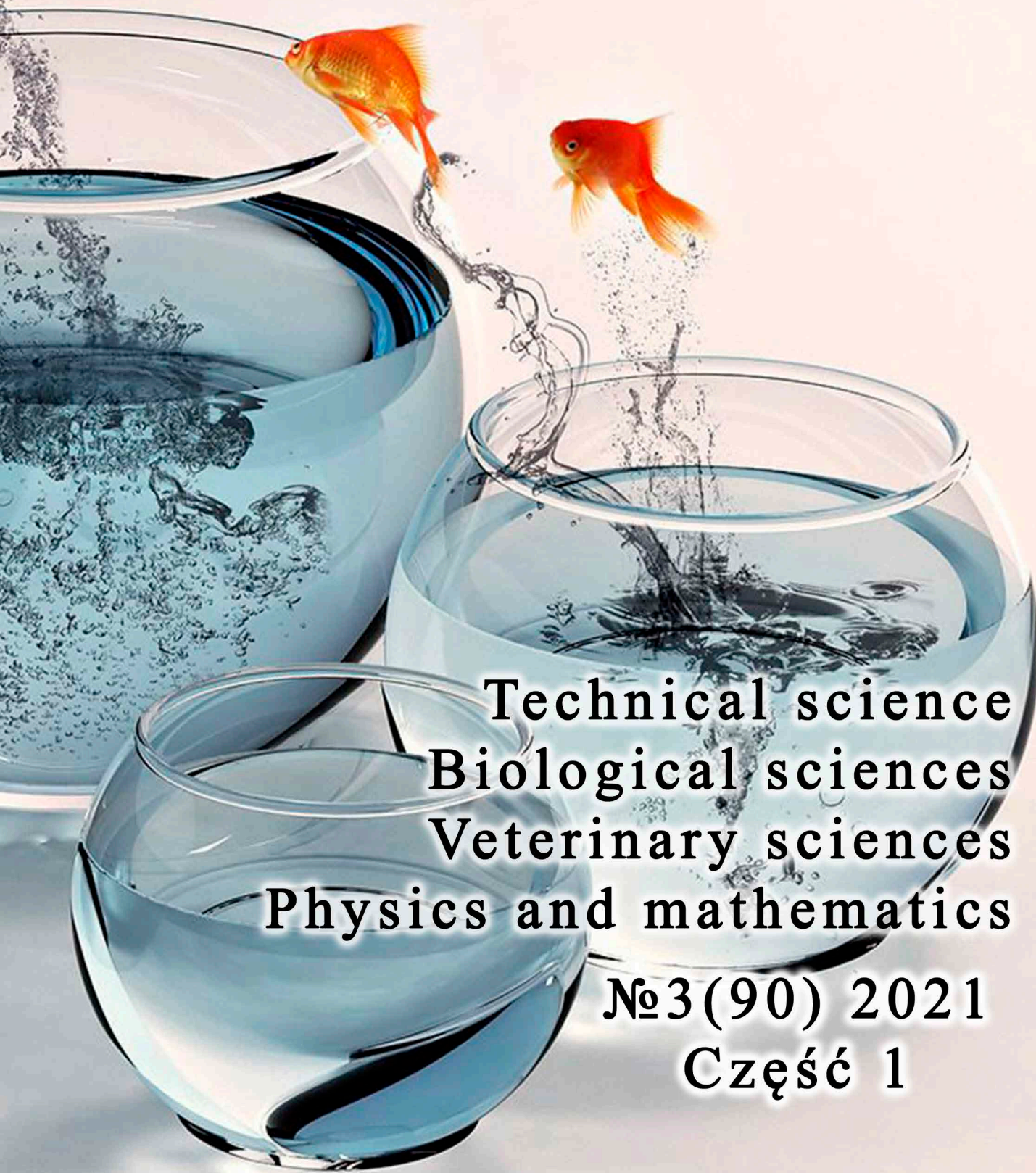




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ПРОФІЛАКТИЧНІ ЗАХОДИ МАСТИТУ У КОРІВ В СУХОСТІЙНИЙ ПЕРІОД

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THE PREVENTIVE MEASURES OF MASTITIS IN COWS DURING THE DRY PERIOD

Анотація.

