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The Use of Biologically Active Substances from Plant Raw Materials in Certain Physiological Conditions of Cows

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ABSTRACT

When using bio-stimulators containing BAS (biologically active substances) obtained from raw materials of plant origin in combination with E-selenium and amylodextrin containing iodine for the treatment of catarrhal postpartum endometritis, the duration of therapy was 6.4 days, which is 38% less than when using Metristar together with Estrophan. The period from calving to the first insemination was reduced by 13% and amounted to 59 days. The period from calving to fruitful insemination was reduced by almost 10% and amounted to 63 days. In general, it can be seen that the recovery processes took place more quickly in the animals of the experimental group, which proves better utilization of glucose against the background of triglycerides and higher levels of creatinine, and globulins. Also, the data obtained prove the safety and effectiveness of the proposed therapies for postpartum endometritis. Since all the animals were in the same conditions and on the same diet, we believe that the acceleration of the regeneration process occurred as a result of the use of BAS-containing drugs. The study of hematological and biochemical parameters of animal blood showed the absence of toxicity and the presence of harmlessness of drugs offered for the therapy of metropathy.

Keywords: Biologically active substances, Therapy, Cows, Catarrhal postpartum endometritis.

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INTRODUCTION

Biostimulants/adaptogens have been used since the time of Avicenna and Hippocrates, but the study of their composition and the scientific justification of the mechanism of action on the body began only in the 20th century [1, 2]. It was found that some preparations contain special substances. They are produced by living cells of various tissues of animal and plant origin during prolonged exposure to extremely unfavorable conditions [3]. In such tissues, BAS substances are formed that stimulate specific biochemical processes in the same tissues, which contribute

to the preservation of the vital activity of tissues in unfavorable conditions [4-6].

The use of drugs containing BAS in strictly dosed amounts increases the indicators of natural resistance of the body (bactericidal activity of blood serum, phagocytic activity of leukocytes), stimulates hematopoiesis, improves metabolism and reproductive function of animals, stimulates the growth rate and weight gain of animals, improves feed conversion [7-10]. The liver, spleen, testes, skin, placenta, peat, estuarine mud, plantain leaves, and other components, including tree aloe, are used for the manufacture of such preparations [11-13].

Currently, such BAS-containing drugs are used by many specialists in the complex therapy of pathologies of reproductive organs, in particular, catarrhal postpartum endometritis in sows and cows [14-18]. This improves the quality of eggs in females and promotes faster regeneration of myometrial tissues after metropathies and calving [15]. However, few specialists seriously think about how exactly a drug or a complex of similar drugs affects the metabolic process in the body, and whether the means used have a hidden negative effect on the body.

In this regard, we set a goal: to study the effect of drugs manufactured and used by us for the treatment of catarrhal postpartum endometritis in cows on the duration of therapy of catarrhal postpartum endometritis, the frequency of insemination, the period from calving to insemination, some hematological and biochemical parameters of cows' blood.

MATERIALS AND METHODS

In the course of scientific work, experiments were carried out to determine the effect of therapeutic drugs manufactured by us on some cow indicators, namely: the duration of therapy, the frequency of insemination, the period from calving to insemination, and some hematological and biochemical parameters of cow blood.

After checking calved cows for the presence of postpartum pathologies on days 14-18, 2 groups were formed from among the animals diagnosed with catarrhal postpartum endometritis: experimental and control.

The animals of the experimental group were injected four times (once a week) with the drug E-Selen at 1ml / 50kg, subcutaneously, injected with a drug obtained from plant tissues at 1ml / 100kg mixed with novocaine 0.5%. Also, for 6-7 days, 150 ml of the drug containing amylodextrin and iodine were administered intrauterine daily. The tissue preparation was manufactured in the laboratory Laboratorul Biotehnologii în Reproducţie şi Transfer de Embrioni NPIBZMV. To prepare the drug, the leaves of the Aloe arborescens Milli plant were used at least 2 years old. The cut aloe leaves were kept for 10-12 days in the dark, at a temperature of 4-8 ° C. The teeth and yellowed ends were removed, cut into small pieces, and ground until a pulp formed. A threefold amount of distilled water was added and boiled for 3-2 minutes (for protein coagulation), after which it was filtered. Sodium chloride was added to the filtrate (7 g per 1 liter), boiled for 2 minutes, and filtered, the pH level was measured (batches of the drug with a pH in the range of 5.0-5.6 were taken into operation), poured into 50 ml vials and sterilized for one hour in an autoclave at 120 ° C.

