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Biologically Active Feed Additive in Feeding of Young Pigs.

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ABSTRACT

The aim of the research was to study the effectiveness of a new domestic immunomodulator based on forest biomass (coniferous biologically active additive – CBAA) in the feeding of young pigs. Coniferous energy additive is developed by using a unique technology of needle processing, based on the extraction of biologically active substances by a new selective extractant. When feeding the studied feed additive, an increase in the intensity of piglets' growth by 8.6-12.5% and a decrease in the cost of feed and nutrients for the production of 1 kg of a live weight gain by 7.2-10.1% were determined.

Keywords: young pigs, coniferous feed additive, live weight, gross gain, feed costs.

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INTRODUCTION

The Russian Federation has approved the National Doctrine of Food Security. The guarantor of its achievement is the implementation of the food security plan to increase domestic production of the country. The main task of agriculture is to increase the productivity of agricultural animals with the high quality of products [11].

At the present stage the increase in the production of pig meat due to the growing popularity of import substitution in the agricultural sector of the economy is a concept of a long-term socioeconomic development of our country [7].

It is well known that the level of productivity of pigs depends on the high-grade feeding. Currently, the efficiency of increasing the functional reserves of the organism of pigs due to the feeding of biologically active feed additives is proved [9].

To ensure the output of the maximum genetically determined productivity of agricultural animals, fodder rations should be balanced not only by nutritional value and be fully provided with macro- and microelements, but also with biologically active substances [4].

Wood waste is rich in similar substances, half of which is not used as a secondary raw material [5]. These wastes can be not used at all, they are mainly burned with a large expenditure of financial resources and labor [6]. However, the wood green can be successfully used in animal husbandry for the production of feed and additives [3].

It is known that the needles have a number of useful properties, in connection with which various preparations for cosmetology, medicine and veterinary medicine are obtained from it. It has been proved that feed additives, including needle extracts, contain in their composition various biologically active extractives that have an immunomodulating, antioxidant and stimulating effect on the animal organism [10].

Needles and leaves are rich in carotene, chlorophyll, vitamins, macro- and microelements. Until now not all the possibilities for the enriching of animal feed rations with coniferous raw materials have been used, although the abilities of this are not limited. In the needles the physiological processes are slightly different than in the leaves of deciduous plant species. The study of the chemical processes occurring in the needles facilitates the solution of the problems of using it for feed production. The use of coniferous additives in the feeding of farm animals and poultry brings positive results in struggling with various diseases (vitamin deficiency, dyspepsia, metabolic disorders, etc.) and contributes to an increase in body weight gain and good health of animals.

The needles contain a large amount of green chlorophyll pigments. Chlorophyll is an effective stimulator of many biological processes, a plastic material for the synthesis of hemoglobin; it has a direct effect on the central nervous system of animals. Chlorophyll increases the hemoglobin content in the blood, promotes faster growth and development of young animals, favorably affects the productivity and improves the activity of the cardiovascular system and the digestive tract. Not less valuable are the vitamins that are present in sufficient quantities in the needles. Vitamin K, contained in wood greens, promotes the synthesis of the thrombin protein necessary for normal blood clotting in the animal body. Vitamin B_2 (riboflavin) in significant quantities is contained in the needles of pine and spruce. The amount of vitamin E (tocopherol) in pine needles reaches 6.06 mg / kg, it is necessary for the normal process of reproduction of animals. The needles of woody plants are especially rich in vitamin C – 25 times more than in grain and potatoes. This vitamin plays an important role in the metabolism of proteins and carbohydrates, in oxidation-reduction processes, in the formation of bone tissue and in other processes occurring in the body of the animal. Vitamin P, contained in the needles, increases the physiological activity of vitamin C. In combination with vitamin P, ascorbic acid is significantly better absorbed by the body. In addition to biologically active substances, the needle contains a significant number of neroplastic substances and structural compounds that can be more fully or partially absorbed by the animal organism. So, the protein of needles is almost completely absorbed. The leaves and needles of wood plants usually have relatively high carbohydrate content. Pine needles contain up to 16.6% starch and sugars. The ash elements make up to 3.08% of dry matter in needles of pine and up to 4.62% in needles of spruce. The ash elements of the needles contain a number of macro- and microelements

necessary for the normal growth and development of farm animals. It should be also mentioned the high content of potassium, calcium, phosphorus in the needles, and from microelements – iron, manganese, cobalt [8].

The aim of the research was to study the effectiveness of a new domestic immunomodulator based on forest biomass (coniferous biologically active additive – CBAA) in the feeding of young pigs.

The coniferous energy additive (CBAA) and the scheme of its application were developed by the authors jointly with the Scientific and Technical Center "Cheminvest" (Nizhny Novgorod) using a unique technology for the processing of wood greens, based on the extraction of biologically active substances by a new selective extractant. The composition of the coniferous energy additive includes glycerin distilled medical and natural ingredient – coniferous bough. Extractant is non-toxic, has antibacterial properties that ensure the preservation of consumer qualities of products for an extended period. The developed technology is characterized by one-stage, low energy costs, waste-free production and high environmental friendliness [1, 2].

