

**Zhumanov K.T., Biyashev K.B., Biyashev B.K., Sansyzbai A.R., Valdovska A.**

*Kazakh National Agrarian University,  
Research Institute of Biological security, urban settlement Guards,  
Korday District, Zhambyl region  
Latvian agricultural universitet, Jelgava, Latvia*

## CATTLE MASTITIS SEROPREVENTION

### **Annotation**

Herein some information is provided on the use of high-efficiency therapeutic anti-cattle mastitis serum.

**Keywords:** mastitis, etiology, pathogens, mastitis treatment and prevention, hyperimmune serum.

### **Introduction**

The most important and the primary objective for an increase in the livestock production is to expand the cattle population and to increase the cattle productivity. As it is well known, dairy cattle breeding, the economic potential of which is mainly associated with the preservation of the lactiferous gland health, is of prime importance in the present-day livestock system [1, 2, 3].

The cow mastitis disease is one of the main reasons of the premature culling of a lot of cows in dairy units, and it also causes a decrease in the milk-yield and the sanitary quality of milk, a shortfall in young cattle, and increases expenses for care, feeding and treatment of sick animals [4, 5, 6]. The ingress of the secretion of sick portions of the lactiferous gland into a bulk milk tank may affect the animals and human health in future.

The numerous literary data published in some foreign and domestic literature testifies that in the etiology of mastitis, many various kinds of bacteria may be of importance. Special etiological emphasis is laid on Staphylococci, Streptococci, and E. coli, whereas other microorganisms play a small part [1, 2, 3, 6].

Currently, antibiotics are widely used in the veterinary practice to treat mastitis.

Some treatment facilities for cow mastitis are known, which include intracisternal introduction of pharmaceuticals such as Masticide, Flavurocide, Mastisanum A, Mastisanum B, and Mastisanum E [1, 2].

The disadvantage of the said pharmaceuticals is that the mastitis pathogens produce a high resistance to some antibiotics due to their long-term use, excessive doses, and violation in the multiplicity of administration thereof. As a result, most of antibiotic-based pharmaceuticals have a low therapeutic effectiveness where an inflammation becomes subacute and chronic.

Unfortunately, the difficult economic situation of the most part of farms and the lack of qualified veterinarians do not allow to pay due attention to the mastitis prevention. It has resulted in the fact that the general level of the cow mastitis has not only failed to reduce but even increased in some farms.

In this respect, it has become more vital to develop and to improve the methods of treating and preventing the cow mastitis where new developments should be effected in some directions such as harmlessness to animals and people, no addiction of the microflora to pharmaceutical components as well as the minimum period of rejection of milk.

Thus, the cattle mastitis seroprevention method was of a certain interest to us. We could not find analogues for the cattle mastitis seroprevention in the available literature.

### **Materials and methods**

Our work was carried out in various farms of Kazakhstan. In total, 2324 samples of milk from 581 cows were studied.

Prior to the milk sampling, animals were examined according to such procedure as accepted in the clinical practice. Anamnestic data on the animals were found in the relevant books of record, valuation documents, and on the basis of the interviews of the attending personnel and some stock-breeders. 1000 milk samples were subject to bacteriological examination from 250 cows and also from the portions of udders of the cows clinically suffering from mastitis – 150, from subclinical mastitis – 298 and of the healthy ones – 552. From each sample, the milk inoculation was made for the beef-extract agar in the Petri dishes, and for the salt and blood agars and the Endo medium as well [7].

The results of the bacteriological examinations of the said milk samples from 250 cows showed that the predominant pathogens of the cow mastitis were Staphylococci - 674 (65,25%) and Streptococci - 239 (23,14%), and to a lesser degree - E. coli (10,57 %) and Diplococci (1,04%). Most of Staphylococci and Streptococci excreted with the milk of those cows which suffered from subclinical mastitis.

Taking into consideration that the predominant pathogens in the cow mastitis were Staphylococci, Streptococci and E. coli, they were taken as productive strains – producers in the preparation of hyperimmune serum.

### **Results and discussions**

Until now, there has been no effective method of the cattle mastitis seroprevention both in our country and abroad. We could not find analogues for the animal mastitis seroprevention in the available literature.

We have developed a method for producing an effective therapeutic anti-cattle mastitis serum.

The method of producing hyperimmune polyvalent anti-cattle mastitis serum consisted in the fact that a polyvalent antigen was prepared from the productive strains *Staphylococcus aureus* M-66, *Streptococcus agalactiae* K-112, *Streptococcus pneumoniae* A-14 and *Escherichia coli* 64Г, then the 2-fold ground-immunization at 5 days intervals and the animal hyperimmunization was conducted with 8-fold intramuscular injections at 3 days intervals where the total dose of antigens was  $40 \times 10^9$  Colony-Forming Unit.

Production blood sampling was done where the ratio of antibodies to Staphylococci, Streptococci and *Escherichia* in the blood serum was not less than 1:800- 1:1200 in the agglutination reaction.

The production hyperimmune serum so produced was checked for sterility and harmlessness.

To check sterility, serum inoculation should be done for beef-extract broth, beef-extract agar and beef-extract liver broth under vaseline oil. Inoculations were incubated for 10 days in thermoregulators at 37 °C. Inoculations were sterile.