Animals of the control group on the 14th-18th day after calving were prescribed a single, rectal, uterine body massage. Also on the 14th-18th, 21st, and 28th days after calving, the contents of one tube of Metristar - 19 g were injected into the uterine cavity, and 2 ml of Estrophan was injected on the 18th and 28th days after calving.

Clinically healthy animals were considered on the 3rd day after the cessation of any discharge from the uterine cavity. At the same time, despite the cessation of discharge from the uterine cavity, therapy using amylodextrin with iodine continued for 3 days after the cessation of discharge from the uterine cavity, and the minimum duration of therapy was at least 6 days, even if the discharge stopped on the 2nd day after the start of therapy.

Before the start of the research and at the end of the experiment, blood samples were taken. Animals of both groups were kept in the same conditions and on the same diet. The results obtained were formalized by test certificates.

RESULTS AND DISCUSSION

Statistically processed research results were summarized in **Tables 1 and 2** below.

Table 1 presents the results of studies to determine the effect of drugs manufactured and used by us for the treatment of catarrhal postpartum endometritis in cows on the duration

of therapy, the frequency of insemination, and the period from calving to insemination.

Table 1. Effectiveness of the proposed means of therapy for catarrhal postpartum endometritis of cows

Groups	Intensive care period, days	Multiplicity of inseminations	Pregnancy after the first insemination	The period from calving to first insemination, days	The period from calving to 100% fertile insemination, days
Experimental	6.4±0.273	1.2±0.22	80%	58.8±1.85	63±5.82
Control	10.4±0.44	1.2±0.22	80%	67.6±3.85	69.8±3.0082
Difference, days	4.0	-	-	8.8	6.8
Difference, %	38.46	-	-	13.01	9.74

The data in **Table 1** shows that the minimum periods of intensive therapy necessary for cleansing the uterine cavity and restoring the structure of the endometrium were 6.4 ± 0.273 days in animals of the experimental group. This is 38.46% less than in the control group, where the minimum duration of therapy required to cleanse the uterine cavity was on average 4 days longer and amounted to 10.4 ± 0.44 days.

The multiplicity of inseminations in both groups was the same and amounted to 1.2±0.22 times per animal. The number of pregnant cows after the first insemination in both groups was the same and amounted to 80%.

The period from calving to the first insemination in cows of the experimental group averaged 58.8±1.85 days and was 8.8 days or 13.01% less than in cows of the control group. In the control group, the period from calving to the first insemination was 67.6±3.85 days. In both groups, some animals were not fruitfully inseminated the first time. These animals were later also taken into account in the experiment. They were re-inseminated after 20-21 days upon arrival in the hunt. Thus, the period from calving to 100% fertile insemination in cows of the experimental group was 63± 5.82 days, and in cows of the control group 69.8±3 days, which is 6.8 days or 9.74% more than in animals in the experimental group.

Table 2 presents the results of studies to determine the effect of drugs manufactured and used by us for the treatment of catarrhal postpartum endometritis in cows on some hematological and biochemical blood parameters in cows.

Table 2. Some hematological and biochemical parameters of cows' blood

Parameters	Groups	Norms	1st blood draw, before the experience	2nd blood draw, after the experience
Hemoglobin, g/l	Experimental	99-129	102.6±2.16	107.4±3.81
	Control		104.5±3.94	106.1±4.56
Erythrocytes, $\times 10^{12}$/l	Experimental	5-10	6.78±0.22	7.7±0.4
	Control		7.04±0.38	7.2±0.61
Leukocytes, $\times 10^{9}$/l	Experimental	4-12	13.12±1.2	6.67±1.1
	Control		13.64±1.6	6.71±0.8
Protein, g/l	Experimental	62.-82	39.3±2.3	42.7±15.2
	Control		39.7±2.1	40.4±4.1
Albumin, g/l	Experimental	28-39	29.7±1.6	26.2±1.8
	Control		25.9±3.2	29.2±2.2
Globulin, g/l	Experimental	29-49	9.4±2.34	16.7±4.1
	Control		13.8±2.8	11.4±3.1
Triglycerides, mmol/l	Experimental	0.3-0.6	0.24±0.047	0.76±0.07
	Control		0.15±0.023	0.7±0.12
Glucose, mmol/l	Experimental	2.3-4.1	4.63±0.63	3.1±0.42
	Control		4.81±0.59	3.7±0.44
Urea, mmol/l	Experimental	2.8-8.8	11.6±1.14	9.2±1.6

