Comparative Efficiency of Sepranol and Cefamethrin Use in Postpartum Acute Endometritis in Cows

Samat R. Yusupov¹¹, Sergey Yu. Smolentsev², Zoya G. Churina³, Galiya R. Yusupova¹, Alfis R. Hasanov¹, Ilsur G. Galimzyanov¹, Evgeny O. Krupin³, Igor G. Konopeltsev⁴

¹¹Kazan State Academy of Veterinary Medicine by N.E. Bauman, Sibirsky tract 35, Kazan city, 420029, Russia
²Mari State University, Lenin Square 1, Yoshkar-Ola city, 424000, Russia
³Tatar Scientific Research Institute of Agriculture, FRC Kazan Scientific Center, Russian Academy of Sciences, Orenburg tract st., 48, Kazan city, 420059, Russia
⁴Vyatka State Agricultural Academy, Oktyabrsky Prospekt 133, Kirov city, 610017, Russia

Article History:
Received on: 03 Feb 2020
Revised on: 03 Mar 2020
Accepted on: 04 Mar 2020

Abstract
In the recent times, postpartum inflammatory diseases of the reproductive organs in cows are considered as a typical infectious pathology. The main reason is an increase in the pathogenicity of conditionally pathogenic micro flora against the weakening of the natural resistance of the animal. The postpartum acute endometritis is diagnosed as the most common among the postpartum inflammatory diseases. It is observed in 22.5...38.4% of calving cows. The aim of the work was to study the effectiveness of preparations of plant based Sepranol and Cefamethrin in the pharmacotherapy of postpartum acute endometritis in cows. Experimental studies were carried out on the basis of the SEC collective farm Niva of Medvedevsky district of the Mari El Republic. The clinical evaluation of therapeutic efficacy of the proposed drugs in combination with other therapeutic methods were carried out in a comparative aspect in scientific and economic experiment with the separation of cows according to the principle of analogues into experimental and control groups under the same conditions of their feeding, keeping, and exploitation. The main criterion for assessing the therapeutic effectiveness of the tested drugs was the restoration of their reproductive function in experimental animals in the shortest time possible. Studies have shown that for postpartum acute endometritis, the use of complex treatment with Cefamethrin at a dose of 80 ml intrauterine with a 48-hour interval before recovery allowed to obtain a therapeutic effect up to 96%, reduce the number of infertility days, and increase the fertility percentage.

Introduction
The transition from an agrarian economy to commercial economy has had an extremely negative impact on the state of domestic animal husbandry; particularly, the leading industry — dairy cattle breeding. According to statistics, though the number of cows in Russia decreased from 16.3 to 6.8 million, and gross milk production decreased to the level of 1957 (Smolentsev et al., 2018), a positive trend has been observed in the last two or three years. The livestock has stabilized, the reconstruc-
tion of the remaining livestock facilities are being carried out, and purchases of pedigree young animals have increased (Semenov et al., 2018). It is quite obvious that the future of domestic livestock farming lies with large agricultural producers. The most important conditions for highly profitable dairy farming are the rapid buildup of the genetic potential of dairy productivity, a reliable and balanced feed base, and the development of modern forage harvesting technologies (Anatolievna et al., 2016; Egorov et al., 2018). At the same time, an appropriate level of veterinary care is required to avoid unjustified losses from diseases and deaths of animals (Matveeva et al., 2015; Dmitriyevich et al., 2016).

Postpartum period in cows is most often complicated by endometritis. The postpartum endometritis is usually severe, involving many areas of the body. The cows that undergo this demeaning health condition have a service period that increases by 75–134 days. Delayed or improper treatment can lead to irreversible structural changes in the uterine wall, with a complete loss of the ability to reproduce, and in the case of generalization of the inflammatory process, can cause death of the animal (Valiullin et al., 2017; Popov et al., 2018).

A thorough study on the subject by going through numerous publications of various authors both from the native land as well abroad, suggests a wide variety of approaches to the methods of treatment of postpartum endometritis. Most of them, particularly recommends the use of antibacterial drugs, Novocaine and its derivatives using blockades, substances increasing tone and uterus contractile activity, general stimulating and immunostimulating agents, probiotics, physiotherapeutic procedures (Kristoforovich et al., 2016). A number of authors indicate the usage of complex treatment regimens. However, none of them provide the use of means to neutralize toxic substances formed as a result of the pathogens vital activity and the dead tissues decay in the pathological focus. The role of the toxic factor is of particular importance in case of acute toxic endometritis, in which systemic septic changes come to be most important (Ilyasovich et al., 2016).