Проблеми із захворюванням на мастит дуже часто є результатом інфекцій, на які наражаються корови у сухостійний період. До 50% корів в стаді можуть мати субклінічні бактеріальні інфекції у вимені. Корови особливо вразливі до нових інфекцій, в наслідок яких розвивається мастит, упродовж перших двох тижнів сухостою, за два тижні до отелення та упродовж двох тижнів після отелення. За правильною обробки молочної залози тварин під час сухостійного періоду можна знизити внутрішньовим'яні інфекції на 20-60%.

Основні методи зменшення кількості інфекцій сухостійного періоду є введення антибіотиків у вим'я, крім того введення у вим'я внутрішніх і покриття його зовнішніми штучними герметичними матеріалами для дійок.

Для виявлення субклінічного маститу корів в кінці лактації перед запуском необхідно застосувати проби з мастидином, відстоювання або каліфорнійського молочного тесту De Laval. Хворих тварин треба лікувати, а потім проводити консервацію вимені.

Консервація вимені при запуску є важливим елементом профілактики маститу. Причому одномоментний запуск є необхідною умовою підтримання низької кількості соматичних клітин у молоці.

Abstract.

Problems with mastitis are often the result of infections that cows are exposed to during the dry season. Up to 50% of cows in the herd may have subclinical bacterial infections in the udder. Cows are particularly vulnerable to new infections that lead to mastitis during the first two weeks of dryness, two weeks before calving, and two weeks after calving. With proper treatment of the mammary gland of animals during the dry period, you can reduce intramammary infections by 20-60%.

The main methods of reducing the number of infections during the dry period is the introduction of antibiotics into the udder, in addition to the introduction into the udder of internal and covering it with external artificial sealed materials for teats.

To detect subclinical mastitis in cows at the end of lactation before starting it is necessary to use tests with mastidine, settling or California milk test De Laval. Sick animals should be treated and then the udder preserved.

Preservation of the udder at startup is an important element in the prevention of mastitis. Moreover, a one-time start is a necessary condition for maintaining a low number of somatic cells in milk.

Ключові слова: *мастит, корови, профілактика, консервація, сухостійний період, субклінічний, перевірка, антибіотики, герметик, соматичні клітини.*

Keywords: *mastitis, cows, prevention, conservation, dry period, subclinical, testing, antibiotics, sealant, somatic cells.*

Introduction.

Mastitis is a global problem in dairy farming. According to researchers, up to 50% of cows in farms with various forms of ownership suffer from mastitis. The greatest economic damage is caused by the subclinical form of mastitis due to the large scale of its spread. It is the subclinical form of mastitis that causes the most significant decrease in the milk productivity of cows and the sanitary quality of milk [5,9].

According to the International Dairy Federation, according to the European Association of Livestock Breeders and many domestic and foreign researchers,

the clinical form of mastitis is diagnosed in a number of cases in 20-25% or more cows, but subclinical - more than 50% of cows in the herd, and this form of mastitis can persist for two lactations in the absence of timely and effective treatment [4, 13, 14].

Analysis of research and publications.

Lactation begins at the time of launch, not calving, as is commonly believed. Dry management plays an extremely important role in preparing pregnant cows for the next lactation. Thus, subclinical mastitis in the period of start (during the last milking) is diagnosed in 12-45% of cases, in the period of dryness - 12-37% and

after childbirth - in 20-25%. The clinical form of mastitis in cows during the dry period is detected in 9.3% of cases, and after birth at the beginning of lactation, their number increases to 54.5% [1, 16].