	Control		12.2±2.11	9.3±1.6
Creatinine, nmol/l	Experimental	56-156	136.57±32.2	166.11±30
	Control		193.04±33.06	182.56±24.67
P, mmol/l	Experimental	1.4-2.5	2.49±0.35	2.5±0.4
	Control		3.16±0.41	2.41±0.44
Calcium, mmol/l	Experimental	2.1-2.8	8.67±1.84	10.88±1.16
	Control		10.5±1.72	12.47±2.09

When considering the results of the study of blood samples taken from cows with a diagnosis of catarrhal postpartum endometritis before and after therapy, it can be seen that the content of hemoglobin and erythrocytes were within physiological norms. Although it is clear that the level of hemoglobin and the content of erythrocytes at the beginning of the experiment are close to the lower limits of the norm in animals of both groups and vary within 102.6 - 104.5 g/l and 6.78-7.04 $*10^{12}$/l, respectively. After a course of therapy, the level of hemoglobin and erythrocytes increased in both groups and was in the range of 107.4-106.1 g/l and 7.4-7.2$*10^{12}$/l. It should be noted that in the animals of the experimental group, the hemoglobin content increased by 4.7%. This is 2.85% (3 times) more than in the cows of the control group, where the hemoglobin level increased by 1.55%. The content of erythrocytes in the blood of cows of the experimental group increased by 13.2%, which is 6.63% (2 times) more than in animals of the control group, where the content of erythrocytes increased by 6.6%. This indicates that sick animals were detected and treated promptly, so serious changes in these indicators did not have time to occur in the body.

The level of leukocytes in animals of both groups at the beginning of the experiment was increased and amounted to 13.12±1.2 and 13.64±1.6 $*10^{9}$/l. At the end of the studies in the experimental group, the content of leukocytes decreased to 6.67±1.1 $*10^{9}$/l, which is 3.3% less than in the control group, where the content of leukocytes decreased to 6.71±0.8* 10^{9}/l. It can be seen that the level of leukocytes in the experimental and control groups decreased by 49.2% and 50.8% (2 times), respectively, and was within the physiological limits. Such dynamics suggest that in the body of the animals of the experimental group, the process of restoring the body was more successful and intense.

At the beginning of the experiment in animals of the experimental and control groups, the level of protein was 39.3±2.3 g/l and 39.7±2.1 g/l, globulin 9.4±2.4 and 13.8±2.8 g /l, triglycerides 0.24±0.047 and 0.15±0.023 mmol/l, respectively. It can be seen that in animals of both groups, these indicators are below the norm. At the same time, the level of urea is higher than normal in both groups and reaches: in the experimental group 11.6±1.14 mmol/l, in the control group 12.2±2.11 mmol/l. This indicates the depletion of the body against the background of recent pregnancy and calving, only the beginning of intoxication of the body due to the presence of postpartum endometritis and an increase in milk production and milk flow, which requires high consumption of energy resources.

After the end of therapy, the protein level increased in both groups, although it was still slightly below normal. In the experimental group, the protein content increased to 42.7 g/l, which is 5.4% more than in the animals of the control group, where the protein level increased to 40.39 g/l. It should be taken into account. that the protein level increased against the background of milking and increased milk production.

Although the level of globulin was still below the norm, it increased significantly in the experimental group, where the content of globulin increased to 16.7±4.1 g/l (by 77.8%), which is 30.6% more than in the control group. In the blood of cows in the control group, the level of globulin decreased to 11.4±3.1 g/l (by 17.3%). Also, after the end of the course of therapy, the level of urea in both groups slightly decreased and amounted to 9.2±1.6 mmol/l and 9.3±1.6 mmol/l, respectively. After a course of therapy, this indicator is slightly above the upper limit of the norm, and this level is typical and can be explained by the high metabolism characteristic of dairy cows at the beginning of milk production and the peak of milk production.