The serum was checked for harmlessness in white mice and guinea pigs. The serum was administered subcutaneously: in a dose of 0,5 ml – to five white mice and in a dose 10 ml – to five guinea pigs. It was harmless, and all test animals remained alive during 10 days after the injection.

Medicinal properties of the hyperimmune polyvalent serum were checked in clinically sick cows suffering from mastitis. The test included 150 clinically sick cows suffering from mastitis, which were divided into 2 groups (one – the test group – 100 cows, and the other – the control group – 50 cows). The test results were assessed as per the number of recovered cows.

For the therapeutic purpose, hyperimmune polyvalent serum was subcutaneously administered to the test animals, in the upper part of the udder, once in a dose of 30 ml. and two times in doses of 20 and 20 ml. at 24 hours intervals. The serum was not administered to the control animals.

In the first group where the serum was administered once, 24 (48,0%) clinically sick cows were recovered from 50 ones; in the second group where the serum was administered twice, 38 (76,0%) cows were recovered, whereas in the control group, 18,0% (9 cows) was recovered.

Preventive properties of the hyperimmune polyvalent serum were studied in sick cows suffering from subclinical mastitis. The test included 100 cows suffering from subclinical mastitis, which were divided into 2 groups (one – the test group – 50 cows, and the other – the control group – 50 cows). The test results were assessed as per the number of diseased cows.

For the therapeutic purpose, hyperimmune polyvalent serum was subcutaneously administered to the test animals, in the upper part of the udder, once in a dose of 20 ml. The serum was not administered to the control animals. The cow morbidity rate in the test group was 6,5% while in the control group it achieved 26,5 %, i.e. it was 4,0 times.

The conducted experimental studies allowed us to carry out wide polyvalent serum trials in some farms of the Republic deemed to be disadvantaged owing to the cattle mastitis. In total, for the medical and preventive purposes, about 1000 liters of serum were used.

### **Conclusions**

In the application of the said serum in some disadvantaged farms, there were no complications and cattle mortality. Clinical observations, epizootological data, and comments of some specialists from those farms where tests of the said polyvalent serum were conducted as compared to the previous years are indicative of the efficiency of the preparation, which enables the cow mastitis morbidity to be largely reduced, and they show the possibility of a wide application of the serum both for the therapeutic and the preventive purpose.

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Жуманов К.Т., Бияшев К.Б., Бияшев Б.К., Сансызбай А.Р., Валдовска А.

### **СЕРОПРОФИЛАКТИКА МАСТИТА КРУПНОГО РОГАТОГО СКОТА**

#### **Аннотация**

Приведены сведения по применению высокоэффективной лечебной сыворотки против мастита крупного рогатого скота.

**Ключевые слова:** мастит, этиология, возбудители, лечение и профилактика маститов, гипериммунная сыворотка.

Жұманов Қ.Т., Бияшев Қ.Б., Бияшев Б.Қ., Сансызбай А.Р., Валдовска А.

## ІРІ ҚАРА ЖЕЛІНСАУЫНЫҢ СЕРОПРОФИЛАКТИКАСЫ

### *Аңдатпа*

Ірі қара мал желінсауына қарсы тиімділігі жоғары емдік қан сарысуын қолдану туралы мәліметтер келтірілген.

**Кілт сөздер:** желінсау, этиология, қоздырғыштар, желінсау профилактикасы және емі, гипериммунды қан сарысуы.

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**Zhumanov K.T., Biyashev K.B., Biyashev B.K., Oryntaev K.B.**

*Kazakh national agrarian university*

## BIOLOGICAL PROPERTIES OF STAPHYLOCOCCI ISOLATED FROM COWS WITH MASTITIS

### **Annotation**

The most important and the main objective of increasing livestock production is the growth of livestock and increase its productivity. As is known, in the modern system of animal husbandry is the main value of dairy cattle, the economic potential of which is associated mainly with the preservation of the health of the breast. Mastitis disease is a major cause of premature culling a large number of cows in dairy complexes and also causes a decrease in milk productivity, milk quality care, the shortfall in young animals, increases the cost of care, feeding and treatment of sick animals.

**Keywords:** probiotics, persistence, Escherichia, Enterobacteria, Enterococci, lactobacilli.

### **Introduction**

Research on the diagnosis, treatment and prevention of mastitis of cows is essential relevance. Economic losses, mainly due to a decrease in milk production and the inability to maximize the genetic potential for milk production of the animal. It was found that the defeat only one quarter of the udder causes the loss of up to 12-15% of milk per lactation. After an illness mastitis in the next lactation milk productivity is not restored in almost half of the cows, and some fall due to non-reversible structural and functional changes in breast tissue [1, 2, 3]. For this reason, sometimes up to 30% cows are culled.

Causes of mastitis in cows can be a variety of factors: infection, intoxication, trauma of udder, especially when the wrong machine milking, chemical irritation, thermal effects (cooling), and others. Of all these reasons are important is mastitis. Particular etiological importance is attached to Staphylococcus, Streptococcus, E. coli, whereas other microorganisms play a minor role, but the inflammation of the udder caused by them, can occur quite adversely and have implications for milk hygiene [4, 5].

The purpose and objectives of the research - to study the biological properties of Staphylococci isolated from mastitis cows.

### **Material and methods**

The studies were conducted in the farms of Almaty region and antibacterial biotechnology laboratory of KazNAU. 2,324 milk samples from 581 cows were investigated. Subject of bacteriological examination were 1000 milk samples from 250 cows, including the proportion of