






## PROBIOTIC “LACTOBACTERIN-TK2” THERAPEUTIC AND PROPHYLACTIC EFFICIENCY

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### ABSTRACT

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Annotation. The therapeutic and prophylactic efficacy of the “Lactobacterin-TK2” probiotic for correction of clinical and microbiological changes in diarrhea of calves under farming conditions has been studied. The therapeutic efficacy showed that the drug product results in complete recovery. Findings on the calves' productivity showed that animals in the experimental groups grew more intensively than animals in the control group during the drug product administration by calves. Use of “Lactobacterin-TK2” probiotic in the treatment and prevention of gastrointestinal infections in calves has provided 100% therapeutic and preventive efficacy. We believe that the effect has been obtained due to the sanitation of the animals intestines from pathogenic flora by suppressing of pathogenic and conditionally pathogenic bacteria reproduction with lactobacilli as a result of their antagonistic activity and colonization of the intestine freed ecological niche with normal microbial flora, stimulation of humoral and cellular immunity factors, level of nonspecific resistance of the organism, activation of metabolic processes, normalization of intestinal microbiocenosis in calves. All this immediately influenced the improvement of digestion processes, which led to more intensive growth and development of animals.

### 1. INTRODUCTION

Gastrointestinal diseases of calves, characterized with digestive disorders, development of dysbiosis, acquired immune deficiency, metabolic disorders, dehydration and intoxication, and with the frequent death of animals, occupy a special place among the diseases of young agricultural animals [1-3].

Calves gastrointestinal diseases of infectious etiology are also a serious problem for public health, as they create a threat and often cause of widespread outbreaks of bacterial food poisoning in humans.

Currently, specific preventive antibiotic and chemotherapy are the major line in the control of gastrointestinal tract diseases. With regard to antibiotic and chemotherapy, in recent decades all countries have faced such a serious problem as the emergence and growth of resistance of Salmonella strains emanated from humans, animals and agricultural products, to antibacterial drug products, especially actively used in medicine, veterinary medicine and agriculture [4-6].

In this regard, scientists around the world believe that it is necessary to use new drug products and treatment regimens promoted the increase of non-specific resistance of newborn calves organisms for the prevention and control of gastrointestinal diseases.

Recently, a lot of reports on the anti-inflammatory and immunomodulatory effects of probiotics have appeared in the scientific literature, so experiments with probiotic drug products to identify their ability to influence not only the microbiocenosis of the gastrointestinal tract, but also the whole organism generally seems very promising and relevant [7-9].

## 2. MATERIALS AND METHODS

The laboratory studies on evaluation of the therapeutic and preventive efficiency of the probiotic “Lactobacterin-TK<sup>2</sup>” in gastrointestinal diseases of calves, were carried out in peasant farms “Burkitti” and “Karakozha-ata” in Kyzylorda region of the RK, laboratory studies were carried out in the laboratory of the Biological Safety department, Kazakh national agrarian university.

The object of research was probiotic “Lactobacterin-TK<sup>2</sup>”, used for the correction of clinical and microbiological indices for gastrointestinal diseases of calves.

In order to study the therapeutic effectiveness of the probiotic “Lactobacterin-TK<sup>2</sup>”, 15 calves of the Alatau breed of the “Karakozha-Ata” peasant farm were used in the experiment, and then they were divided into three groups of 5 in each. Diseased calves of the control group was treated with antibiotics and sulfonamides used in the farm.

In order to study the therapeutic effectiveness calves of the control group were fed, according to the basic diet of the farm and they were treated according to the scheme adopted in the farm, the 1st experimental group calves got the drug product “Lactobacterin-TK<sup>2</sup>” on the animal unit in a dose of 5 g in a mixture with milk 3 once a day in addition to basic diet. 2nd experimental group calves got the drug product “Lactobacterin-TK<sup>2</sup>” in the same scheme, only in a dose of 10 g 2 times a day.

The calves were weighed at the beginning and at the end of the experiment.

Three groups were formed from newborn calves (5 animal unit in each group) to determine the preventive efficiency of the probiotic “Lactobacterin-TK<sup>2</sup>” in the scientific and economic experience. Until the 8-day-old age they were daily fed with 4 liters of colostrum milk from the suckle feeder in two steps, and then with 6 liters of whole fresh milk from a bucket. From 40-45 days of age. The experiment lasted 2 months. The first group served as control. Calves of the second group in addition to the basic diet (BD) got 10 ml of the drug product “Lactobacterin-TK<sup>2</sup>” per animal unit with the first dose of colostrum milk and daily for 10 days, and once a week in the same dose from the 10-days age to 2-months old. The animals of the third group were additionally given 15 ml of the drug product once a day for 7-day courses with 1-week interval in addition to the MD.

