

Comparative effectiveness of preventive medical care when orthopedic pathologies in COWS

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Abstract. The available bibliographic sources on the study of distal limbs diseases in cows were analyzed. The causes and factors that contribute to limb pathology risk in cows at milk production enterprises are emphasized. Lack of active exercise, inadequate feeding rations, insufficient veterinary hygiene, high contamination of premises and low or insufficient level of preventive medical care have an increase in the incidence of animals up to 40% of the herd. Therefore, the problem of cows' distal limbs pathology treatment and prevention is currently of great importance. In the complex preventive and medical care against the disease of the distal limbs in cows, functional trimming of the hoof horn has an important veterinary hygienic value. The beginning of therapy at an early stage reduces the risk of developing more severe pathologies of the limbs. The use of "EMS-I type A" for the treatment and prevention of distal limb lesions, depending on the degree and size of tissue damage, provides recovery after 2-3 bandages and disease containment in the study groups.

1 Introduction

In modern conditions of dairy farming, cattle limbs diseases cause considerable economic damage to the commercial farm units. The mechanism of mass limbs diseases, including hooves is a complex of various causes: all-year zero pasture of animals, high contamination of premises, manure gutters, pens and places of cow alley, inadequate, insufficient and unbalanced feeding, low level of preventive medical care [1, 2, 3].

Currently, more and more reports are appearing about problems in dairy cattle breeding associated with the occurrence of distal limbs diseases, which, of course, negatively affects the health of animals and their productivity. The increase in the incidence of the distal limbs depends on many factors: all-year zero pasture of cows, high contamination of farms, sections, boxes, pens and places of cow alley, lack of active exercise, inadequate and insufficiently balanced feeding regimes, low level of preventive medical care. The high level of morbidity in cows confirms the complexity of the multifactorial etiology of limb lesions. According to many researchers, it is noted that this problem in our country has

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begun to manifest itself quite acutely in recent decades with the reduction of domestic breeds of animals and the active import of Holstein cattle, which are predisposed to have a problem with limb diseases. Domestic breeds of cows were created by animal breeders in certain territories with the peculiarities of natural and climatic conditions [4, 5].

Due to the spread of limb pathology in cows, all farms suffer considerable economic damage, which consists in a significant decrease in milk yield and milk quality, an increase in premature cow disposal, a decrease in reproductive capacity and an increase in the cost of treating animals [6, 7].

Based on the above, the aim is to determine the level of incidence of orthopedic pathology in cattle and to conduct a comparative analysis of preventive medical care when distal limb lesions in cows.

2 Methods and methods

The research was carried out on a complex and a dairy farm, located in the Oryol region. The object of the study was cows (healthy and sick with orthopedic pathologies) of a black-and-white Holstein breed. During the clinical examination, the animals' body temperature, pulse rate, and respiration were measured.

According to the principle of analogs, animals were selected in experimental groups. Two series of experiments were carried out. In the first one the therapeutic effectiveness of the drug was studied and in the second, its prophylactic effect.

Spray with an antibiotic, Top-Hooves gel for hooves, oxytetracycline hydrochloride pulvis, copper sulfate pulvis, preparation "EMS-Y type A" were used for the treatment and prevention of distal limbs diseases in cows.

The preparation "EMS-Y type A" is a disinfectant made in the form of a solution for external use, containing free iodine in the form of iodophor (patent No. 2535016) as an active substance and surfactants as auxiliary components that do not have an irritating effect on the skin. The composition includes crystalline iodine, oxyethylidenediphosphonic acid, dimethyl carbinol, neonol, glycerin, water. In appearance, the liquid is dark brown in color with a faint smell of iodine, mixing with water in any ratio. It has significant washable properties and a bactericidal effect against non-sporous microflora. Glycerin softens the effects of iodine on the skin. The drug is developed and mass-produced by the limited liability company "Experimental and Technological Company "Etris".

Functional processing and trimming of hooves were carried out with special discs, cutters, forceps and knives.

The results of the studies were subjected to statistical processing.

3 Results and Discussion

Due to the spread of limb pathology in cows, all farms suffer considerable economic damage, which consists of a significant decrease in the quantity and quality of milk, an increase in the loss of cows from the herd, a decrease in reproductive ability and an increased cost of medical and preventive measures [4, 6, 8].

According to scientists, the limbs pathology of highly productive cows is in the second and third place after obstetric and gynecological pathologies and mastitis. In some farms it affects up to 35-40 % of the herd. Studies show that hoof pathology is a polygenic and multifactorial disease, so therapy program should be aimed at the complex prevention of this pathology. The development of safe and effective means and methods of its application for care and prevention of orthopedic pathologies in cows is of great veterinary, zoohygienic and economic importance [2, 7].

At the complex, three groups of dairy cows with 65-70 heads in each were examined. 20-30% of the animals in each study group were identified with obvious signs of limb lesion. These cows visually showed different degrees of lameness when moving.

On the dairy farms 623 milk cows were examined. 210 animals (33.7%) were identified with obvious signs of limb lesion.

Table 1. Analysis of the morbidity of cows with distal limb lesions

	Numbers of cattle	%
Healthy animals	413	66,3
Animals with signs of limb lesions	210	33,7
Total amount of animals	623	100

Changes in the anatomical structure of the hoof, pododermatitis, interdigital phlegmon, necrotic dermatitis, laminitis, interdigital dermatitis, sole exfoliation, plantar ulcers, hoof deformity, calluses (interdigital growths) were recorded during the examination of animals (Figure 1).



