



Productive indicators of cows and milk quality, when adding amide-vitamin-mineral concentrate to the diet

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ABSTRACT

The effectiveness of dairy breeding largely depends on the intensity of the use of the breeding stock. At the same time, the factor of the duration of economic use of animals is gaining importance, which affects not only the production economy, but also the improvement of stocks and breeds. The lifelong productivity, the quantitative and qualitative growth of the stock, the amount of capital investment in its formation and the efficiency of operation depend on the term for the productive use of cows. The terms of breeding and production use of animals are directly linked with the biologically possible longevity of each animal, in turn, the duration of the productive period of cattle is in the range of 12-17 lactations. The influence of feed on production is associated primarily with the level of digestion and assimilation. The digestive capacity of the digestive tract of animals can be improved by selecting the optimal ratio in the diet of rough, juicy and concentrated feeds, i.e. optimization of animal feeding types. We conducted an analysis of milk productivity in lactating cows, when using AVMC feed additive in the diet. The experiment was conducted in the conditions of the dairy farm of Biryuli CJSC of the Vysokogorsky District of the Republic of Tatarstan on three groups of lactating cows. For the experiment, 30 cows were selected, 10 in each Holstein black-and-white breed according to the principle of analogues. Studies have shown that AVMC with rapeseed oil seeds and AVMC with fus in the diet of lactating cows provided higher animal productivity and positively affected the chemical composition of milk.



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INTRODUCTION

Animal breeding is the predominant livestock industry. This is due to the fact that cattle provide more than 99% of milk and about 50% of beef - the main livestock products of the population of our planet (Khristoforovich *et al.*, 2016; Smolentsev *et al.*, 2018). Depending on the natural and economic characteristics of individual zones, districts and farms, cattle breeding can be dairy, meat and dairy and meat (Semenov *et al.*, 2018).

Increasing the production of high-quality livestock

products is a problem over the years that does not lose its relevance, but is increasingly gaining importance both with the growth of the population of our planet, particularly in our country, and the satisfaction of humanity's need for food. In connection with this, great economic importance is attached to the development of this industry (Anatolievna *et al.*, 2016; Ilyasovich *et al.*, 2016; Egorov *et al.*, 2018).

Full satisfaction of the needs of the country's population in food products, including milk and meat, urgently requires comprehensive expansion and improvement of their production. For this industry to be competitive, it must be based on a highly productive population (Matveeva *et al.*, 2015; Dmitriyevich *et al.*, 2016). However, to fully reveal the genetic potential of a cow, it is necessary in a special way to find methods to increase the efficiency of feed use. In a balanced feeding system for dairy cattle, fodder protein and energy play an important role in feeding. To this end, the search for new feed resources continues, the identification and use of which will make up for the lack of protein and increase the biological value of feed rations (Valiullin, 2017; Popov *et al.*, 2018).

In connection with the foregoing, the objective of our research was to develop the theoretical foundations and practical principles of production, and the introduction into production of amide-vitamin-mineral concentrates (AVMC) with a high content of protein and energy, as well as their rational use in animal feed and feed rations of cows.

AVMC is an extruded mixture of high-protein energy-saturated feed components and urea with the optimal amount of nutrients and biologically active substances, adapted to the biogeochemical characteristics of the region and feed production.

The aim of our research was to study the milk productivity of lactating cows and the cost-effectiveness of using AVMC feed additives in the diet.

MATERIALS AND METHODS

The task was carried out in the conditions of the Biryuli dairy farm of the Vysokogorsky district of the Republic of Tatarstan, where scientific and economic experiments were set up on three groups of lactating cows. For the experiment, 30 cows were selected, 10 in each Holstein black-and-white breed according to the principle of analogues, taking into account the breed, age, productivity, live weight, fat and protein in milk. The experimental design is shown in Table 1.

According to the experimental design, the animals

that were undergoing the experiment that were of the control group received a balanced household ration, consisting of haylage of vetch-oat, barley straw and mixed feed of their own production. In the diets of cows of the second and third experimental groups, various experimental AVMCs were included in the amount of 12% of the grain part without disturbing their balance. The staff of the animal husbandry department of the Tatar Agricultural Research Institute has developed a recipe for an experimental AVMC for dairy cows, the feed value of 1 kg of which is 10.0 - 10.9 MJ of exchange energy, 32.0 - 33.0% of crude protein, 5.0 - 5.6 crude fat, 2.0 - 2.8 crude fiber, 2.2 - 2.3 calcium, 2.4 - 2.6 phosphorus and 2.9 - 3.0% sodium chloride.

The missing amount of vitamins and minerals in the diet of the experimental groups were enriched in the form of vitamin-mineral premix P60-3.

