Zootechnical and veterinary methods of high-producing dairy cows treatment

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Abstract. The article represents the results of research into the development of a remedy for treating puerperal mastitis and endometritis in high-producing cows. The work was carried out at The Department of Obstetrics, Surgery, and Physiology of Domestic Animals in Don State Agrarian University. The research involved a complex pharmaceutical composition used as a dosage form and containing yotoin as the active substance, excipients (retinol, dexamethasone, propolis), and vehicle (liquid paraffin). When getting into an affected cavity, the remedy is completely absorbed and therapeutically acts on affected tissues and organs both generally and locally. The effect is adjusted depending on the disease severity. All studied compositions have a high therapeutic effect. However, they differ in the time needed for the improvement in well-being to appear and the length of therapeutic treatment. We chose composition no. 2 as the optimal for further clinical trials. When using the tested remedy, the improvement in the general and local well-being of an animal appeared on the fifth day since the beginning of treatment. The whole therapeutic treatment took 10 days. The tested remedy showed a 100% therapeutic effectiveness.

1. Introduction
The degree of incidence and causative factors of mastitis are controversial, diverse, and not well-studied.

Nowadays, activities aimed to prevent lacteous gland diseases in agricultural animals consist of a set of sanitary, hygienic, zoocultural, and veterinary measures in the course of breeding stock feeding as well as the stocking, growing and keeping healthy rearing flocks [1, 2, 4].

In this respect two problems remain acute: the reproduction of agricultural animals and the prevention of infertility. Only healthy cows can have a high level of reproduction and increased milk yield.

Farm specialists often cull high-producing cows after the first or second lactation due to reproductive dysfunctions or limb and lacteous gland diseases. This causes great economic loss. Only reasonable prevention and correct approach can help to solve these challenges and obtain needed results in import substitution.

V.V. Novikov et. al. [3] have studied the reasons for the contraction of mastitis in cows at the large dairy unit “Agri-corporation Kuban”. The scientists analysed the spread of the primary pathogenic flora which can get into the udder tissue and cause subclinical mastitis. The researchers also offered
prevention techniques and proved that their implementation and use can improve the health of the livestock and decrease the number of clinical mastitis cases to 10%.

2. Methods
The research was carried out at the Department of Obstetrics, Surgery, and Physiology of Domestic Animals in Don State Agrarian University.

The aim of this research is to develop a remedy for treating puerperal mastitis and endometritis in high-producing cows.

For this purpose, it is necessary to: find the optimal balance of components in the proposed remedy and its therapeutic effectiveness, compare the treatment effectiveness of the proposed experimental remedy with approved medicinal products, develop a new generalized pharmaceutical composition for treating puerperal mastitis and endometritis which produces disinfecting, regenerating, and antihistaminic effect and doesn’t contain antibiotics so that meat and milk could be used without limitations.

To find the optimal balance of components in the proposed remedy and its therapeutic effectiveness we established 3 groups of animals. Each group contained 10 cows with puerperal mastitis and endometritis chosen according to the principle of analogue pairs. Then, we treated each group with remedies of different compositions. To compare the treatment effectiveness of the proposed experimental remedy with approved medicinal products we established 2 groups of animals. Each group contained 10 cows with puerperal mastitis and endometritis chosen according to the principle of analogue pairs. Then, we treated the first group with the experimental remedy and the second group with tyneol.

3. Results
The component ratios for 100 and 1000ml of the finished product are represented in table 1.

The proposed remedy contains yotoin (active iodine in the form of a polymer complex, allantoin, glycerine), retinol, dexamethasone, propolis essence, and liquid paraffin with the following ratios for 100 and 1000ml of the product:

| Component            | Against mastitis (100ml) | Against endometritis (1000ml) |
|----------------------|--------------------------|-------------------------------|
| Yotoin               | 30ml                     | 150ml                         |
| Retinol              | 10ml                     | 40ml                          |
| Dexamethasone        | 8ml                      | 80ml                          |
| Propolis essence     | 20ml                     | 100ml                         |
| Liquid paraffin      | 32ml                     | 630ml                         |

