the compared groups.

In calves of the experimental groups, the respiratory and digestive diseases were reduced in 2.3 and 7.0 times, recovery time - on 1.3 and 4.3 days, and the Mellenberg coefficient by 2.8 and 15.4 times, respectively, compared with the control (P<0.05), that indicates a pronounced prophylactic effectiveness of the tested drugs for these diseases.

It was established that the increase in the body weight of animals of the 1st and 2nd experimental groups at the age from 1 to 540 days was higher by an average of 18.8 and 23.4 kg, while the feed costs per 1 kg of the increase in live weight, conversely, were lower by 0.36 and 0.45 EFU, respectively, than in the control.

Slaughter qualities of young animals are presented in Table. 5.

Against the background of the use of biopreparations, the pre-slaughter weight of young animals increased by 20.3 and 24.4 kg, the weight of the hot carcass increased by 12.9 and 16.8 kg, the slaughter weight by 13.8 and 17.5 kg, and the weight of internal fat by 0.9 and 0.7 kg. Thus, improved fattening and slaughter qualities of young animals (P <0.05-0.001) were established under the influence of biological preparations.

Indicators of meatiness of half-carcasses of young animals are presented in Table. 6.

The mass of the half-carcasses of the young stock of the 1st and 2nd experimental groups was higher in comparison with the control by 6.8 and 9.2 kg, the pulp weight - by 5.33 and 7.25 kg and bones - by 1.0

and 1.38 kg respectively (P<0.01-0.001). However, the yield of bones from the half-carcasses of young animals of the tested groups was lower by 0.4 and 0.5%, respectively. The results of these studies indicate that as the weight of the half-carcasses of the experimental animals increased, the specific weight of the pulp increased, and, on the contrary, of the bones decreased.

Table 5 - Slaughter qualities of young stock

Indicator	Group of animals		
	control	1st experimental	2nd experimental
Live weight at removing from fattening, kg	426.6±2.50	446.0±3.17**	450.8±2.28***
Preslaughter live weight, kg	416.8±2.17	437.1±2.61***	441.2±2.05***
Weight of carcass, kg	211.3±1.95	224.2±2.11**	228.1±1.83***
Yield of carcass, %	50.7	51.3	51.7
Weight of internal fat, kg	7.4±0.25	8.3±0.19*	8.1±0.15*
Output of internal fat,%	3.50	3.70	3.55
Skin weight, kg	29.4±0.31	30.1±0.27	30.2±0.25
Skin output,%	7.05	6.90	6.85
Slaughter weight, kg	218.7±2.21	232.5±2.47**	236.2±2.17***
Slaughter yield, %	52.5	53.2	53.5

* P≤0.05, ** P≤0.01, *** P≤0.001.

Table 6 - Meatiness of half-carcasses of young stock

Indicator	Group of animals		
	control	1st experimental	2nd experimental
Weight of half-carcasses, kg	103.6±1.27	110.4±1.05**	112.8±1.07***
Pulp, kg	77.80±0.95	83.13±0.76**	85.05±0.89***
Pulp yield, %	75.09	75.29	75.39
Bones, kg	21.85±0.63	22.85±0.21*	23.23±0.27**
Bone output, %	21.09	20.69	20.59

* P≤0,05, ** P≤0,01, *** P≤0,001.

According to organoleptic, biochemical and spectrometric indicators, beef met the requirements of the Technical Regulations of the Customs Union "On food safety" TR CU 021/2011 and the Technical Regulations of the Customs Union "On the safety of meat and meat products" TR CU 034/2013, which indicates the good quality of meat carcass [27].

It was established that the body temperature, pulse rate and respiratory movements in calves during the growing period and in young stock in the process of complete growth and fattening were within physiological norms.

Biopreparations activated erythropoiesis and increased the concentration of hemoglobin in the blood (P<0.05-0.01), but did not affect CI, CHC, and leukopoiesis. Hemopoiesis was more pronounced under the influence of Prevention-N-A.

The revealed fact of relative eosinophilia in the blood of animals of experimental groups allows us to conclude that the tested preparations caused an anti-stress effect on the body, especially during the calving period, with a higher Prevention-N-A effect.