At the end of the experiment, feces and blood samples from three calves from each group were taken for microbiological and hematological studies.

Serial ten-fold dilutions were prepared from the sample of feces in a sterile 0.9% solution of sodium chloride, they were taken a culture respectively in Endo medium to account the growth of Escherichia and Salmonella.

Blood tests have been made: hemoglobin content was measured with Sahli's hemoglobinometer, shaped elements were measured in the Gorjaev's count chamber, concentration of the total protein was tested in the blood serum by the biuret reaction.

Majority of calves in the control group had diarrhea clinical picture. Animals of the second group had also some digestion malfunction, but only two of them had severe disease. Only one calf in the third group had an easy form of diarrhea. All animals recovered after treatment with the drug product during 3-4 days.

The average weight of the 1st control group was 33 kg, it was 32.6 kg in the 2nd test group and 31.5 kg in the third group.

Following observation of calves has been made throughout the entire period: clinical examination, the period of recovery, evaluation of body weight gain (BWG). Clinical, hematological and physiological and biochemical indicators are used as a criterion to assess therapeutic and prophylactic efficacy.

Hematological and physiological-biochemical studies were carried out in the research laboratories of Kazakh national agrarian university on the DIATRON MI PLC H-197 hematological and automatic biochemical analyzer Budapest, HUNGARY.

### 3. RESULTS OF THE RESEARCH

Calves presented with suppression, decreased appetite diarrhea, fever and palpation tenderness of the abdominal wall at the beginning of the experiment. Strains of coliform bacillus were isolated at microbiology testing of feces and pathological material. Calves recovered gradually during the treatment. Third experimental group calves showed decrease in the clinical signs of diarrhea on the second day. The same pattern was observed in the 2nd test group calves on the 4th day of the experiment. Complete clinical recovery of the both experimental groups calves was observed on the seventh day of the experiment. 4 calves showed complete recovery in the control group on the 9th-10th day with manifestation of diarrhea recidivated. One calf died on the fifth day of the experiment.

Exposure to the drug product “Lactobacterin-TK<sup>2</sup>” on the performance of young animals was determined in the course of the experiment.

Results of exposure to the drug product on gain in weight and livability are given in Tables 1 and 2.

**Table-1. Results of exposure to the drug product on calves gain in weight**

| Indicators  | Groups  |  |   |
|---|---|--|---|
|   | 1-control group: BD + therapeutic regimen adopted in the farm | 2-experimental group: BD + “LB” in a dose of 5 g/animal unit | 3- experimental group: BD+”LB” in a dose 10 g/animal unit |
| body weight, kg, at the beginning of the experiment     | 33.0  | 32.6   | 31.5  |
| Gain for the test period, kg                            | 50.0  | 54.0   | 53.5  |
| Average daily gain over the period of the experiment, g | 425   | 535  | 550   |
| -% to control   | 100.0   | 125.8  | 129.4   |

**Table-2. Results of exposure to the drug product on calves' livability**

| Indicators  | Groups              |  |   |
|---|---------------------|--|---|
|   | 1-control group: BD | 2-experimental group: BD + “LB” in a dose of 5 g/animal unit | 3- experimental group: BD+”LB” in a dose 10 g/animal unit |
| Number of animal units at the beginning of the experiment | 5                   | 5  | 5   |
| Number of animal units at the end of the experiment       | 1                   | 5  | 5   |
| Livability ratio in %                                     | 80.0                | 100.0  | 100.0   |

Thus, it was found that the average daily body weight gains of calves who had got the drug product “LB” at a dose of 5 g/animal unit and 10 g/animal unit was higher than in the control group by 29.4 and 25.8%, and the livability in both experimental groups was 100, 0% versus 80.0% in the control group.

The data obtained indicate that the use of the probiotic “Lactobacterin-TK<sup>2</sup>” has a high therapeutic efficiency in the diarrhea of calves and contributes to the normalization of clinical score. The dose must be justified.

Calves were weighed at birth and at 2 months' age during the scientific and economic experience conducted to evaluate prophylactic efficacy of the drug product “Lactobacterin-TK<sup>2</sup>”. clinical condition of animals, feed palatability, functioning of digestive system were daily registered.

The daily use of the drug product “Lactobacterin-TK<sup>2</sup>” in the first 10 days of life and then once a week did not have a reliable preventive effect, and use of the probiotic in a dose of 15 ml weekly courses prevented the disease of 90% of the animals.