The aim of the work was to study the effectiveness of preparations of plant origin Sepranol and Cefamethrin in the pharmacotherapy of postpartum acute endometritis in cows.

**MATERIALS AND METHODS**

Experimental practices were carried out in accordance with the established requirements for the selection of analogues, control, and compliance with the same conditions of feeding and keeping animals. Experimental studies were carried out on the basis of the SEC collective farm Niva of Medvedevsky district of the Mari El Republic. The clinical evaluation of therapeutic efficacy of the proposed drugs in combination with other therapeutic methods was carried out in a comparative aspect in scientific and economic experiment with the separation of cows according to the principle of analogues into experimental and control groups under the same conditions of their feeding, keeping, and exploitation.

In comparison with well-known antimicrobial agents, the therapeutic efficacy of drugs based on plant materials — Sepanol and Cefamethrin — was determined in experiments. Table 1 presents the dosing regimen of drugs.

The main criterion for assessing the therapeutic effectiveness of the tested drugs was the restoration of their reproductive function in experimental animals in the shortest time possible. At the same time, the duration of treatment course, terms of disappearance of the disease expressed signs, timing of resumption of the reproductive cycles and their usefulness, fertility after the first and subsequent inseminations, insemination index, number of infertility days were taken into account. Statistical data processing was performed using the Statistica 6.0 application software package.

**RESULTS AND DISCUSSION**

Comparative characteristics of various complex treatment regimens for cow patient with postpartum acute endometritis are presented in Table 2.

As a result of experimental work, it was proved that clinical recovery occurred in all cows. The therapeutic course in animals of the first experimental group was 6 days, in cows of the second experimental group it was 1.5 days longer, and animals of the control group were 3.3 days longer. The infertility days in cows of the second experimental and control groups were longer than in animals of the first experimental group by 6 and 29 days, respectively. The insemination index in cows of the first experimental group was within 1.4; in animals of the second experimental and control groups, it was higher by 0.2 and 1.2, respectively.

In cows with catarrhal-purulent endometritis, uterine contents with an admixture of pus were observed. Evacuation of exudate was enhanced by defecation, urination, and especially after morning milking. It was found in the form of crusts on the inner surface of the tail and sciatic tubercles A
Table 1: Structure of Scientific and Industrial Experience

| Groups of animals | Administered drugs |
|-------------------|--------------------|
| First experimental | Cefamethrin, intrauterine dose of 80 ml with a 48-hour interval before recovery |
| Second experimental | Sepranol, 2 tablets intrauterine 1 time per day until recovery |
| Control group | - Oxytocin intramuscularly, 40 Units 1 time after 36 hours; - Tetravit intramuscularly, 10 ml, once; - Bicillin-5, intramuscularly at a dose of 500 thousand; - IU 1 time after 48 hours; - Furazolidone sticks of 5 pcs. intrauterine, daily. |

Table 2: Effectiveness of Various Treatment Regimens for Cows

| Groups | Recovered, goals | Duration of therapeutic course | Service period | Number of infertility days | Insemination index |
|--------|------------------|-------------------------------|----------------|---------------------------|--------------------|
| First  | 10               | 6±0.4                        | 83±0.4         | 23±3                      | 1.4±0.3            |
| Second | 10               | 7.5±0.4                      | 97±0.4         | 37±4                      | 1.6±0.3            |
| Control group | 10 | 9.3±0.3                      | 112±0.5        | 52±7                      | 2.6±0.2            |