Yotoin – solution for internal and external use. The components of the remedy have an antiseptic, disinfecting, desensitising, anti-inflammatory, and regenerating effect. One millilitre of the remedy contains 1mg of active iodine in the form of a polymer complex, allantoin, glycerine. Retinol (vitamin A) – a colourless, oily substance; easily dissolved in fats; very resistant; sensitive to oxidizers and acids, especially during heating. Vitamin A is a structural element of cell membranes. It takes part in nitrogen, amino acid, carbohydrate, and fat metabolism. The vitamin maintains the cells of mucous membranes, especially in the alimentary canal as well as breathing and reproductive organs. Dexamethasone – 1ml contains 2mg of dexamethasone (in the form of disodium phosphate) used as an active substance and excipients: sodium metabisulphite – 1mg, methyl–para hydroxybenzoate —1mg, propyl para hydroxybenzoate – 0.1mg, disodium phosphate dodecahydrate – 13.5mg and water for injections. Dexamethasone 2mg/cm3 is a transparent colourless liquid. It’s a synthetic glucocorticosteroid. It has a marked anti-inflammatory, antiallergic, desensitisising effect and immunodepressive action.
Liquid paraffin is a synthetic product made of oil. It’s a colourless oily fraction left after kerosene distillation. Liquid paraffin has high purity and lack of impurities and additives which can harm the organism.

The key point of our solution is that we created a complex pharmaceutical composition used as a dosage form and containing – yotoin as the active substance, excipients (retinol, dexamethasone, propolis), and vehicle (liquid paraffin).

Table 2. The composition of the dosage form

| Group 1 (composition no. 1) | Against mastitis (100 ml) | Against endometritis (1000 ml) |
|-----------------------------|--------------------------|--------------------------------|
| Yotoin                      | 10ml                     | 100ml                          |
| Retinol                     | 10ml                     | 100ml                          |
| Dexamethasone               | 6ml                      | 80ml                           |
| Propolis                    | 5ml                      | 50ml                           |
| Liquid paraffin             | 69ml                     | 690ml                          |
| Group 2 (composition no. 2) | Against mastitis (100 ml) | Against endometritis (1000 ml) |
| Yotoin                      | 30ml                     | 150ml                          |
| Retinol                     | 10ml                     | 40ml                           |
| Dexamethasone               | 8ml                      | 80ml                           |
| Propolis                    | 20ml                     | 100ml                          |
| Liquid paraffin             | 32ml                     | 630ml                          |
| Group 3 (composition no. 3) | Against mastitis (100 ml) | Against endometritis (1000 ml) |
| Yotoin                      | 15ml                     | 150ml                          |
| Retinol                     | 15ml                     | 150ml                          |
| Dexamethasone               | 7ml                      | 70ml                           |
| Propolis                    | 10gr                     | 100gr                          |
| Liquid paraffin             | 53ml                     | 530ml                          |

The therapeutic effectiveness of proposed compositions is shown in table 3.

Table 3. Therapeutic effectiveness of proposed compositions

| Indicator                           | Group 1 | Group 2 | Group 3 |
|-------------------------------------|---------|---------|---------|
| Number of animals                   | 10      | 10      | 10      |
| Time of well-being improvement, days| 8       | 5       | 7       |
| Therapeutic treatment, days         | 14      | 10      | 12      |
| Recovered, animals                  | 10      | 10      | 10      |

Table 3 shows that all studied compositions have a high therapeutic effect. However, they differ in the time needed for the improvement in well-being to appear and the length of therapeutic treatment.

We chose composition no. 2 as the optimal for further clinical trials.

Table 4 shows that when using the tested remedy, the improvement in the general and local well-being of an animal appeared on the fifth day since the beginning of treatment. The whole therapeutic treatment took 10 days. The tested remedy showed a 100 % therapeutic effectiveness.
Table 4. The comparative effectiveness of remedies

| Indicators                        | Group  |        |
|----------------------------------|--------|--------|
|                                  | first  | second |
| Number of animals                | 10     | 10     |
| Time of well-being improvement, days | 5      | 7      |
| Therapeutic treatment, days      | 10     | 14     |
| Recovered, animals               | 10     | 9      |

4. Conclusions
1. In this research we found an optimal balance of components in the proposed remedy and its therapeutic effectiveness. We compared the effectiveness of the experimental remedy with approved pharmaceutical products.
2. We created a new universal pharmaceutical composition for treating puerperal mastitis and endometritis which produces disinfecting, regenerating, and antihistaminic effects and doesn’t contain antibiotics so that meat and milk could be used without limitations.

References
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