



Treatment of dyspepsy in calves with an innovative drug – iodpropionix

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Abstract

In recent years, for the prevention and treatment of acute gastrointestinal diseases (AGID) of newborn calves, many methods and schemes have been proposed using various drugs, both domestic and imported. At the same time, there are very few affordable, cheap, environmentally friendly drugs for the effective treatment of this pathology. One of such agents with a combined effect is a new effective way to treat calf dyspepsia - the combined use of an innovative drug - Iodpropionix, which is a product of biotechnological production (concentrated biomass of propionic acid bacteria *P. freudenreichii* subsp. *Shermanii* KM-186 in a living active form (10¹⁰-10¹¹ CFU/cm³) (Khamagaeva and Badlueva 2007), containing 20 µg of iodine in 1 ml in combination with an immunostimulant - Stimadent. This article presents the results of scientific studies showing the effectiveness of the use of the innovative drug - Iodpropionix - with an immunostimulator - Stimadent - in the treatment of dyspepsia of newborn calves in a comparative aspect. It was established that the effectiveness of the treatment of newborn calves with dyspepsia using the innovative drug Iodpropionix with Stimadent was 20% higher than with Sulfa - 480. The use of Iodpropionix in combination with Stimadent significantly increased the concentration in the blood of the experimental group of calves on the 10th day of treatment: hemoglobin, red blood cells, total protein, total calcium, inorganic phosphorus, protein-bound iodine (PBI), and alkaline reserve, respectively, by 14.61; 14.12; 15.64; 7.14, 17.70; 50.35; and 11.50% compared with the control group. Drug treatment of calves of the experimental group with dyspepsia with innovative drug Iodpropionix in combination with an immunostimulant Stimadent increases their recovery rate, average daily gain in live weight and reduces the duration of the disease by 20.0; 20% and 2 times, respectively, compared with calves of the control group.

Keywords: calves, innovative drug iodpropionix, stimadent, blood, dyspepsia, immunoglobulins, effectiveness

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INTRODUCTION

According to various researchers (Belov 2007, Maslykina 2009, Diagterov et al. 2016, Efanova et al. 2012), the lack of feed and their low quality and unbalanced feeding of animals neglecting their need for biologically active substances of the body lead to metabolic disturbances in the animal's body, a decrease in milk and meat productivity, and the birth of unviable young animals with weak immune system, cause death and disease. The young growth is prone to frequent diseases in the first weeks of life and often dies (Efanova et al. 2012).

A set of measures to organize proper nutrition for pregnant women, especially in the second half of pregnancy, means a lot for the prevention of diseases of

the gastrointestinal tract of calves. Only proper feeding of animals for all nutrient and biologically active substances can serve as a guarantee of the birth of a healthy offspring (Vladimirovna 2012). As noted (Holstege et al. 2018, Mosolkov 2006, Zukhrabov et al. 2015), the genetic potential of the reproductive function of cattle allows raising at least 96% of the number of calves born viable. However, a violation of fetal development leads to the birth of a physiologically immature newborn with an underdeveloped digestive system, with the weak immune system, which in the postnatal period creates conditions for diseases of the

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gastrointestinal tract. The incidence of newborn calves is also associated with their immunological protection to colostrum, which is the only source of protein, amino acids, various classes of immunoglobins, vitamins, macro- and micronutrients, specific antibodies against opportunistic microflora, viruses and fungi (Holstege et al. 2018). Colostrum immunoglobulins protect the body of a newborn, increase immunity, activate the complement system, and increase phagocytic and lysozyme blood activity (Efanova et al. 2012).

Among diseases of newborn calves, a large share belongs to dyspepsia. In various cattle and dairy farms, more than 90% of calves suffer from various dyspepsias. The fatal outcome with this pathology is from 15 to 70%. A large number of scientific works have been devoted to the study of this pathology, many effective treatment and prevention methods and ways have been proposed, and so far it has not been possible to achieve 100% preservation of newborn calves (Mosolkov 2006).

Thus, the entire world experience in the fight against animal diseases has shown that the leading role belongs to the development of new, more effective and environmentally friendly pharmacological drugs aimed at increasing the therapeutic and prophylactic efficiency in the treatment of animal diseases and preventing economic damage.

In the Republic of Dagestan, the etiology, pathogenesis, clinical manifestation of diseases of the gastrointestinal tract of young cattle in an age aspect, measures to combat them, as well as the economic damage to livestock, remain understudied. Effective treatment and preventive measures to combat the above diseases of newborn calves have not been developed on a scientific basis.