Treatment of dry cows - preservation of the udder during the start-up period is an effective method to prevent the development of new infections during the early dry period. Such therapy is 90-93% effective against subclinical streptococcal infection, 70-80% against staphylococcus and 70-90% against external streptococcus. The effectiveness of treatment of staphylococcal infections during lactation can be only 50% or even less [3, 8].

Dry therapy. As a rule, long-acting antibiotics are used when starting cows. They consist mainly of cloxacillin, ampicillin in doses several times higher than drugs used for the treatment of mastitis during lactation. The duration of action of the drugs is 28-50 days. Therefore, when choosing a means of preserving the udder, it is also necessary to keep in mind the length of the dry period.

It is believed that the formation of the keratin plug of the teat duct occurs immediately after the transfer of the cow to the start and it is a biological barrier that protects the duct from infection. At the same time, studies have shown that up to 25% of cows in the dry period do not form a keratin plug even after 6 weeks, and in 3-5% it is absent. The use of sealants in combination with udder preservation will provide an additional protective effect. The sealant is stored on the tip of the teat for up to 7 days and requires additional application. It can also be used for heifers, especially in rooms where there are many flies. Therefore, preservation of the udder at startup is an important element in the prevention of mastitis [7].

Culling. Culling, or eradication of the pathogen from the herd, is an extreme measure to control the pathogen, especially contagious mastitis. Over time, the urgent question arises about the culling of cows - unfortunately, the only and effective method of preventing the spread of infection. After all, such cows are

a constant source of infectious mastitis. The following are criteria that can be used to guide animal culling:

- low-yielding cows with a chronic course;
- mastitis is re-diagnosed in the next lactation (recurrence in the next lactation);
- cows were treated at least 3 times during the current lactation and the therapeutic effect is absent;
- the pathogen is isolated three times from more than one quarter;
- combination "mastitis-infertility";
- the number of somatic cells in milk during the month > 400 thousand/cm³[2].

Causes of somatic cells in milk. The presence of somatic cells in milk is natural. Somatic cells are dead epithelial cells of the udder alveoli, their remains, dead blood cells: erythrocytes and leukocytes, as well as dead bacteria. The previously mentioned cells of various origins, which can be found in milk, are called somatic cells. Their presence and quantity in milk indicates the cow's immunity and general health. The milk of a healthy cow can average from 20 to 250 thousand somatic cells per 1 ml. milk. Studies abroad have found that there is no Staph. aureus in farms whose milk does not exceed 100,000 somatic cells. The increased number of somatic cells in milk is sometimes caused by mastitis pathogens or their number in the group increases significantly when it comes to cows in which metabolic diseases are detected [12, 19].

Of all the bacteria that cause mastitis, Escherichia coli (E. coli) and Staphylococcus aureus (S. aureus) are the most dangerous. The bacterium E. coli is often the cause of subacute clinical mastitis, characterized by compaction of individual lobes or the entire udder, decreased appetite, decreased milk production, and in some cases dehydration, animals are constantly lying down and may even die [15, 17, 18].

Table 1 provides summary information on common pathogens of clinical udder inflammation and subclinical udder inflammation. Knowing the causative agent of udder inflammation, it will be easier for you to find critical points in the cowshed that can cause cow disease in the case of udder inflammation [1, 11, 20].