METHODOLOGY OF RESEARCH

Studies were carried out on piglets-weaners of a large white breed in the conditions of JSC "Kirovsky" of the Republic of North Ossetia-Alania. Groups of piglets at the age of two months were formed according to the principle of analog pairs according to the following scheme (Table 1).

Table 1: Scheme of experiment on piglets of 2-4 months, n=14

Group	Feeding conditions
1 – control	Basic ration (BR)
2 – experimental	BR + CBAA 10 g per head
3 – experimental	BR + CBAA 20 g per head

The duration of the experiment was 60 days. During the research, the following indicators were taken into account:

– intensity of animal growth rate by individual weighing and calculating the gross and average daily gains for the period of the experiment;

– feed cost by 1 kg of gain;

– economic efficiency of application of various dosages of the studied feed additive.

Indicators of nutrient concentration in 1 kg of dry matter in the ration of piglets with live weight of 20-30 kg are presented in Table 2.

Table 2: Indicators of nutrient concentration in 1 kg of dry matter in the ration

Inducator	Diet of piglets with live weight of 20-30 kg
Energy feed unit	1.39
Exchange energy, mJ	13.90
Crude protein, g	197.20
Digestible protein, g	152.20
Lysine, g	8.80
Threonine, g	5.90
Methionine + cystine, g	5.10
Raw fiber, g	59.70
Energy-protein ratio	0.07

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The study of the concentration of energy and some nutrients in 1 kg of dry matter showed that these feeding parameters corresponded to the physiological needs of the piglets in the studied age period.

RESULTS

The results of the analysis of live weight are given in Table 3.

Table 3: Average live weight of piglets of 2-4 months in the period of growing, kg, n=14

Group	Age	
	60 days	120 days
1 – control	18.52±0.17	45.60±0.55
2 – experimental	18.51±0.23	48.28±0.70**
3 – experimental	18.44±0.19	49.20±0.71***

*Note: **P≤0,01; ***P≤0,001in relation to the parameters of the control group*

As a result of control weighing of animals at the age of 120 days, it was determined that the live weight of piglets-weaners in the second group exceeded the control values by 5.9% (P≤0.01). In the third group the live weight of the piglets was maximal and amounted to 49.20 kg that was 7.9% higher than the control analogues.

Based on the live weight data, absolute and average daily gain was calculated (Table 4).

Table 4: Gain rates of piglets-weaners, kg, n=14

Group	Gain of live weight		In % to control
	gross, kg	daily average, g	
1 – control	27.34±0.39	455.72±6.55	100.0
2 – experimental	29.69±0.63**	494.87±10.46**	108.6
3 – experimental	30.76±0.71***	512.67±11.89***	112.5

*Note: **P≤0,01; ***P≤0,001 in relation to the parameters of the control group*

The greatest value of gross and average daily gain relative to control animals was recorded in experimental groups (by 8.6 and 12.5% respectively). In our opinion, an increase in the intensity of growth in young pigs is associated with a decrease in the stress load after weaning due to the antioxidant properties inherent in the test feed additive containing needle extract.

The costs of nutrients per 1 kg of the live weight gain are presented in Table 5.

Table 5: Feed and nutrient costs per 1 kg of live weight gain

Group	Spent on 1 kg of live weight gain:		
	Energy feed units (EFU)	Digestible protein, g	Mixed fodder, kg
1 – control	4.17	456.49	4.25
2 – experimental	3.87	423.95	3.92
3 – experimental	3.75	410.68	3.88

From the given table values we can note a dynamics of decrease in feed costs per 1 kg of the live weight gain in the second group of piglets by 8.4%, in the third group – by 9.5%, and also the costs of nutrients of 1 kg of the live weight gain of piglets. The least costs of energy feed units was recorded in the second experimental group – by 7.2% and in the third experimental group – by 10.1%. The greatest decrease in the costs of digestible protein was also observed in the experimental groups.

In the practice of animal husbandry, the problem of diseases and mortality of young animals is well known. Critical for newborn piglets are the first 2 months of life. During this period, the norm of the immune response of the organism to all kinds of infections occurs. Various medications (including antibiotics) are used

for treatment, but preparations usually do not eliminate the cause of the disease at the level of metabolism, but struggle with the effect (pathogens).

As a result, the piglets recovered after intensive treatment for a long time still remain weak, poorly gaining weight and suffering from various diseases. Therefore, as an alternative to antibiotics, it is necessary to look for prophylactic natural feed additives that positively influence on the immunity of young animals and this is effectively handled by natural immunomodulators.

From the calculation of the economic efficiency of feeding the piglets with the studied feed additive, the highest profitability level was recorded in the third experimental group, which was 30.65% (9.2% above the control) with the net income per head of 1010.30 rubles. In the second experimental group the level of profitability was 28.92% (7.5% above the control) with the net income of 932.50 rubles.

CONCLUSION

As a result of the conducted studies, it was found out that the use of coniferous biologically active feed additive in rations of pigs-weaners promoted an increase in the intensity of growth in young animals by 8.6-12.5% and in the level of profitability and also promoted a decrease in the nutrient costs of feed for 7.2-10.1 %.

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