Thus, the improvement of existing and the development of new more effective and environmentally friendly methods of combating diseases of the gastrointestinal tract of newborn calves using modern pharmacological preparations is an urgent task of modern veterinary science.

A new effective method for the treatment of newborn calves with dyspepsia using an innovative environmentally friendly drug - Iodpropionix with a stimulant immunostimulator was developed in the laboratory for the study of non-infectious diseases of farm animals of the Caspian Zonal Scientific Research Veterinary Institute - a branch of the FSBSI Federal Agrarian Scientific Center of the Republic of Dagestan and at the Department of Therapy and Clinical Diagnostics of M.M. Dzhambulatov Dagestan State Agrarian University.

Objective

To study the effectiveness of a new treatment method for calf dyspepsia - the combined use of an innovative drug - Iodpropionix with an immunostimulant

Table 1. Experimental procedure

Parameters	Unit of measurement	Groups	
		control	experimental
The number of experimental calves	head	10	10
The amount of colostrum per day	l	4.0	4.0
Sulf-480	tabl.	1 tablet per 1 dose twice a day for 5-7 days	-
Iodpropionix innovative drug	ml	-	3 ml per 1 head once a day with milk for 10 days
Stimadent immunostimulant	µg/kg	-	intramuscularly, 50 µg/kg or 0.5 ml of 0.1% solution per 10 kg of weight for 4 days.

Stimadent in the conditions of Kizlyaragropromkompleks OJSC, Kizlyar district, the Republic of Dagestan.

MATERIAL AND METHODS

The experiment was conducted in 2019 at MTF No. 3 of Kizlyaragropromkompleks OJSC, Kizlyar district, the Republic of Dagestan on newborn 3-4-day-old red steppe calves with dyspepsia.

According to the principle of analog pairs of 20 calves, 2 groups of 10 animals each were formed (**Table 1**). The calves of the control group received colostrum and an antibacterial drug - Sulf- 480, 1 tablet twice a day for 5-7 days according to the in-farm treatment regimen. The calves of the experimental received the innovative drug Iodpropionix 3 ml per head orally once a morning for 10 days together with milk. And at the same time, they received intramuscularly an immunostimulant Stimadent 50 µg/kg or 0.5 ml of a 0.1% solution per 10 kg of weight, once a day for 4 days.

For morphological and biochemical tests, blood was taken from the jugular vein.

In the blood serum of calves, the total protein content was determined by refractometry. Total immunoglobulin in the blood serum of calves was determined by zinc sulfate precipitation reaction (Kondrakhin et al. 2004).

The concentration of total calcium and inorganic phosphorus in the blood serum of calves was determined using a Bravo-100 biochemical analyzer. The reserve alkalinity of the blood was determined by I.P. Kondrakhin diffuse method (Kondrakhin et al. 2004). Protein-bonded iodine (PBI) in blood serum was determined by the kinetic rhodanide-nitrate method (Aliev 1993).

In the control and experimental group of newborn calves, live weight at birth, the duration of the disease, and the number of diseased animals were determined. The percentage of recovery and the growth rate of live weight were determined at the age of 10 days.

Table 2. Effect of Iodopropionix in combination with Stimadent and Sulfa-480 on the morphological blood parameters of newborn calves in the treatment of dyspepsia

Parameter	Unit of measurement	Day 10 after treatment	
		Groups of animals (M±m)	
		Control	Experimental
Hemoglobin	g/l	88.30±0.74	101.20±0.85**
Erythrocytes	10 ¹² /l	5.10±0.08	5.82±0.12*
Leukocytes	10 ⁹ /l	8.83±0.14	8.30±0.12
Immunoglobulins	(more than 15 mg/l) optimal level	1	10
Immunoglobulins	(5-15 mg/l) low level	9	-

Note: *P<0.05; **P<0.01

Table 3. Effect of Iodopropionix in combination with Stimadent and Sulfa-480 on the biochemical blood parameters of newborn calves in the treatment of dyspepsia

Parameter	Unit of Measurement	Day 10 after treatment	
		Groups of animals (M±m)	
		Control	Experimental
Total protein	g/l	56.50±0.70	65.34±0.52**
Total calcium,	mmol/l	2.52±0.09	2.70±0.07*
Inorganic phosphorous	mmol/l	2.26±0.06	2.66±0.10**
Protein-bonded iodine	µg %	2.82±0.08	4.24±0.11***
Alkali reserve,	vol% CO ₂	48.70±1.72	54.30±1.82**

Note: *P<0.05; **P<0.01; ***P<0.01; P<0.01

RESULTS

The results of the study showed that the use of Sulfa-480 and Iodopropionix in combination with Stimadent had a significant effect on the hematological parameters of the blood of experimental calves.