In the blood of the experimental newborn calves, the stab neutrophil forms predominated, and in the subsequent periods of research - segmented ones. And the number of segmented neutrophils was higher in the blood of animals in the experimental groups than in the control (P>0.05). The established qualitative changes in the stages of development of neutrophils indicate a shift of the neutrophilic nucleus to the right, i.e. the activation of cellular factors of nonspecific protection of the animal organism under the influence of preparations.

Against the background of intramuscular injection of calves, biopreparations have been shown to increase the production of the main cellular elements of the immune system, lymphocytes, by the bone

marrow, which testifies to stimulation of cellular (contact interaction with the cells-victims) and humoral (development of antibodies) immunity.

The content of total protein, albumins and γ-globulins in the blood serum of the first and second experimental groups was significantly higher than in the control, for example, by the end of the growing period - by 3.8 and 5.0 g/l, 3.3 and 4.5 g/l, 3.5 and 3.7 g/l, respectively (P<0.05-0.01). These changes in the blood serum of animals were caused by the activation of the mechanism of nonspecific resistance of the organism under the influence of biological preparations.

After intramuscular administration of PS-2 and Prevention-N-A in calves, buffer systems, exchange of glucose, total calcium, inorganic phosphorus and provitamin A were activated in the organism.

The state of humoral resistance of the young organism most fully characterizes the lysozyme activity of the plasma and the bactericidal activity of blood serum (Figures 5, 6).

The lysozyme activity of the blood plasma of animals in the control, 1st and 2nd experimental groups increased in the experimental period from 6.1 ± 0.36 to 24.2 ± 0.41%, from 6.4 ± 0.40 to 25.4 ± 0.45 and from 7.0 ± 0.44 to 26.0 ± 0.23%, respectively. This activity of the humoral link of nonspecific protection of the organism of animals in the 1st and 2nd experimental groups was higher than in the control: during the growing period, by 1.5-3.1 and 2.0-4.1% (P<0, 05-0,001), in the complete growing period by 1.8 (P<0.05) and 2.8% (P<0.001), fattening by 1.2 (P>0.05) and 1.8% (P<0.001).

The bactericidal activity of the blood serum of the control and experimental animals on the 1st day after the setting the experiments did not differ significantly and amounted to 32.0 ± 1.10%, 32.1 ± 1.24 and 32.8 ± 1.02%, respectively. Subsequently, the values of this indicator consistently increased and by the end of the observation period were 58.0 ± 0.40%, 59.0 ± 0.48 and 60.1 ± 0.23%, i.e. increased by 1.81, 1.84 and 1.83 times. It should be noted that the bactericidal activity of the blood serum of animals of the 1st group was significantly higher than in the control: at the age of 15 days by 4.6%, 30 days - by 2.8%, 60 days - by 5.0%, 90 days - by 3.7%, 120 days - by 3.3% and 180 days - by 3.4% (P<0.05-0.01). At the same time, the difference between the data of animals of the 2nd experimental and control groups turned out to be reliable in 15, 30, 60, 90, 120, 180 and 540 days after intramuscular injection of the Prevention-N-A biopreparation. The corresponding values for the young stock in the 2nd group were 5.4%, 4.8, 6.8, 6.0, 5.1, 5.6, 2.8, and 2.1%, respectively (P<0.01-0.001).

