

## Conference Paper

# Use of “Kayod” Preparation in Cows

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**Abstract**

The Altai territory is an agricultural region; it is a biogeochemical province deficient in iodine. We conducted a study of metabolic disorders in cows that had hypofunction of the thyroid gland. Our research is devoted to the expediency of a single use of the drug “Kayod” administered in the form of a subcutaneous implant in order to normalize the therapeutic status of animals suffering from a chronic lack of iodine in their diet. The purpose of this work is to justify not only the use of the preparation “Kayod” in animals kept in the biogeochemical provinces deficient in iodine, but also the use of tablets administered through a subcutaneous implant. We found a significant increase in the amount of hemoglobin and a decrease in the number of white blood cells in the blood of animals after the use of “Kayod”, and in the second experimental group, these indicators were slightly higher than in the first one. Indicators of the level of total protein and reserve alkalinity of blood were within the limits of physiological norms, but in the experimental groups they were slightly higher than in the control group. The level of total calcium and carotene in the blood of animals in the experimental groups, especially the second, significantly exceeded the level of the same substances in the blood of the animals in the control group. However, the level of inorganic phosphorus tended to decrease. The level of glucose in the blood of cows in the experimental group increased significantly more than in the blood of cows in the control group. This increase was particularly significant in the blood of animals in the second experimental group. When the preparation “Kayod” was used in the form of a subcutaneous implant, there were no clinical signs of hypothyroidism in the cows of the first experimental group after nine weeks. In the cows of the second experimental group, the condition of the cows returned to normal after six weeks.

**Keywords:** Cows, iodine, hypothyroidism, implant, “Kayod”.

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Published: 5 April 2021

Publishing services provided by  
Knowledge E

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Selection and Peer-review under the responsibility of the DonAgro Conference Committee.

## 1. Introduction

Currently, one of the most important tasks of the state is to ensure food security of the population. To solve this problem, the production capacity of various livestock enterprises has been constantly increasing. At the same time, cattle breeding is one of the most promising branches of agriculture. The products of cattle breeding are extremely

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diverse, in addition, they are consumed almost completely. The most important are meat and milk, but cattle skins and even manure can be useful too. Due to high need-satisfying properties of meat, beef occupies one of the leading positions in food products. Milk and dairy products are included in the daily consumer basket of citizens of the Russian Federation because of their high taste and dietary qualities.

Thus, it is important to constantly increase the quantity and quality of products obtained from cattle. However, simply increasing the number of livestock in this situation is not enough. It is necessary to draw attention of veterinary specialists to the production intensification increasing the producing capacity and reproduction of cows.

To solve this problem, first of all, it is necessary to organize proper and complete feeding of cows, especially during pregnancy and lactation. Full-fledged feeding of pregnant cows is the key to proper intrauterine development of calves, formation of a healthy highly productive stock of young animals. Efficient and scientifically based feeding of lactating animals makes it possible not only to get the highest quality products, but also to maintain high productivity of the cow for a longer period [1, 2]. In addition, it should be noted that an unbalanced diet, especially low in micro- and macronutrients, leads to the development of various pathologies, which without proper correction can cause the death of animals [3–5].

The Altai territory is an agricultural region and it is a biogeochemical province deficient in iodine. The soil, water and, consequently, plants of the Altai territory contain a low amount of iodine. Thus, the diet of cows is not balanced in terms of this mineral substance content [6, 7]. Animals do not get it as much as is necessary with food and water, which leads to two scenarios: the development of endemic goiter or the use of mineral fertilizers to compensate for the lack of iodine [8, 9]. However, the fact that iodine has a high volatility should be borne in mind. Therefore, during the manufacture of various forms of feed, during their storage and transportation, it either volatilizes, or enters into a chemical reaction with other contained mineral substances and passes into forms that are not digested by the cattle organism [10–12]. The same part of the iodine contained in feedings, which eventually gets into the stomach of the animal, under the influence of gastric juice passes into a molecular form and is not absorbed by the organism [13]. Thus, the use of feed additives containing iodine is not an effective method of solving the existing problem [14, 15].