As **Table 2** shows, the hemoglobin content and the number of red blood cells in the blood of the experimental group of newborn calves significantly increased by 14.61 and 14.12%, respectively, compared with the control group. The leukocyte count, on the contrary, decreased to the level of the physiological norm in the blood of the control and experimental group of calves, which indicates a decrease in the inflammatory process in the body. An increase in the number of immunoglobulins in the blood serum of the experimental group of calves to the optimal level (more than 15 mg/l) was noted, while in calves of the control group there was only 1 head, and the remaining 9 heads had a low level (5-15 mg/l), which indicates an increase in immune status.

The effect of the antibacterial drug – Sulf-480 and Iodopropionix in combination with Stimadent on the biochemical parameters of blood serum are presented in **Table 3**.

Studies have shown that the use of Iodopropionix in combination with Stimadent for therapeutic purposes significantly increased the concentration of total protein, total calcium, inorganic phosphorus, and alkaline

Table 4. Comparative effectiveness of Iodopropionix in combination with Stimadent and Sulf-480 in the treatment of dyspepsia in newborn calves

Parameters	Unit of measurement	Groups	
		control	experimental
The average live weight of the experimental calves at birth	kg	31.8±0.38	31.6±0.42
The number of calves	head	10	10
Disease duration	days	3-4	1.5-2
Died	head	2	-
The average live weight of the experimental calves during the treatment period of the experiment (10 days)	kg	34.3±0.65	34.6±0.78
The average daily gain in live weight in 10 days	kg	2.5	3.0
Efficacy of treatment	%	80	100

reserve in the blood serum of the experimental group of calves by 15.64; 7.14; 17.60, and 11.50%, respectively, compared with the control group, which indicates the normalization of protein metabolism, phosphorus-calcium metabolism, acid-base balance, liver functions, and strengthening of the immune system.

The thyroid gland contains 80% of all iodine in the animal body; iodine is part of thyroxine and triiodothyronine, which are actively involved in the regulation of energy metabolism. Iodine deficiency in the animal body leads to the decreased functional activity of the thyroid gland and the development of endemic goiter disease. The blood protein-bound iodine (PBI) is 90-95% composed of thyroxine, therefore its level in the blood serves as a reliable criterion for assessing the functional state of the thyroid gland. In healthy animals, its blood content ranges from 5-10 µg% (394-788 nmol/l) (Kondrakhin et al. 2004).

The concentration of protein-bound iodine (PBI) in the blood of calves of the experimental group was 50.35% higher than in the control group and was at the level of healthy animals, which, in our opinion, is due to the organic form of iodine, which is part of the innovative drug – Iodopropionix. In our opinion, Iodopropionix normalizes the function of the thyroid gland in the calves of the experimental group and also helps to restore impaired function in the body during their treatment.

Studies (**Table 4**) have shown that the disease in the calves of the control group lasted for 3-4 days, and in the experimental group - for 1.5-2 days, which is 2 times longer than in the experimental group, which indicates the effectiveness of the pharmacotherapy. The treatment efficacy of calves with dyspepsia in the control and experimental groups was 80 and 100%, respectively. In the control group, 2 calves died.

The growth rate of the live weight of calves in the experimental group was 20% higher compared to the control group.

Based on the results of the research, an application was filed for the invention of the Russian Federation.

SUMMARY

1. It was established that the treatment efficacy of the innovative drug Iodopropionix in combination with Stimadent for dyspepsia in newborn calves was 20% higher than with Sulfa-480.

2. The use of Iodopropionix in combination with Stimadent for treatment purpose significantly increases the concentration in the blood serum of the experimental group of newborn calves: total protein, total calcium, inorganic phosphorus, protein-bound iodine (PBI), and alkaline reserve by 15.64; 7.14; 17.60; 50.35, and 11.50%, respectively, compared with the control group.

3. Drug treatment of calves of the experimental group with dyspepsia with Iodopropionix in combination with Stimadent increases their recovery rate, average daily gain in live weight and reduces the duration of the disease by 20.0; 20% and 2 times, respectively, compared with calves of the control group.

4. The results of scientific research allow us to recommend an effective new method of treating calves using the innovative drug – Iodopropionix in combination with Stimadent for the prevention and treatment of dyspepsia of newborn calves in various livestock farms of the Republic of Dagestan.

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