Table 3: Biochemical Indicators of Blood Serum in Cows with Postpartum Endometritis

| Groups | Total protein, g/l | Albumins, g/l | Globulins, g/l |
|--------|--------------------|---------------|---------------|
|        | α                  | β             | γ             |
| Before treatment |                   |               |               |
| First  | 73.8±2.1           | 24.3±2.4      | 18.3±1.3      | 13.2±1.7 | 18.0±2.1 |
| Second | 72.1±1.8           | 23.0±2.6      | 17.5±1.1      | 12.7±1.3 | 18.9±1.8 |
| Control group | 72.6±2.6 | 23.6±3.0      | 17.9±1.4      | 12.7±2.0 | 18.4±1.6 |
| After treatment |                   |               |               |
| First  | 84.3±1.9           | 25.3±2.1      | 19.1±2.0      | 14.0±1.6 | 25.9±2.3 |
| Second | 83.8±2.4           | 25.9±1.8      | 18.9±1.8      | 13.8±2.0 | 25.2±2.1 |
| Control group | 78.1±3.2 | 24.9±2.7      | 18.4±2.1      | 13.4±1.7 | 21.4±1.8 |

vaginal examination revealed: mucous membrane oedema, bright red, striate or massively occasional hemorrhages were observed. On the lower wall of the vagina, a catarrhal-purulent outflow with the presence of white loose membranes. The cervix was enlarged, oedemic, hyperemic, exudate flowed from its canal.

A rectal examination determined that the uterine horns were asymmetric and hung over the edge of the pubic fusion into the abdominal cavity and it was not possible to pull them into the pelvic cavity, the uterine wall was flabby, oedemic, pasty, the uterus did not respond to massage reduction.

In 91% of cows with endometritis body temperature exceeded the upper limit of the norm by 0.5-1°C, the pulse increased by 10–15 bpm. The number of respiratory movements were also increased by 5–10. Decreased appetite and milk productivity was recorded in all animals.

Experimental observations showed that the very next day after the intrauterine administration of the tested drugs, there was a significant decrease in soreness of the internal genital organs and change in exudate nature and volume. Thus, if on the first day all animals had a high degree of pain in the uterus, and the exudate was almost liquid, a mass of dirty pink or gray with a sanious odour, then in a day we noted a decrease in pain in manipulation, and the exudate became of a viscous, tractive consistency, white color and a barely discernible specific odour. Similar results were observed in animals of the control group, but on the 3–4th day of treatment. Subsequently, cows in all groups experienced progressive involution of the genitals with a gradual decrease in the exudate volume and, ultimately, the complete disappearance of inflammation signs.
A study of hematological parameters and an assessment of the level of nonspecific organism resistance of cows with purulent-catarhal endometritis was carried out the day before the treatment and after complex treatment on the 10th day of recovery.

In cows of all three groups, there was a decrease in number of red blood cells and hemoglobin was also noted to an average of 5.3–10^12/l and 94 g/l, respectively. The number of leukocytes in animals of all groups increased and averaged 13.6·10^3/l. On the 10th day after recovery, there was an increase in the amount of hemoglobin in cows of the first experimental group to 114.2 g/l, which is 11.5 and 14.8 g/l higher than in animals of the second experimental and control groups, respectively. When studying the leukogram, it was found that the number of leukocytes of the neutrophilic group in cows in the experimental and control groups decreased, and the lymphocytes increased.

There is a number of biochemical blood indices that can be used to judge the general condition of the body and the level of metabolic processes in it (Table 3).

The concentration of total protein in the blood serum of cows with purulent-catarhal endometritis, before treatment, in all the studied groups averaged 72.8 g/l. After the treatment, the concentration of total protein in blood serum tended to increase in animals of the experimental group as compared to cows of the control group by 11.7 and 11.2 g/l, respectively.

The concentration of albumin, α- and β-globulins increased slightly after treatment and throughout the experiment remained within the initial parameters. However, changes in the content of the γ-globulin fraction in cows in the 1st and 2nd experimental groups were revealed when using drugs of plant origin in treatment regimens.

The concentration of γ-globulins after treatment compared with the cows of the control group before treatment in the 1st and 2nd experimental groups increased by 7.5 and 6.8 g/l, respectively.

Analyzing and summarizing the results of a research of the causes of postpartum endometritis in cows, the results of a clinical assessment of the developed complex chemotherapeutic drugs and complex treatment regimens, we consider it possible to propose using etirotropic products along with the generally accepted veterinary, zoo-engineering and general economic measures in dairy-and-meat and dairy cattle herds in case of postpartum acute endometritis on the basis of plant-originated raw materials – Sepranol and Cefamethrin.