Having studied the data on the content of protein, globulin, and urea, we see that these indicators in

the experimental group are closer to the limits of the norms. Consequently, in the body of the cows of the experimental group, the processes of regeneration proceed more quickly after calving and the course of endometritis therapy. Also, these indicators indicate a better metabolism and the formation of immunity with a continuously increasing load on the urinary system with an increase in the volume of milk production. This in cows of the experimental group is confirmed by an increase in the level of creatinine to 166.11±30 nanomol/l after the course of therapy. In cows of the control group, on the contrary, at the beginning of the experiment, the creatinine content was above the norm and after the course of therapy, it decreased slightly, which indicates a slower metabolism and recovery after calving and postpartum endometritis.

The level of albumin in both groups fluctuated slightly. It should be noted that although in the experimental group after the course of therapy the level of albumin decreased by 11% and amounted to 26.2±1.8 g/l, the level of globulin in these cows increased by 77%, which also indicates the rapid development of immunity. In cows of the control group, on the contrary, the level of albumins increased to 29.2±2.2 g/l, and the level of globulins decreased by 17.3%, which demonstrates a higher load on the immune system, slowing down the recovery processes of the body after calving and after a course of therapy postpartum endometritis.

As for the content of triglycerides and glucose, it was found that the level of triglycerides at the beginning of the study was below the norm, and the glucose level was slightly above the upper limit of the norm and amounted to 4.63±0.63 mmol / l in the experimental group. in the control group 4.81±0.59 mmol/l. This indicates a violation of the processes of glucose utilization due to a lack of energy resources against the background of milking and the presence of metropathies. At the end of the course of therapy, the level of triglycerides in both groups increased against the background of a simultaneous decrease in glucose levels. This indicates the normalization of glucose utilization processes against the background of endometrial restoration. Thus, the level of triglycerides in the experimental group increased to 0.76±0.07 mmol/l (3 times), and in the control group to 0.7±0.12 mmol/l (4.5 times). The glucose content in the experimental group decreased to 3.1±0.42 mmol/l (by 33.8%), and in the control group, it decreased to 3.7±0.44 mmol/l (by 23.1%). Based on their results, it can be seen that in the experimental group, the decrease in glucose concentration was greater, and the increase in triglyceride levels was less compared to the control. This additionally indicates a higher metabolic rate in the cows of the experimental group, as well as an increase in the level of creatinine in the cows of the experimental group. The level of calcium was both before and after the experiment 4-5 times higher than the norm, however, it was calcium of exogenous origin since the animals consume water with a very high natural content of calcium. Animals receive water on this farm both from a well and from the Dniester River. The main aquifers in the soil of the republic and the channel of the Dniester River lie in thick calcareous deposits at the bottom of the Sarmatian Sea, which was located on the site of the republic 10 million years ago. Therefore, the water in the republic everywhere is excessively abundant in calcium or fluorine or various mineral additives.

Additionally, stable fluctuations in the levels of triglycerides, urea, and creatinine, which accordingly changed during the treatment of postpartum endometritis, also indicate that this is calcium of exogenous origin. These indicators in the presence of pathologies of the musculoskeletal system (the presence of osteoporosis, myositis, or hepatopathy) are often significantly higher than the norm. The content of these components would not have shifted very much towards their normalization within the boundaries close to normal in the course of our therapeutic measures for postpartum endometritis.

The concentration of phosphorus both before and after the end of the study was within acceptable limits and fluctuated in both groups within 2.4-3.2 mmol/l.

In general, according to the obtained indicators, it can be seen that in the animals of the experimental group, recovery processes occurred more quickly, which is proved by better utilization of glucose against the background of triglycerides and a higher level of creatinine and globulins. Also, the data obtained prove the safety and efficacy of the proposed means of therapy for postpartum endometritis.

Since all animals of both groups were in the same conditions and on the same diet, we believe that the acceleration of the regeneration process after calving and the reduction in the duration of therapy in the experimental group was the result of the use of BAS-containing preparations in the course of therapy for catarrhal postpartum endometritis in cows.

CONCLUSION

The proposed biologically active substances, when used in combination with E-selenium and amylodextrin containing iodine, can reduce the time of intensive therapy of postpartum catarrhal endometritis in cows to 6.4±0.273 days, and the period from calving to 100% fruitful insemination is 63±5.82 day. The study of hematological and biochemical parameters of the blood of animals showed the absence of toxicity and the presence of the safety of the drugs proposed for the treatment of metropathy.

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CONFLICT OF INTEREST: None

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ETHICS STATEMENT: The protocol for experiments with animals complied with the requirements of the European Convention for the Protection of Vertebrate Animals used for Experimental and other Scientific Purposes.

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