Based on the above observations, we concluded that it is necessary to study in detail the correction of iodine deficiency by subcutaneous administration of “Kayod” tablets. To avoid the effect of gastric juice on the iodine contained in the tablets, we used “Kayod” tablets administered as a subcutaneous implant

In the process, we studied metabolic disorders in cows that had hypofunction of the thyroid gland. With this in mind, we analyzed the endemic status of the territory where the Prigorodnoye instructional farm is located, which is the experimental base of the Altai State Agrarian University. In addition, the metabolism in cows was of interest, which was studied in a comparative aspect for healthy animals and those suffering from hypofunction of the thyroid gland.

Our research is devoted to the expediency of a single use of the drug “Kayod” in the form of a subcutaneous implant in order to normalize the therapeutic status of animals that suffer from a chronic lack of iodine in their diet.

## 2. Methods and Equipment

We conducted our research in 2019 – 2020 on the basis of the Prigorodnoye instructional farm located at 44, Novosibirskaya street, Barnaul, Altai territory, Russian Federation. Instructional farm is a unit of Altai State Agrarian University, it is used for conducting experimental research and practical training with students of the Faculty of Veterinary Medicine.

30 black-and-white cows were selected for the experiment. The selection was based on age, number of lactation (the third year of lactation), live weight of cows, volume of milk yield, as well as the presence of similar signs of hypofunction of the thyroid gland. All the animals were in the second half of pregnancy at the start of the study. Three groups of 10 animal units each were formed. At the start of the experiment, all animals received a basic diet consisting of 5 kg of meadow hay, 12 kg of corn silage, 3 kg of wheat straw, 2 kg of wheat stock feed and 80 g of table salt per day. As a result of the analysis of the diet, we found that the animals have a significant deficiency in the diet of iodine (0.8 mg per animal unit per day, which is 15% of the norm). The scheme of the experimental study can be found in detail in table 01.

TABLE 1: Scheme of the experimental study

Name of animal group	Number of animals in group	Conditions for conducting the experiment
Experimental group 1	10	Basic diet with implantation subcutaneously of 2 tablets “Kayod” (6 mg of potassium iodide)
Experimental group 2	10	Basic diet with implantation subcutaneously of 3 tablets “Kayod” (9 mg of potassium iodide)
Control group	10	Basic diet

The preparation “Kayod” is tablets containing 3 mg of potassium iodide, stabilized with Sodium hydrocarbonate, therefore resistant. The method of subcutaneous implantation corresponded to the recommendations of innovation proposal No. 242 by Dutova O. G., the tablets were implanted at the level of the middle of the shoulder blade in the upper third of the neck, 15 cm from its edge. Wool was removed from a skin section 6\*5 cm in size. Then it was wiped with 70% ethanol solution. A small piece of rubber tube was placed on the scalpel in such a way that the cutting part 2.5 cm long remained free. This is necessary to limit the size of the puncture of the skin. The size of the scalpel should be chosen so that its width is 2 mm larger than the diameter of the tablet. This is done considering the elasticity of the skin. Then a skin puncture was performed with a scalpel prepared in this way in a vertical direction, which then served as a hole for subcutaneous implantation of the “Kayod” tablet.

The technique of performing the puncture is as follows: with the thumb, index, and middle fingers of the left hand one should slightly pull the skin of the animal so that its folds form a kind of pocket. Then you need to pierce the skin with a scalpel with a sharp movement. With the index finger of the right hand, a tablet should be inserted into the resulting puncture, while continuing to hold the skin fold with the left hand. The tablet should be inserted as deep as possible. Then for 40-45 seconds it is necessary to approximate and close the edges of the puncture. It should be noted that no additional disinfection of the implantation site is required, since the drug “Kayod” is an active antiseptic.

In the course of work, experimental animals' blood tests were performed. They determined total protein (refractometric method), total calcium (complex-metric method), inorganic phosphorus (with Vanadate-molybdenum reagent in protein-free blood filtrate), alkaline blood reserve (in double flasks by diffusion method), carotene (photocolorimetric method). In addition, the content of iodine in feed was determined using brilliant green (Kapustina Yu.A. et al., 2009). Clinical examination of animals, auscultation, palpation and percussion were performed

### 3. Results

The combination of clinical examination and palpation revealed the symptoms characteristic of hypothyroidism of iodine intake insufficiency. The results of the study can be found in table 02.