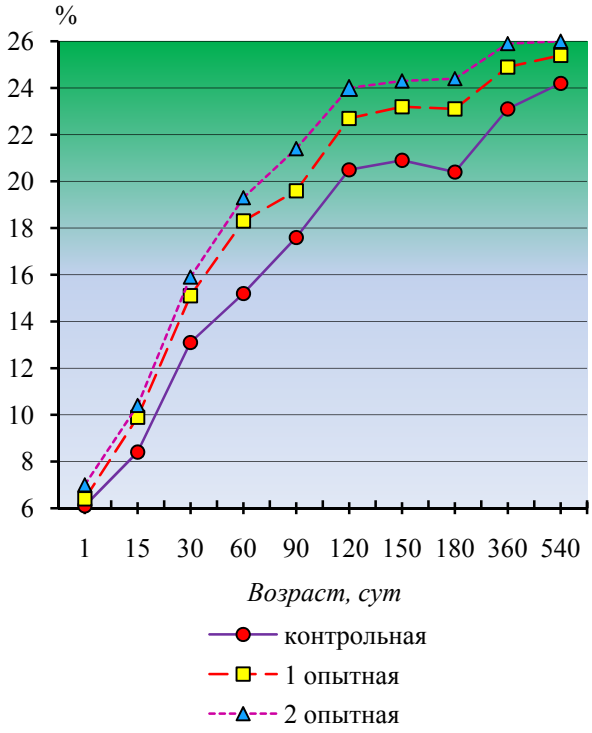

Figure 5 - Dynamics of lysozyme activity

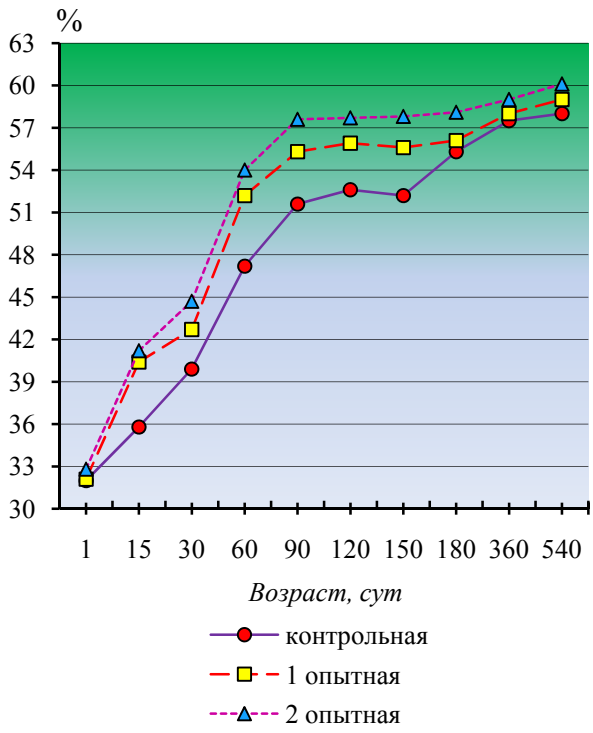

Figure 6 - Dynamics of bactericidal activity

In addition, the drugs used in the experiments stimulated the production of immunoglobulins.

It was established that the phagocytic activity of leucocytes was higher in young animals grown with the use of PS-2 and Prevention-N-A than in the control by the end of the growing period by 4.0% and by 4.6%, of the complete growing period - by 4.0 and 6.4%, fattening - by 2.8 and 3.4% (P<0.05-0.01). A similar pattern was also observed in the dynamics of the phagocytic index.

Consequently, biopreparations activate both humoral and cellular links of unspecific resistance of the organism.

The economic effectiveness of the use of PS-2 and Prevention-N-A in the technology of obtaining and growing calves in order to improve the reproductive qualities of black-and-white cattle and fattening qualities of young animals was 1 rub. additional costs of 6.0 and 7.48 rubles respectively.

Conclusion. Thus, PS-2 and Prevention-N-A biopreparations, activating the nonspecific resistance of the organism of cows-mothers and newborn calves to the effect of environmental and technological factors of the habitat, prevent postpartum complications and gynecological diseases of cows and improve their reproductive qualities, and in calves contribute to prevention of respiratory and digestive diseases, intensify growth and development, improve fattening and slaughter quality of young animals.

Proposals to production. In order to improve the reproductive qualities of black-and-white cattle and realize the productive potential of calves in remote periods of growing and fattening, we recommend:

1) to inject intramuscularly the Prevention-N-A biopreparation in sterile nonmilking cows three times for 45-40, 25-20 and 15-10 days before calving in a dose of 10 ml;

2) to inject intramuscularly the Prevention-N-A biopreparation in calves twice on 2...3 and 7...9th day of life in a dose of 3 ml.

It should be noted that PS-2 and Prevention-N-A improve the reproductive qualities of cows, fattening and slaughter qualities of young stock by activating the nonspecific resistance of the organism, preventing the incidence of cows and calves, with a more pronounced corresponding effect of Prevention-N-A.

