

**EFFECT OF PROPOLIS UPON MORPHOLOGIC CHARACTERISTICS OF  
PERYTHERAL BLOOD ERYTHROCYTES AND PHYSIOLOGICAL INDEXES OF COWS  
IN CASE OF INFLAMMATION**

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**Summary.** Endometritis of cows cases a significant damage upon milk complexes of Russia, increases periods of service, and also costs of treating sick animals, even rejecting them from a herd. In order to solve the problem of postnatal endometritis in terms of modern milk-commmodity complex cows of black-marked breed were exposed to research on studying efficiency of new scheme in treating cows, sick with postnatal purulent-catarrhal endometritis, using intrauterine introduction of propolis preparation “Propomast” in comparison to traditional course of treatment. Analysis of therapeutical and economic efficiency of the undertaken research showed us that using this propolis preparation provided for decrease in treatment period in comparison to the control as well as period of recovering reproductive function, decrease in period, measured from calving to a fruitful insemination.

**Key words:** cattle, purulent-catarrhal endometritis, propolis, Propomast, levoerythrocycline, erythrocytes, insemination.

**Introduction.** The most wide-spread complication of postnatal period among cattle is endometritis. According to the data of Y.A. Rodina, purulent-catarrhal postnatal endometritis has the dominant share among all animal diseases – from 86,6 to 88,1%. In case of late and unsystematic treatment endometritis have a negative influence upon fertility and productivity of animals. Inflammatory processes in uterus create unfavourable conditions for sperm rooting as well as death of embryo that enters cavity of such uterus [6, 8].

Nowadays we can observe a decrease in therapeutic efficiency of antibiotics that can be explained by emergence of resistant strain of agents. Sensitivity towards antibiotics of the first generation, frequently used in veterinary, particularly penicillin, streptomycin, is especially low. A significant number of pathogenic microorganism strains, immune to sulfanilamides, nitrofurans, and other anti-microbial preparations has been discovered. In this regard efficiency of antibiotic therapy has decreased drastically as well as effectiveness of certain relatively-new medications in case of

inflammatory processes in uterus [1, 2, 6, 8].

One of the ways to increase therapeutic effectiveness of anti-microbial preparations, strengthen and broaden range of their impact, prevent formation of resistant strains, and decreasing side reactions in implementation of medicines that possess a high preventive and treating efficiency [6].

To the group of such medications we can refer propolis, as it possesses anti-bacterial, fungicide, anti-inflammatory, and anesthetic effect. It stimulates factors of natural resistance and immunity, metabolic processes in an organism, growth and development of animals. However, propolis has not found a wide implementation in veterinary medicine due to low degree of its research [5, 7].

In spite of constant of its chemical and morphological composition, blood is one of the early convincing markers of reformations, happening in an organism under the influence of different physiological and pathologic processes. Erythron as a functional system embraces operation of all physiological systems of an organism, therefore, most of homeostatic parameters of red blood allow us to judge upon organism condition on the whole and analyze presence and mechanisms of inflammatory process [3, 4]. The objective of this work is studying morphologic indexes of erythrocytes and physiological state of cows, suffering endometritis and treated with propolis.

**Object and methods of research.** Experimental and scientific-productive studies were carried out at the foundation of Agricultural Joint Stock Company “Bereznekovskoye” of Dalnekonstantinovskiy district of Nizhegorod region. Laboratory tests were carried out in Nizhegorod regional veterinary laboratory.

To study therapeutic efficiency of propolis preparation according to the principle of similar pairs with consideration of age, live mass, fatness, productivity, and disease severity three groups of black-marked cows in age of 4-6 years were formed, each group counted 15 heads. Conditions of feeding, keeping, and exploitation of animals were in accordance with generally-accepted zoologic regulations.

The first group was formed of clinically-healthy animals with normal flow of delivery and postnatal period.

The second and third group included cows with postnatal purulent-catarrhal endometritis clinical signs of which showed during the first 10 days after calving.

Diagnosis of purulent-catarrhal endometritis was established according to anamnestic data, clinical symptoms, and results of microbiological examination of cervical slime of cows.

Two complex schemes were implemented in treating cows with sings of acute postnatal purulent-catarrhal endometritis.

Preparation “Propomast” (TC 08064-19-53-95) in dose of 100 ml was introduced to animals

of the second group daily until the moment of clinical recovery. Effectiveness of treatment with preparation "Propomast" was studied within a comparative aspect with levoerythrocycline.

Levoerythrocycline in dose of 100 ml was introduced intrauterinally to animals of the third group every 72 hours until full recovery. In both groups treatment was attended in combination with 2% solution of synestrol, 30E oxytocin, and trivit, solutions were introduced intramuscularly.

During the experiment animals of both groups were exposed for daily clinical examination. Therapeutic effectiveness of treatment schemes were defined according to change in general condition of an animal, condition of reproductive organs, and mucous membranes of genital tracts, nature of uterine excrements. The research was considered finished in event of completion of genital organs involution and emergence of reproductive cycle initiation.

Morphologic research of blood included defining levels of erythrocytes, hemoglobin, hematocrites, color, average hemoglobin content, average hemoglobin concentration, erythrocyte volume, ESR.

Statistic procession of the received data was made with facilitating a pack of applications Statistica 6.0 for Windows 98.

**Research results.** The results of researching morphologic indexes of cow blood in case of normal postnatal period flow and cows, suffering from endometritis, are presented in table 1.