Table 1

Pathogens of udder inflammation

Pathogens of septic infections	Staph. aureus, coagulase negative staphylococci, Strept. agalactiae, Strept. disagalactiae, E.coli
Microorganisms from the holes of the teats	E. coli, Citrobacter freundii, Enterobacter cloacae, Klebsiella spp., Proteus vulgaris, Proteus mirabilis
Microorganisms from the skin and hair of cows	Enterococcus spp., Micrococcus spp., Aerococcus spp.
Microorganisms from the hands, respiratory tract and clothes of milkers	E.coli, Staphylococcus spp., Streptococcus spp.
Microorganisms from the environment (air, litter, manure, milking machines, dairy utensils)	Coliforms, Staphylococcus spp., Micrococcus spp., Escherichia coli (Bacillus spp.), Clostridium spp.
Microorganisms from water used to wash the milk ducts	E.coli, Enterococcus spp., Bacillus spp., Micrococcus luteus, Staphylococcus spp., Aspergillus spp., Mucor spp. (mucoral mushrooms)
Microorganisms from the skin of cats and dogs	Bacillus spp., Micrococcus spp., Staphylococcus spp., Escherichia spp., Pseudomonas spp., Proteus spp., Pasteurella multocida
Microorganisms from grass on pastures	Lactococcus spp., Lactobacillus spp., Micrococcus spp.
Microorganisms from animal feed	Microscopic fungi, Listeria spp., Clostridium spp., Aeromonas hydrophila

The main methods of reducing the number of infections during the dry period are as follows: the introduction of antibiotics into the udder; introduction into the udder of the inner and covering it with external artificial sealed materials for teats; environmental management. Antibiotic therapy is a professional approach. Intravenous administration of long-acting antibiotics is one of the effective means of the program for the prevention of mastitis [4, 18].

During the start-up period, the drugs should be administered in all quarters of the udder ("carpet" dry therapy), and not only in those who had clinical mastitis during previous lactation, or in those who had a high number of somatic cells (selective dry therapy) [10].

One of the most effective methods of protection against udder infection throughout the dry period is a combination of the introduction into each part of the udder of a long-acting antibiotic and an internal artificial sealant that mimics a keratin plug.

For detection of subclinical mastitis of cows at the end of lactation before start it is possible to use tests with mastidine, settling or California milk test De Laval. Sick animals should be treated, and only then to preserve the udder [7].

Materials and research methods.

In the medium economy, mastitis in cows is widespread and accounts for about 27% of the total number of cows. The highest incidence rate is in the winter-spring period (17%), lower in the summer-autumn period (10%). The subclinical form of mastitis was diagnosed in 13% of all lesions.

Laboratory studies indicate that the mastidin test with the formation of a jelly-like clot is quite sensitive and essential for the diagnosis of subclinical mastitis in cows. It is characterized by simplicity and speed of execution, clarity and contrast of the reaction.



Fig. 1. Examination for subclinical mastitis by California test (left part of the plate) and mastidin test (right part).

Given that the results of the diagnostic test with mastidine are not sufficient for diagnosis, they are confirmed by other research methods (fig. 1). Thus, the California Mast Test (CMT) was used to quickly assess the number of somatic cells in milk. The study of secretion with the California milk test De Laval was performed after milking milk from each quarter of the udder. The evaluation was performed according to the instructions for changing the consistency of the mixture:

- negative reaction (up to 500 thousand somatic cells in 1 ml) - the mixture is homogeneous, without clots and mucous inclusions or there are traces of jelly on the edge of the plate; - positive reaction (more than 500 thousand cells in 1 ml) - a jelly-like clot is formed, which is fixed to the bottom of the plate. The greater the number of somatic cells in the secretion, the denser the clot formed (table 2).

Table 2

Evaluation of somatic cell test in milk	
Color	Score
Light - purple	Number of somatic cells up to 250 thousand/ml
Dark - purple	Dark purpThe number of somatic cells from 250 to 400 thousand/ml

To control the effectiveness of the diagnosis of mastitis, a settling test was performed (fig. 2). The main diagnostic feature of subclinical mastitis is the formation of milk in the milk after settling of sediment or mucous cream. The color of cow's milk in subclinical mastitis is bluish



Fig. 2. Test of defending milk.

shade and watery consistency, with a layer thickness of cream less than 5 mm. Analyzing the results of the research, it was noted that determining the effectiveness of diagnostic methods by the number of sick animals or udder quarters is not an objective indicator,

as the identity of the results is not taken into account. Therefore, to determine the accuracy of the use of the studied methods of diagnosis of subclinical mastitis, we analyzed how their positive and negative results coincide with the results of the settling test (table 3).