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В.Г. Семенов[1], Д.А. Баймұқанов[2], В.Г. Тюрин[3], Н.И. Косяев[1], Р.М. Мударисов[4], Д.А. Никитин[1], К.Ж. Исхан[5], М.Б. Қалмағамбетов[2], А.А. Тлепов[6]

[1]Чуваш мемлекеттік ауылшаруашылық академиясы, Чебоксары қаласы, Чуваш Республикасы, Ресей;
[2] Қазақ мал шаруашылығы және азық өндірісі ғылыми - зерттеу институты, Алматы қаласы, Қазақстан Республикасы;
[3] Ветеринарлық санитария, гигиена және экология бүкілресейлік ғылыми – зерттеу институты Мәскеу өаласы, Ресей;
[4]Башқұр мемлекеттік аграрлық университеті, Уфа қаласы, Башқұрстан Республикасы, Ресей;
[5] Қазақ ұлттық аграрлық университеті , Алматы қаласы, Қазақстан Республикасы

ӨНІМДІЛІК САПАСЫ ЖӘНЕ ҰДАЙЫ ӨСІРУДІ ЖҮЗЕГЕ АСЫРҒАНДА АНАЛЫҚ СИЫР МЕН БҰЗАУ ОРГАНИЗІМІНДЕ ӨЗГЕШЕ ҚОРҒАНЫС

Аннотация. Мүйізді ірі қара (қара – ала сиыр) малдың репродуктивтік қасиеттерін жақсарту және биологиялық препараттармен организмге тән емес қарсылықты белсендіру арқылы бұзауды бордақылау қазіргі заманғы зоотехникалық ғылым мен практиканың өзекті мәселесі болып табылады. Бұрын бекітілген PS -2 препаратымен салыстырғанда, Saccharomyces cerevisiae ашытқы жасушалары және Prevention-N-A бактерицидтік полисахаридтер

кешенінің негізінде дайындалған препараттарды қолданудың тиімділігі ғылыми негізделіп, алғашқы рет тәжірибие негізінде дәлелденді. Жаңа биопрепараттармен (Prevention-N-A) көп төлдеген сиырлардың және туылған төлдердің ағзасын иммунокоррекциялау эколого – технологиялық стресс- факторлар жағдайында сиырларда төлдеу және төлдеуден кейінгі уақыттарда гинекологиялық сырқаттарды алдын алуға, ал бұзауларда тыныс алу және асқорту ағзаларының сырқаттарын болдырмауға, өсіп – жетілуді ынталандырады, өсіру және бордақылау кезінде өнімділік потенциалының толық ашылуына мүмкіндік береді. Сыналып отырған препараттардың қауіпсіздігі еттің органолептикалық, биохимиялық және спектрометриялық көрсеткіштерінің оң нәтижелері бойынша дәлелденді

Түйін сөздер. Сиырлар, бұзау, биопрепараттар, тән емес қарсылық, гинекологиялық күй, репродуктивтік және өнімділік қасиеттері.

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В.Г. Семенов[1], Д.А. Баймуканов[2], В.Г. Тюрин[3], Н.И. Косяев[1], Р.М. Мударисов[4], Д.А. Никитин[1], К.Ж. Исхан[5], М.Б. Калмагамбетов[2], А.А. Тлепов[6]

[1]Чувашская государственная сельскохозяйственная академия, г. Чебоксары, Чувашская Республика, Россия;
[2]Казахский научно-исследовательский институт животноводства и кормопроизводства, г. Алматы, Республика Казахстан;
[3] Всероссийский научно-исследовательский институт ветеринарной санитарии, гигиены и экологии, г. Москва, Россия,
[4]Башкирский государственный аграрный университет, г. Уфа, Республика Башкортостан, Россия;
[5]Казахский национальный аграрный университет, г. Алматы, Республика Казахстан;
[6]Таразский государственный университет имени М.Х. Дулати, г. Тараз, Республика Казахстан;