Table 1.

Morphologic indexes of blood for cows,  
suffering from endometritis, before and after treatment

Indexes	Group I (control group)	Group II		Group III	
		Before treatment	After treatment	Before treatment	After treatment
Erythrocytes, $10^{12}/\mu\text{l}$	7,44± 0,23	5,42± 0,19*	7,05± 0,20	6,01± 0,23*	7,45± 0,19
Hematocrit, l/l	0,33±0,010	0,29±0,008*	0,31±0,010	0,28±0,009*	0,34±0,010
Hemoglobin, g/l	103,00±1,39	95,25±1,52*	125,00±1,40	92,05±1,29*	120,00±1,30
Color	0,85±0,02	0,52±0,05*	0,85±0,02	0,72±0,04*	0,99±0,01
Average hemoglobin content, pg	14,01±0,58	17,52±0,54*	17,61±0,62	15,32±0,45*	16,11±0,50
Average hemoglobin concentration, g/l	300,14±5,59	325,17±4,45*	405,17±5,09	328,51±4,49*	357,98±5,12
Erythrocyte volume, $\text{mcl}^3$	45,12±0,60	53,20±0,56*	44,11±0,48	46,61±0,46*	44,62±0,55
ESR, mm/hr	0,45±0,06	0,88±0,04*	0,55±0,04	0,78±0,01*	0,40±0,02

Note: \*  $p<0,05$  in relation to control group of animals.

Analysis of the presented results has shown that concentration of erythrocytes in blood of second-group animals equaled 73% of control values before treatment, and 81% - among animals of group three. Amount of hemoglobin in peripheral blood of cows before treatment was lower by 8% in group two and by 11% in group three, in comparison to the control group. Index of hematocrit was also decreased in blood of the animals.

To define correlation between amount of erythrocytes and their saturation with hemoglobin color index was established as well as average content of hemoglobin in one erythrocyte. Color index was decreased among animals of experimental groups: by 39% in group two and 15% in group three. Average content of hemoglobin in erythrocyte, in other words, index that determines density of filling cell of an animal with hemoglobin, was increased in group two by an average of 8%.

Average content of hemoglobin in one erythrocyte among animals of groups two and three was higher than among healthy animals by 21% and 7% correspondingly. Volume of erythrocytes was significantly higher among experimental animals than in the control group.

ESR that should equal 0,15-0,5 mm/hr, was elevated in both experimental groups, and it proves flow of inflammatory process in organism of animals.

The received results show us that significant changes in indexes of red blood take place in case of acute postnatal purulent-catarrhal endometritis. Considering the fact that increase in average volume of erythrocytes in blood of cows, and this index is mostly used to describe type of anemia, we can suggest that macrocytic anemia develops among cows at the background of inflammatory process [3]. Presence of anemic condition is confirmed by indexes of erythrocyte and hemoglobin amount that were decreased before treating cows. In its turn, decrease in amount of erythrocytes and their oxygen-transport function causes degradation in metabolism of the whole organism, so implementation of propolis-based medicine is justified, as it increases natural resistant and immunologic reactivity of an organism

After treating the first and second group of experimental animals, positive shifts in metabolic processes up to the level of physiological norm were registered. Index of erythrocyte sedimentation decreased, levels of erythrocytes, hemoglobin increased, index of hematocrit stabilized. Qualitative index of erythrocytes – average content of hemoglobin, average concentration of hemoglobin, and erythrocyte volume restored up to the level of physiological norm.

It is established that the best therapeutic effect was achieved with facilitation of propolis medication. Periods of recovery and physiological condition of animals that received "Propomast" decreased in comparison to the group of animals that received levoerythrocycline. Thus, with usage

of “Propomast” (group two), rigidity of uterine restored among cows on days 2-3 after the treatment, active evacuation of exudate from genital tracts took place. An active regeneration of uterine was registered in later days of treatment. After 6-8 days of treatment excrements from external genitals obtained form of slime. Clinical recovery of animals came after  $15,33 \pm 0,55$  days, in other words, recovery period decreased by 2,84 days in comparison to group three. In three months 90% of cows from this group were fecundated, sterility period equaled  $31,42 \pm 6,13$  days, in other words, decreased by 6,66 days in comparison to animals of group three, fecundation index equaled  $1,57 \pm 0,18$ .

Among animals of group three (complex treatment with levoerythrocycline) positive shifts in disease flow came on days 4-5 of treatment. By this time signs of tumors became less intensive in genital tracts, transition of endometrium inflammation into catarrhal form happened. Rectal examination showed a significant decrease in uterine volume, restoration of its rigidity. Clinical recovery came after  $18,17 \pm 0,56$  days. Period between calving and first rutting equaled  $48,17 \pm 1,01$  days, period of sterility was in average of  $38,08 \pm 6,72$  days, fecundation index equaled  $1,66 \pm 0,19$ .

Thus, the presented data shows us that propolis preparation is an effective therapeutic means of treating endometritis among cows. Propolis decreases oxidation processes due to flavonoid content in it and thus decreases destruction of membranes in organs of organism system. Besides, introduction of propolis into organism can stimulate discharge of gluco-corticoids and thus limit development of stress reaction, related to process of inflammation amongst animals [5,9]. Enhancing adaptive mechanisms with propolis, contained in medication “Propomast” provides a relatively expressed therapeutic effect to cows with endometritis and complete restoration of reproductive functions.

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