Table 3

The results of the evaluation of methods for detecting subclinical mastitis

Methods of diagnosis of subclinical mastitis	Positively responding cows to subclinical mastitis	
	heads	%
Mastidin test	27	11
California milk test De Laval	29	13
Defending test	29	13

At the same time in the number of sick animals noted a slight discrepancy. According to the results of the California milk test, De Laval had two more animals, which was confirmed by the breakdown of the defense. Thus, according to the results of comparative studies, the accuracy of the diagnosis of subclinical mastitis is: mastidin test - 80%, California milk test De Laval and settling test - 100%.

The most susceptible to the subclinical form of mastitis are high-yielding cows with a productivity of more than 6000 kg aged over 3 years. The results of the research confirmed the highest diagnostic value of the California milk test De Laval and make it possible to recommend it for wide practical use.

One of the most effective methods of protection against udder infection throughout the dry period is a combination of the introduction into each part of the udder of a long-acting antibiotic and an internal artificial sealant that mimics a keratin plug. Such a sealant may be, for example, a wax-based bismuth salt. Insert it into the teat channel during startup. As it has no antibacterial properties, strict hygiene measures should be observed during operation.

If during the introduction of a prolonged-release antibiotic into the teat it should be massaged from tip to base so that the antibiotic is completely in the teat and the gland of the breast tank, then when re-introducing the internal artificial sealant the base of the teat should be clamped between the thumb and forefinger so as to limit further advancing the sealant and that it settled on the base of the teat, directly above its channel.

After the introduction of the internal artificial sealant, the teat should be immediately immersed in a disinfectant, which will cover it with a film. An excellent practice is to regularly immerse the teats in a disinfectant solution during the dry period or at least in the last three weeks before calving.

Only after the introduction of a long-acting antibiotic and an internal artificial sealant that mimics a keratin plug into each teat, and after immersing the teats in a disinfectant, can the proposed hoof trimming be performed.

Results and its discussion.

At Limited Liability Company (LLC) «Zoloti Luki», a one-time start was used for most dairy cows at the end of lactation. Cows were launched 40-60 days before the expected date of calving. In practice, the one-time launch of cows justified itself, without a gradual reduction in the number of milkings.

Cows were launched in groups immediately after morning milking. It is not advisable to significantly limit the consumption of feed and water, although high-yielding cows, logically, it is desirable to stop feeding concentrates four to five days before launch and transfer to another group. In cows with lower milk yields, the keratin plug is formed better.

Gradual start-up, which involves reducing the number of milkings to once a day, is not recommended for the following reasons:

- is considered unproductive when limiting the number of milkings acts as an incentive for further milk production;
- prolongation of periods between milkings may increase the risk of bacterial infection;

- milk from cows, which are milked once a day, has a high number of somatic cells;
- a time-consuming start-up process can reduce the duration of the dry period.

Gradual launch is also controversial for two reasons.

First, incomplete milking of cows promotes the rapid multiplication of bacteria in the teat duct before the introduction of the antibiotic and thus causes a predisposition to mastitis.

Secondly, cows in the case of a gradual start in a day or two develop a large number of somatic cells. In one study, a group of late lactating cows with an average number of somatic cells of 255 thousand per 1 ml was observed. When the gradual start was carried out over two days, the number of somatic cells increased to 580 thousand, and during its duration during six days, the average number of somatic cells increased to 6600 thousand and more.

Thus, a one-time start is a necessary condition for maintaining a low number of somatic cells.

In studies performed on 24 cows, two-quarters of each cow's udder was injected with only a long-acting antibiotic, and the other two-quarters were given both a long-acting antibiotic and a sealant that mimicked a keratin plug (table 4).