Every 15 days, milk productivity was taken into account individually for each cow by means of control milking with determination of fat content, protein, density, dry skim milk residue (DSMR) in milk.

Digital material was statistically processed on a personal computer using generally accepted methods of variation statistics using the Microsoft Excel program.

RESULTS AND DISCUSSION

Studies found that the milk productivity of cows in the second and third groups during the experiment was higher by 1.97 and 3.22 kg in terms of basic fat content or by 8.9 and 14.6%, respectively, compared with the control (Table 2).

Milk obtained from cows from the experimental groups was noted to have a high fat content. In this case, the maximum milk fat was detected in cows of the third experimental group and amounted to 4.07%, which is 0.18% higher than the control indicators. According to the protein content in milk between groups, no significant difference was found.

When calculating the yield of milk fat over the period of the experiment, experimental animals of the second and third groups also differed, which received different AVMC in diets. So, if in the second experimental group the yield of milk fat was 38.18 kg, then in the third - 40.97 kg, which is more than in the control by 10.3% and 18.4%, respectively ($P < 0.05$)*. In terms of milk protein yield, these indicators exceeded the control by 11.4% and 14.5%.

The milk productivity of cows differed with the test feeding, balancing concentrates was reflected at the cost of feed and nutrients per unit of output. So,

Table 1: Experimental design

Groups	Number of animals	Nature of feeding
Control I	10	Basic balanced diet
Experimental II	10	Main diet + experimental AVMC with rapeseed oil seeds (12% to the grain part)
Experimental II	10	Main diet + experimental AVMC with fus (12% to the grain part)

Table 2: Milk productivity of experimental animals

Indicators	Groups		
	I	II	III
The average daily milk yield, kg	19.77±0.93	21.37±1.02	22.37±1.06
The average daily milk yield in terms of the base fat content (3.4%), kg	22.04±0.98	24.01±1.05	25.26±1.09
The fat content of milk, %	3.89±0.05	3.97±0.08	4.07±0.11
The protein content of milk, %	2.97±0.03	3.06±0.06	3.01±0.05
The yield of milk fat, kg	34.61±2.36	38.18±2.49	40.97±2.81*
The yield of milk protein, kg	26.42±2.03	29.43±2.17	30.30±2.31
The cost of feed per 1 kg of milk: exchange energy, MJ	10.97	10.11	9.68
crude protein, g	168.06	163.67	156.22

Table 3: Chemical composition of milk of experimental animals, %

Indicator	Groups (n = 5)		
	I	II	III
Dry matter	11.80±0.67	11.73±0.60	12.22±0.61
Ash	0.81±0.02	0.79±0.02	0.80±0.02
Protein	2.97±0.32	3.06±0.33	3.01±0.32
Fat	3.89±0.43	3.97±0.41	4.07±0.43
DSMR	8.15±0.93	7.91±0.86	8.38±0.93
Density, °A	29.40±1.53	29.35±1.61	29.71±1.53
Calcium	0.11±0.0089	0.12±0.0122	0.12±0.0089
Phosphorus	0.080±0.0027	0.080±0.0061	0.083±0.0027

if in the first control group 10.97 MJ of feed were spent per 1 liter of milk, then in the second and third experimental groups, respectively, 10.11 and 9.68 MJ or less by 7.8 and 11.8% compared with the control. A similar pattern has been established for raw protein costs.

Consequently, feeding in the diets of cows AVMC, which included sunflower fuze, has a more productive effect than with rape oilseeds

Analysis of the chemical composition of milk in experimental animals (Table 3) showed that dry matter and DSMR were greater in the third experimental group compared with the control group by 0.42% and 0.23%, and compared with the second experimental group by 0.49% and 0.47%, respec-

tively, indicating a higher content of organic and mineral substances in milk. The protein content comparison is favourable with milk obtained from cows of the second group and amounts to 3.06%. In the milk of cows of the third group, its content was less by 0.05%, and the first control by 0.09%. Animals in the third experimental group exceeded the fat content in milk and amounted to 4.07%, while in the first and second groups these indicators were at the level of 3.89% and 3.97%, which is lower by 0.18% and 0.10 % respectively. The milk density indices in all three groups corresponded to the norm, but in the third group this indicator was higher by 0.31...0.36%.

The content of calcium and phosphorus in milk

between the groups did not have large differences. Therefore, analyzing the foregoing, we can say that according to a set of quality indicators, the milk of cows of the third experimental group had an advantage over other groups.

CONCLUSIONS

Thus, AVMC with rapeseed oil seeds and AVMC with fus in the diet of lactating cows provided higher animal productivity and had a positive effect on the chemical composition of milk, as evidenced by its high technological parameters.

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