**CONCLUSION**

Clinical signs of acute postpartum endometritis: lochia partial dilution and their grayish colouring are found in 5–6 days after calving. A large number of liquid and heterogeneous gray color lochia with mucous veins is observed on the 7–8th day, with a transition to the catarrhal-purulent or purulent-catarhal form of inflammation, reddish lochia with mucus, with flakes or streaks of pus are released from the uterus, mucous membrane is bright red, with striate or occasional hemorrhages. A mucopurulent exudate is located on the lower wall of the vagina, most often in the form of white loose membranes.

The use of complex treatment for postpartum acute endometritis: Cefamethrin in a dose of 80 ml intrauterine with a 48-hour interval before recovery.

**REFERENCES**

Anatolievnna, S. E., Yurievich, P. O., Vasilevnna, T. E., Vik-torovnna, K. T., Gennadievnna, S. E., Yurievich, S. S. 2016. Development of technology lamb boiled in the skin with the use of milk-protein complex. Research Journal of Pharmaceutical, Biological and Chemical Sciences, 7(3):839–846.

Dmitriyevich, C. E., Vladimirovich, O. A., Leonidovich, R. A., Valerevnna, H. L., Sergeevnna, N. C., Vladimirovich, M. E., Yurievich, S. S. 2016. The Russian heavy draft milk type mares characteristics. Research Journal of Pharmaceutical, Biological and Chemical Sciences, 7(2):1930–1933.

Egorov, V. I., Valiullin, L., Biryulya, V. V., Nabatov, A. A., Smolentsev, S. Y., Papunidi, K. K., Nikitin, A. I. 2018. Toxicity indices of uracil derivatives on lung epithelial cells. Indian Veterinary Journal, 95(6):33–36.

Ilyasovich, S. E., Mikhailovnna, T. A., Rasimovich, S. V., Yurievich, S. S., Akhmadullovich, S. F., Khristoforovich, P. K., Yakovlevich, T. M. 2016. The efficiency of application of a polysaccharide enterosorbent of “Fitosorb” for prevention of the combined mycotoxicoses. Research Journal of Pharmaceutical, Biological and Chemical Sciences, 7(4):2229–2237.

Khristoforovich, P. K., Ravilevich, K. I., Rasimovich, S. V., Yakovlevich, T. M., Mikhailovnna, T. A., Akhmadullovich, S. F., Yurievich, S. S. 2016. Cyto-morphological changes hepatorenal system combined with fever poisoning xenobiotics. Research Journal of Pharmaceutical, Biological and Chemical Sciences, 7(4):2214–2221.
Matveeva, E. L., Korosteleva, V. P., Papynidi, E. K., Yusupova, G. R., Smolentsev, S. Y. 2015. Electron microscopic evaluation of the impact on microorganisms of quaternary ammonium compounds. *Research Journal of Pharmaceutical, Biological and Chemical Sciences*, 6(4):207–209.

Popov, S. V., Kalyuzhnyi, I. I., Smolentsev, S., Yu, Gataullin, D. H., Stepanov, V. I., Nikitin, A. I., Zakirova, G., Sh 2018. Acid-base homeostasis indices upon electric neurostimulation therapy of calves with acute pulmonary pathologies. *Research Journal of Pharmaceutical, Biological and Chemical Sciences*, 9(3):553–556.

Semenov, E. I., Mishina, N. N., Tanaseva, S. A., Kadikov, I. R., Tremasova, A. M., Papunidi, K. K., Smolentsev, S. Y. 2018. Systemic anaphylaxis due to combined mycotoxicosis in Wister rats. *Indian Veterinary Journal*, 95(6):16–19.

Smolentsev, S. Y., Poltaev, E. N., Matrosova, L. E., Matveeva, E. L., Ivanova, A. E., Tremasova, A. M., Erochondina, M. A. 2018. Stimulation of Rumen Microflora in Cattle by Using Probiotic Concentrate. *Research journal of pharmaceutical biological and chemical sciences*, 9(2):948–950.

Valiullin, L. R., Idiyatov, I. I., Egorov, V. I., Saitov, V. R., Papunidi, K. K., Raginov, I. S., Smolentsev, S. Y. 2017. A study into the safety of novel bioresorbable matrices for repairing bone tissue defects. *Bali Medical Journal*, 6(2):88–91.