



UDC 636.084.52:636.087.72

Organic trace element complex for calves feeding

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Trace elements are commonly used in the form of inorganic salts poorly digested by ruminants due rumen microflora, which transits its greater part into indigestible and insoluble form. Trace elements in the form of chelates are supplied with amino acids and peptides, and used by the body much more efficiently. Inclusion of organic trace element complex (OMEK) in compound feed KR–1 in the amount of 10% of the existing standards for trace elements content in typical formulations for growing young cattle for meat has a positive impact on palatability of feeds, morphological and biochemical composition of blood and animals' performance, economic efficiency of calves fattening. Use of organic trace element complex in compound feeds KR–1 increases concentration of total protein in blood by 8 – 12% ($P < 0.05$), reduces the amount of urea by 11 – 16% ($P < 0.05$). Comparative analysis showed that animals in experimental group II used the feeds more efficiently. Metabolizable energy consumption per 1 kg of weight gain made 33.7 MJ against 37.4 MJ in the control group or by 9.9% lower, the same trend is established for digestible protein cost – by 10%. Inclusion of OMEK in compound feed KR–1 for young cattle ensures average daily weight gain increase by 12.3% ($P < 0.05$), decreased of feed cost per 1 kg of weight gain by 10%. Use of organic trace element complex helps to decrease the cost price of weight gain, by 9.0% and obtain extra profit of \$37.2 USD per one animal during the experimental period.

Key words: energy, organic trace element complex, compound feed, diet, blood, weight gains, feed cost.

Citation:

Radchikov, V.F., Tsai, V.P., Gurin, V.K., Lyundishev, V.A. (2016). Organic trace element complex for calves feeding. *Scientific Messenger LNUVMBT named after S.Z. Gzhytskyj*, 18, 3(71), 225–227.

Introduction

Knowledge of the natural amount of trace elements in feeds and diets is a prerequisite for the organization of a balanced nutrition and obtaining high performance of animals (Radchikov et al., 2010; Suchkova et al., 2012; Kairov et al., 2014).

Belarus is a non-chernozemic area, where diets always lack such trace elements as Zn, Cu, Co, I and Mn. The biological role of these elements is essential not only to ensure high milk and meat performance, but also for animals' health and normal reproduction functions (Radchikov et al., 2014).

One of the tasks of scientific research in this direction is to increase the bio-availability of minerals. In recent years in animal husbandry, as a rule, inorganic forms are used to replenish the deficiency of trace elements. However it is determined that mineral salts are not completely digested in the gastrointestinal tract of animals.

Numerous researches conducted in our country and

abroad prove a more efficient positive impact of organic form trace elements on animals' performance compared with inorganic (Radchikov et al., 2014).

Use of organic compounds increases absorption of Zn, Cu, Mn, Fe and Co, allows to control these trace elements more precisely and maintain productive and reproductive traits of animals, ensure increase of fat and protein content in milk, reduction of somatic cells, process of formation of the immune status and decrease of animals' diseases.

The aim of research was to study the efficiency of trace elements in organic form for feeding young cattle.

Research objectives. 1. To study feeds' nutrients intake.

2. To determine the biological and chemical composition of blood of experimental animals. 3. To determine the feed energy conversion into produce, average daily weight gains and cost-effectiveness of organic mineral complex (OMEK) use for calves feeding.

Material and methods

Clinically healthy young cattle had been selected to achieve the objectives taking into account body weight, age, fatness and growth rate of calves.

In scientific and economic research the steers of the control group received compound feed KR-1 with premix of standard formulation, milk, milk replacer, hay, silage, rolled corn grain; and young cattle of the II group – KR-1 feed with premix consisting of organic trace element complex in addition to the basic diet.

Results and discussion

Researches helped to determine that dry matter intake of experimental animals was at a level of 1.71–1.75 kg/day. Concentration of metabolizable energy in dry matter of diets in the II experimental group made 14.6 MJ against 14.7 – in the I control group. Crude protein in dry

matter (DM) of diet in the control group made 24.5%, in the experimental – 24.3. 14.1 grams of digestible protein came per 1 MJ of metabolizable energy (MA) of diet in control and experimental groups. Concentration of easily digestible carbohydrates (starch and sugar) in the DM of diet in the I control group made 33.5% against 32.9% – in the II experimental group. The ratio of calcium and phosphorus in the diet of the I control group was at the level of 1.3:1, in the II experimental group – 1.31:1.

The use of trace element organic complex in compound feeds KR-1 increases total protein concentration in blood by 8–12% (P <0.05), and decreases the amount of urea by 11–16% (P <0.05).

The researches helped to determine positive effect of feeding calves with premix in composition of compound feed KR-1 during rearing from 10 to 75–days of age containing inorganic salts of elements, and with premix with the salts replaced by the organic form of iron, manganese, copper, cobalt and zinc on the body weight the average daily weight gains of calves (Table 1).

Table 1

Index	Group	
	I	II
Body weight at the beginning of experiment, kg	42.5 ± 0.6	41.9 ± 0.64
Body weight at the end of experiment, kg	86.3 ± 1.05	91.1 ± 1.36
Average daily weight gain, g	674 ± 21.85	757 ± 18.46*
Increase of average daily weight gain, g	–	83
Increase of average daily weight gain, %	–	12.31
Extra weight gain from 1 animal per experiment, kg	–	5.40
Feed cost per 1kg of weight gain, feed units	4.29	3.86
Decrease of feed cost, feed units	–	0.43
%	–	10.0
Metabolizable energy per 1 kg of weight gain, MJ	37.4	33.7
Digestible protein per 1 kg of weight gain, g	623.3	561.7
Extra attributable profit counted per 1 animals per experiment, USD	–	37.2

*P < 0.05

The final body weight at the end of the experiment differed between the groups in compliance with the intensity of calves growth. Thus, the highest increase of performance by 12.3% was observed in the II experimental group.

Data on efficiency of feed energy for weight gain indicate that in calves consuming compound feed KR-1 with chelate compounds of trace elements the deposit energy increased by 4.0% with respect to metabolizable energy. Calculated per 100 kg of body weight the deposit energy in the control group made 9.8 MJ, and in experimental – 11.1MJ or 13.3% higher, that ensured increase of coefficient of productive energy use from 0.55 to 0.64 and average daily weight gain by 12.3%.

The use of organic trace element complex for feeding animals of experimental group allowed to decrease the prime cost of weight gain by 9.0% and obtain extra profit of \$37.2 USD per animal over the experimental period.

Conclusion

Thus, the use of organic trace element complex in compound feeds KR-1 has a positive impact on morpho-

logical and biochemical composition of blood, also increases the total protein concentration by 8–12% (P <0.05), and decreases the amount of urea by 11–16 % (P <0.05).

Inclusion of OMEK in the compound feed KR-1 for young cattle increases the average daily weight gains by 12.3% (P <0.05), while reducing the feed cost per 1 kg of weight gain by 10%.

The use of organic trace element complex allows to reduce the prime cost of weight gain depending on the age of young cattle by 9.0% and obtain extra profit of \$37.2 USD per animal during the experimental period.

Perspectives of further researches.

Researches are required on the use of OMEK for feeding older age young cattle. Also development of new mineral elements in organic form is very important.

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Стаття надійшла до редакції 1.10.2016