To preserve the udder in the farm used intracister-nal prolonged drug Bayokloks DS. This syringe-tube contained the active substance cloxacillin benzathine - 500 mg. This broad-spectrum antibiotic has high activity against contagious pathogens - *B. agalactiae* and staphylococci resistant to penicillin, as well as pathogens associated with the environment.

In the quarters in which the two drugs were administered, a 28% reduction in new infections was recorded. Decreases were also registered in the same quarters and a 35% reduction in clinical mastitis in the first 60 days of lactation.

Table 4

The results of udder preservation in cows during the start-up period

Indicator	Gradual start (without preservation of the udder), 12 heads	One-time launch (with preservation of the udder), 12 heads
The average amount of milk received in the last 10 days of lactation, kg	51	73
Check for subclinical mastitis during the last milking	no data	adverse reaction
The number of clinical cases of mastitis during dryness, pieces (%)	2 (16,6)	1(8,3)
The number of new cases of clinical mastitis during the next lactation (the first 100 days after calving), pieces (%)	5 (41,7)	3 (25)

According to studies, cows that were injected with a long-acting antibiotic and an internal artificial sealant that mimics a keratin plug in each teat showed the following results:

- produced 150 kg more milk in the new lactation;
- had 11 times less cases of clinical mastitis during the dry period;
- received 2.5 times fewer infections during calving;
- there were almost three times fewer clinical cases within 21 days after calving before the next hunt.

It is proved that with proper treatment of the mammary gland of animals during the dry period, you can reduce intrauterine infections by 20-60% during the dry period.

According to statistics, an average of 40-50% of cows in the herd may have subclinical bacterial infections in the udder. Milk remains without visible changes, but in the laboratory sowing on mastitis pathogens gives a positive result. Only not many farms have a low KSC (somatic cell count). On the day of start-up, during udder preservation, an anti-mastitis agent is injected into each quarter of all cows that are started.

Before administration of the drug, each teat should be immersed in a bactericidal solution for 30-45 seconds, then wipe dry with a paper or linen towel. Then the end of the teat should be disinfected with an alcohol solution. Carefully remove the protective cap from the cannula. The cannula is inserted into the teat canal only partially, completely not.

Immediately after treatment, the teats are immersed in a suitable solution. Treatment of dry cows and immersion of teats in a bactericidal solution effectively reduces udder infection unless bacterial lesions of the udder are too severe.

In practice, it has been proven that 10-15% of cows develop new infections if they do not preserve their udders at startup.

From 10-20% of cows in the herd need to take milk samples for crops during the year to determine the dominant organisms. Samples should be taken from cows that have new mastitis infections. In cows with a somatic cell count (CSC) that is too high at the beginning of lactation, milk samples for seeding should be taken. If *S. aureus* is found, such a cow should not be inseminated and should be culled from the herd if it is not possible to isolate it. Such cows remain a source of infection as long as they are in the herd.

Conclusion.

Keeping dry cows requires as much effort and attention as keeping dairy cows. You should be very careful and cautious during the start of the cow and in the period before calving. If you neglect the comfort of cows, housing conditions and feeding rules, it can negatively affect the long-term profitability of the dairy farm.

For most dairy cows at the end of lactation it is necessary to use a one-time start - 40-60 days before

the expected date of calving, which is a necessary condition for maintaining a low number of somatic cells for udder preservation.

In cases where there is a high incidence of mastitis during calving or high average CSCs during the first examination of first-borns, it is better to use milking cows before calving and treatment with antibiotics.

To preserve the udder, it is effective to use two drugs: an antibiotic and a sealant that mimics a keratin plug, the introduction of which reduces the reduction of new infections by a third and reduces the incidence of clinical mastitis by 35% in the first 60 days of lactation.

To reduce the risk of antibiotic residues used for dry cows getting into the milk, it is necessary to: separate dry and newborn cows from the dairy herd; mark dry cows and treated dairy cows differently; milking machine operators must be able to "read" the various labels used for cows and have access to animal treatment records. If cows have received additional treatment, their milk should be tested before it enters the general tank.

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