Thus, we see that the lack of iodine results in the skin and coat condition. There was dullness of the coat, lack of gloss, it was ruffled. In the facial part of the skull, the

TABLE 2: Indicators of clinical examination of cows, n=30

Non-specific symptoms on the skin	Number of animals
Dryness Folding Dandruff	26 12 11
Non-specific symptoms on the coat	Number of animals
Ruffled Dullness Alopecias Curl	16 17 10 10
Specific symptoms	Number of animals
Myxedema Increasing size of thyroid gland Fringe, mane	20 14 20

appearance of hair tortuosity was observed. The wool is held in the hair follicles poorly, is easily pulled out with your fingers. Skin turgor is significantly reduced.

Areas of alopecia were noted on the neck, the lower chest, and the sacro-lumbar region of the back. In two animals, the skin in these places is hyperkeratinized, there are keratinized crust and scab formation.

In addition, taking into account the physiological state of the studied animals (pregnancy), we conducted a clinical examination of the musculoskeletal system. Three animals had last rib retraction, twelve – softening or resorption of the last tail vertebrae.

In the study of heart rate, respiratory movements, rumination, body temperature, there were no significant deviations from normal physiological parameters.

During the experimental part of the research, we found a significant increase in the amount of hemoglobin and a decrease in the number of white blood cells in the blood of animals after the use of the preparation “Kayod”, and in the second experimental group, these indicators are slightly higher than in the first one. Indicators of the level of total protein and reserve alkalinity of blood were within the limits of physiological norms, but in the experimental groups they were slightly higher than in the control group.

The level of total calcium and carotene in the blood of animals of the experimental groups, especially the second, significantly exceeded the level of the same substances in the blood of animals of the control group. The level of inorganic phosphorus, on the contrary, tended to decrease. The level of glucose in the blood of cows in the experimental group increased significantly more actively than in the blood of cows in the control group. This increase was especially significant in the blood of animals of the second experimental group.

It should also be noted that when using the drug “Kayod” as a subcutaneous implant, there were no clinical signs of hypothyroidism in cows of the first experimental group after 9 weeks. In cows of the second experimental group, the organism condition returned to normal after six weeks.

## 4. Conclusion

As a result of the work we have made the following conclusions:

- A lack of iodine in the animal's diet is the fundamental reason of hypothyroidism. This situation occurs when animals are kept in biogeochemical provinces deficient in iodine, which include the Altai territory. Hypodynamia is a concomitant factor in the development of the disease, which is observed in cattle with stable system keeping.
- During pregnancy and lactation, the organism is most susceptible to the development of hypothyroidism since certain resources of the body are spent on the formation of a healthy fetus. However, with chronic iodine deficiency, there is a danger of developing hypothyroidism not only in the pregnant female, but also in the fetus.
- Lack of iodine is quite easy to diagnose. In cows clinical signs of hypothyroidism are very specific, they can include dry skin and coat, curly hair, myxedema, alopecia, an increase in the size of the thyroid gland. When diagnosing an important role is played by assessment of the biogeochemical status of the area, analysis of the diet of animals.
- The use of "Kayod" tablets in the form of subcutaneous implants for the prevention and treatment of iodine deficiency in cattle is justified for cattle farms. The drug is of low cost and high efficiency, which was proved during the experiment.
- Developed by O.G. Dutova and introduced in 1999 the method of subcutaneous implantation of tablets in cattle is simple and convenient. Its implementation does not require special equipment, and its effectiveness is clinically obvious.

Thus, it is worth mentioning that the lack of iodine is a serious threat to livestock. The productivity and reproduction of cows and the period of their economic use are reduced. This is especially important for the Altai territory, which is a biogeochemical province deficient in iodine. To increase the efficiency of agricultural production, it is necessary to constantly pay serious attention to the intensification of production processes through the introduction of innovative technologies for the treatment and prevention of animal diseases.

Our understanding is that the use of the drug "Kayod" administered in the form of subcutaneous implants has undeniable advantages over other methods of correcting pathology. The drug has a low market value, its use does not require any special equipment. Subcutaneous implantation does not cause complications in animals and is not

contraindicative for pregnant and lactating animals. Tablets have a rational composition, so the substances contained in them are completely absorbed by the body. In addition, thanks to the original innovative form of application as subcutaneous implants, the drug is not subjected to negative effects of aggressive environment of the gastrointestinal tract, respectively, its effectiveness is not reduced.

## Conflict of Interest

The authors have no conflicts of interest.

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