НЕСПЕЦИФИЧЕСКАЯ ЗАЩИТА ОРГАНИЗМА КОРОВ - МАТЕРЕЙ И ТЕЛЯТ В РЕАЛИЗАЦИИ ВОСПРОИЗВОДИТЕЛЬНЫХ И ПРОДУКТИВНЫХ КАЧЕСТВ

Аннотация. Улучшение воспроизводительных качеств черно-пестрого скота и реализация продуктивного потенциала телят в отдаленные периоды доращивания и откорма активизацией неспецифической резистентности организма биопрепаратами является актуальной проблемой современной зоотехнической науки и практики. Впервые на основе комплексных исследований научно обоснована и экспериментально доказана целесообразность применения разработанного биопрепарата Prevention-N-A на основе полисахаридного комплекса дрожжевых клеток Saccharomyces cerevisiae и бактерицидного препарата группы аминогликозидов в технологии получения и выращивания телят в сопоставлении с ранее апробированным препаратом PS-2. Установлено, что иммунокоррекция организма глубокостельных коров и новорожденных телят в условиях прессинга эколого-технологических стресс-факторов биопрепаратами нового поколения предупреждает у коров гинекологические заболевания в родовой и послеродовой периоды, улучшая воспроизводительные качества, а у телят – способствует профилактике заболеваний органов дыхания и пищеварения, активизирует рост и развитие, обеспечивая более полную реализацию продуктивного потенциала молодняка в периоды доращивания и откорма, при более выраженном эффекте Prevention-N-A. Доказана доброкачественность мясных туш по органолептическим, биохимическим и спектрометрическим показателям и, следовательно, безопасность испытуемых препаратов.

Ключевые слова. Коровы, телята, биопрепараты, неспецифическая резистентность, гинекологическое состояние, воспроизводительные и продуктивные качества.

About the authors:

Semenov Vladimir Grigoryevich, doctor of biological science, professor, honored worker of science of the Chuvash Republic, professor of department of morphology, obstetrics and therapy of the Chuvash state agricultural academy, Cheboksary, Chuvash Republic, Russia, e-mail: semenov_v.g@list.ru;

Baimukanov Dastanbek Asylbekovich, doctor of agricultural sciences, professor, corresponding member of National Academy of Sciences of the Republic of Kazakhstan, chief researcher of department of growing and selection of the dairy cattle of the Scientific Research Institute of Animal Breeding and Fodder Production, Almaty, Republic of Kazakhstan, e-mail: dbaimukanov@mail.ru;

Tyurin Vladimir Grigoryevich, doctor of veterinary sciences, professor, head of the laboratory of zoohygiene and environmental protection of the All-Russian Research Institute of veterinary sanitation, hygiene and ecology, Moscow, Russia, e-mail: potyemkina@mail.ru;

Kosyaev Nikolay Ivanovich, doctor of veterinary sciences, professor of department of an epizootology, parasitology and veterinary and sanitary examination of the Chuvash state agricultural academy, Cheboksary, Chuvash Republic, Russia, e-mail: kocyevni81@mail.ru;

Mudarisov Rinat Mansafovich, doctor of agricultural sciences, professor of department of beekeeping, private zootechnics and animal husbandry of the Bashkir state agricultural university, Ufa, Republic of Bashkortostan, Russia, e-mail: r-mudarisov@mail.ru;

Nikitin Dmitry Anatolyevich, candidate of veterinary sciences, associate professor of morphology, obstetrics and therapy of the Chuvash state agricultural academy, Cheboksary, Chuvash Republic, Russia, e-mail: nikitin_d_a@mail.ru;

Iskhan Kairat Zhalelovich, Candidate of Agricultural Sciences, associate professor, professor of the department "Technology of production of livestock products" of the faculty "Technology and Bioresources", Non-commercial Joint-Stock Company “Kazakh National Agrarian University”. E-mail: kairat@mail.ru;

Kalmagambetov Murat Baitugelovich, Candidate of Agricultural Sciences, Head of the Department of Feeding Livestock Animals, Limited Liability Partnership “Kazakh Scientific Research Institute of Animal Breeding and Fodder Production”. E-mail: animal_feeding@mail.ru;

Tlepov Anarbek Amreevich, candidate of Agricultural Sciences, Associate Professor of the Department of Biotogi, M.Kh. Dulati Taraz State University, Taraz, Kazakhstan. E - mail: tlepov_anarbek@mail.ru.

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