Microbiological studies of feces of 2-month-old calves showed great variability in the number of coliform bacillus and lactobacilli in animals within groups, but nevertheless the use of the drug product “Lactobacterin-TK<sup>2</sup>” has exert material influence on the intestinal microflora.

Thus, the number of coliform bacillus and paratyphoid bacteria in feces of calves who got the 10 ml dose of probiotic first 10 days of life daily and then once a week before the 2-month-old age, respectively, decreased 5.6 times and 16 times, respectively. At the same time, the number of lactobacilli increased 3.8 times in the intestine, respectively.

Feeding of the drug product “Lactobacterin-TK<sup>2</sup>” in a dose of 15 ml for 7 days with a weekly interval provided more pronounced effect on the bacterial flora. The number of Escherichia and Salmonella decreased by 34.1 and 1.6 times, the number of lactobacilli increased 8.37 times in animals of the third group, in comparison with the control group,

The data obtained showed that addition of “Lactobacterin-TK<sup>2</sup>” to the feed provide the optimal microbial balance in the intestine.

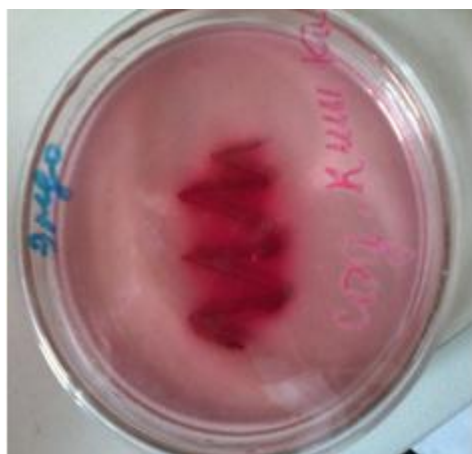


Figure-1. Growth of cultures isolated from the feces of diseased calves on the Endo medium



Figure-2. “Lactobacterin-TK<sup>2</sup>”



Figure-3. Growth of cultures isolated from the feces of diseased calves on Ploskirev's medium

Moreover, the use of the drug product according to the tested schemes has not materially affected the concentration of hemoglobin and the number of elements and the leukocyte formula in the blood. At the same time the total protein content increased significantly in the blood of the animals treated with the drug product (Table 3).

Table-3. Hematological parameters of 2-month-old calves

| Indicators                            | Group       |              |             |
|---------------------------------------|-------------|--------------|-------------|
|                                       | First group | Second group | Third group |
| Hemoglobin, g/l                       | 133.6       | 128.1        | 127         |
| Erythrocytes, million/mm <sup>3</sup> | 8.96        | 9.12         | 9.02        |
| Leukocytes, thousand/mm <sup>3</sup>  | 6.48        | 7.39         | 6.43        |
| Platelets, thousand/mm <sup>3</sup>   | 446.4       | 438.2        | 580.0       |
| Total protein, g/l                    | 78.2        | 79.0         | 82.6        |

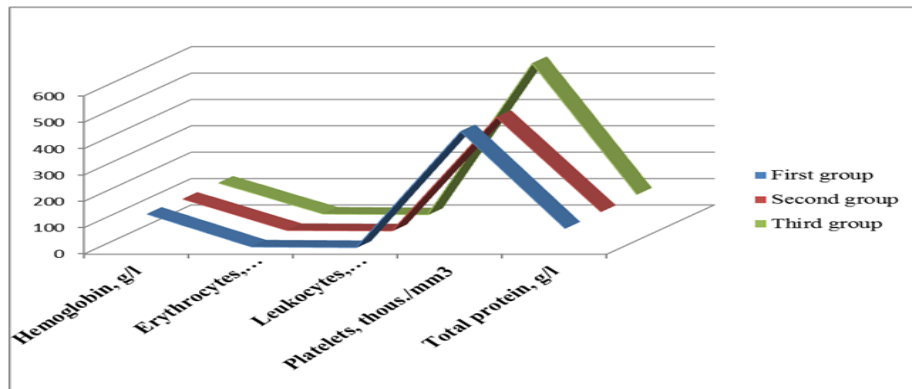


Figure-4. Hematological parameters of 2-month-old calves

The results of the research showed high efficiency of the new probiotic “Lactobactrin-TK<sup>2</sup>” in the cultivation of calves during the research and production tests. The drug product has inhibiting effect on *Escherichia* and *Salmonella*, maintains the optimal microbial balance in the digestive tract, increases non-specific resistance, livability and body weight gain of animals, it has a preventive and curative effect in diseases accompanied with diarrhea.

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