Fig. 1. Clinical signs of distal limbs pathology

Dairy cows, heifers on rearing are periodically passed through hoof baths filled with a 10% solution of copper sulfate, 3-5% solution of formalin and "SKIF-D" for the hoof diseases prevention. In addition, cleaning and individual treatment of hooves are carried out periodically in sick animals, with the use of disinfecting drugs and antibiotics. Despite the measures taken at the dairy complex with a yard housing in different age groups, from 20 to 45% of sick animals with distal limbs pathologies are observed. The significant number of affected hooves on the hind limbs were noted in clinical examination of the herd compared to the forelimbs. Thus, the right hind hooves are affected in 50% of animals, the left hind in 23.7 %, the right forelimbs - 11.3 %, the left forelimbs - 15 %.

On the dairy farms during the period of functional processing and trimming of hooves, the morbidity of limbs in animals that are in winter on tie-up housing was as follows: the right forelimb is 4.8 %; the left forelimb is 2.7 %; the right hind is 48.5 %; the left hind is 44 %.

Causes of the development of limbs pathology in cows at the dairy complex:

1. Lack of active exercise, which would contribute to the natural attrition of the hoof horn.
2. Inadequate feeding rations.
3. Insufficient level of veterinary hygiene.
4. High contamination rate in the premises where the animals are kept.

5. High level of limb injuries.

6. Low or insufficient level of preventive medical care, namely: insufficient examination of animals, untimely functional and preventive trimming of overgrown hoof horn and late treatment of the developed pathology.

Before the experiments, bacteriological and mycological studies of inter-hoof cleft scrapings of sick animals were carried out. In the samples from the affected limbs, the causative agent of necrobacillosis was not isolated, but the pathogenic *Staphylococcus aureus* (B – hemolytic, plasma-coagulating) was isolated. And during mycological studies, fungi of the genus *Aspergillus* (*A. niger*, *A. flavus*), *Penicillium*, *Mucor* were found. Laboratory studies of the microflora growth retardation zone in Petri dishes showed that the isolated microorganisms have a certain sensitivity to antimicrobial drugs and "EMS-I type A" agent.

In the experiment, the agent "EMS-I type A" was tested by individual treatment of sick animals. Before the treatment, the animals' hooves were thoroughly cleaned and trimmed. To clear the hooves of the animals, a set of tools was used: pliers, a hoof knife. The instrument was disinfected before use. A special machine was used to fix the animals. Cleaning hooves of cattle was carried out in the following way. First of all, the hoof was cleaned of mechanical contamination. Then with the help of hoof knife, the old horn with a yellowish color was carefully cut off from the sole and digital torus, and the overgrown hoofed wall was bitten off with pliers, leaving it at the level of the white line. Special milling cutter was used to trim the hoof horn. The damaged areas were cleaned of necrotic tissues and treated with a 3 % solution of hydrogen peroxide. For treatment, a 50% foamy solution of "EMS-I type A" was used on the cleared surface of the hooves and a gauze bandage was applied. The bandage was changed after three days. In the presence of a pathological process, the bandage was applied repeatedly. Figure 2 shows the hooves of cows before and after treatment.



Fig. 2. Images of a cow's limb before and after treatment

Individual clearing and treatment of sick hooves with the use of 50 % foam agent "EMS-I type A" ensured the recovery of animals after 2-3 bandages. The recovery of the animals depended on the degree and area of tissue lesion.

Currently, in veterinary practice, there are a large number of monocomponent disinfectants used as preventive medical care against the lower limbs' pathology of cattle. As preventive measure, farms use formalin baths with a 5% solution of formaldehyde, copper-vitriol baths with a 10% solution of copper sulfate, Hooves solutions and others. However, these disinfectants do not solve this problem. The most effective ones are combined disinfectants; their main advantages are absence of immunosuppressive action, low toxicity to cows, and breadth of biocidal action against potentially pathogenic microorganisms [8, 9, 10].

"EMS-I type A" is an important component in the integrated method of combating widespread pathology when studying the hoof diseases prevention effectiveness in the cows group passing through foot baths filled with a foamy preparation of 10% solution. The control group of animals was passed through hoof baths with a 10 % solution of copper sulfate. Preparation, use and replacement of solutions in hoof baths were carried out according to generally accepted methods (Figure 3).

The cow's hooves were completely immersed in the foam solution, and the animal, coming out of the bath, carried a certain amount of foam on the limbs, which was kept on the hooves for about 10 minutes providing a longer treatment.



Fig. 3. Hoof bath filled with foam and hooves of animals after treatment with foam of 10 % solution of "EMS-I type A"

During the period of the experiment, there was a decrease in the number of sick cows in each study group. When treated with a foam solution with a concentration of 10 % of the agent "EMC-I type A", the lameness reduction was 7 %. In the control group of animals, when treated with a 10% solution of copper sulfate, the decrease was also 7 % as in the experimental group.

The cows were examined during the study period. It was found that the preventive effect was shown by all the solutions of drugs used at the initial stage and with a small area of hoof tissue lesion. The studied solutions of drugs did not contribute to wound healing with a stronger lesion of hooves. Timely clearing and trimming with the formation of the correct anatomical shape of the hooves is a significant effect in the prevention of diseases in cows.

4 Conclusions

Orthopedic diseases in cows are a widespread pathology. The level of cows' morbidity with this pathology in farms, depending on the use of preventive medical care is in the range of 20 to 45%, and regardless of veterinary hygiene, the hind limbs are affected. Preventive examination of animals, systematic treatment of hooves is the most essential link in the

complex preventive medical measures that are aimed at combating this disease. Individual cleaning and therapy of animals was provided in the distal limbs with the use of "EMS-I type A". This depended on the degree and area of tissue damage, provided recovery of animals after 2-3 bandages. Cattle driving through hoof baths filled with a foam solution of the "EMS-I type A" product in order to prevent pathologies of the hooves has a deterrent effect on the growth of the disease.

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