

The Influence of New Biologically Active Additive from Brewer's Yeast on some Productive Indicators in Cows and Young Cattle of the Holstein Breed

Yulian Stepanovich Yurku¹; Grigore Efimovich Darie¹; Galina Vladimirovna Osipchuk¹;
Pavel Sergeevich Kobylyatsky²; Vyacheslav Anatolievich Karatunov³;
Razin Mirzekerimovich Ragimov⁴; Naida Murtazalievna Abdullaeva⁴; Marina Nikolaevna Verevkina⁵;
Sergey Nikolaevich Povetkin^{6*}

¹Public Institution Scientific and Practical Institute of Biotechnologies in Zootechnics and Veterinary Medicine, Maksimovka, Moldova.

²Don State Agrarian University, Persianovsky, Rostov Region, Russia.

³Kuban State Agrarian University named after I.T. Trubilin, Krasnodar, Russia.

⁴Dagestan State Medical University, Makhachkala, Dagestan Republic, Russia.

⁵Stavropol State Agrarian University, Stavropol, Russia.

^{6*}North Caucasus Federal University, Stavropol, Russia.

Abstract

In consequence of experimental researches on the study of new biologically active medication on brewer's yeast, which were in the conditions of growing and dairy cattle's operation in Moldova, and in the number of livestock breeding farms in the Stavropol Territory of the Russian Federation the physiological indicators were obtained and statistically processed in 2020. During the experiment, the cows from the first and the second lactation and herd replacements of the Holstein breed were involved. The researches included the study of the effect of the medication on mature animal and young cattle. According to the research result, the claimed medication which is used in feeding pregnant cows and rearing cows has a positive effect on some aspects of reproductive indicators in the postpartum period and contributes to the growth and development of young cattle.

Key-words: Brewer's Yeast, Cattle, Cow, Livestock, Preparation.

1. Introduction

According to the recommendations of the FAO/WHO, as well as a document called the food security doctrine, in accordance with physiological standards, the level of animal protein consumption should be at least 85 kg. According to the forecasts collection published in the 20th century, the demand for food (especially protein) is growing every year due to the increase in the

world's population [1-3]. Comparing the WHO requirements and the levels of protein consumption by decile groups it can be seen that a significant part of the population of these regions in their diet have deficient animal protein [4-6].

In connection with this, it is necessary to apply intensive reproduction livestock in dairy farming [7-9]. During the intensification of herd reproduction, the main goal of cattle breeding is preservation its genetic potential and maximize the productivity and cattle's reproductive qualities. The solution to this problem is impossible without making a solid animal fodder ground, organization full feeding of livestock, diet enriching with additives, which directly or indirectly contributing to the improvement of assimilation and conversion of animal fodder [10-13]. For this purpose, new generation additives are used in recent years, providing cattle with full-value protein, amino acids and natural vitamins. Of the great interest among these additives are the products of enzymatic hydrolysis of proteins, including yeast preparations, and in particular preparations synthesized from brewer's yeast [14]. They promote better absorption of animal fodder, improve motility, pancreatic secretion, stimulate appetite and promote the toxic substances' elimination from the body [15-17].

The protein contains in brewer's yeast is easily digestible. Essential and critical amino acids, which are almost completely contained in yeast protein, give it great value. The study of the effect of yeast on the cattle is relevant in the theoretical and practical aspects because the question of the yeast additives effect on the organism, in particular, on some productive indicators, has not been sufficiently explored. In addition, brewer's yeast contains carbohydrates, fourteen vitamins: B-complex (pantothenic acid, pyridoxine, thiamine, folic acid and choline) and vitamins E, PP, H provitamin D and others; essential fatty acids, enzymes glucosidase, peptidase, proteinase, β -fructofuranosidase, a huge amount of minerals: selenium, calcium, iron, zinc and others. Besides the reach amino acid consist, there are trace elements and vitamins, yeast makes an anaerobic environment ideal for ruminal digestion and the development of rumen flora [18].

In practice, cattle is often fed according to diets averaged for a particular age group, which is not always and not completely balanced of protein, a number of amino acids and many other components. The researchers, which were conducted abroad and in Russia, have proved the prospects and effectiveness of use yeast additives to increase the palatability of dimension animal fodder. However, during studies it is necessary to strictly observe a number of measures and rules, particularly, to balance the diet well. It allows improving cattle's metabolic process that leads to the increase in the quantity and quality of the products obtained.

The purpose of our research is to determine the effect of new preparations from brewer's yeast on certain reproductive indices and some biochemical blood indices in cows and body weight gain in replacement young cattle.

2. Materials and Methods

The researches were conducted in the conditions of a farm for raising and exploiting dairy cattle in the republic of Moldova and in some livestock breeding farms in the Stavropol region of the Russian Federation in 2020. The experiment involved the first and the second lactation cows and Holstain replacement young. For research, four groups of cattle from pregnant cows and replacement young cattle were selected and formed. Two of them, one experimental and one control group, were consisted of pregnant cows at the 7th month of pregnancy, 10 heads in each group. According to the plan of the experiment and accompanying studies, the experiment on dairy cows began during the period when the cows were in the last two month of pregnancy and continued for three months after calving. Another two groups, one experimental and one control, were formed from calves at the age of 7-9 months, 10 heads each. The experiments on young cattle had been continuing for 1 month.

The cows of the experimental group were orally individually injected once a day with a biologically active preparation synthesized from brewer's yeast in a dimension 20 ml per head a day. The medication was given two months before calving and continued for three months after, in order to monitor the effect on the reproductive ability in the postpartum period. At the same time, the feeding in both groups was in accordance with the requirements rationed feeding.

The calves of the experimental group were given a biologically active medication synthesized from brewer's yeast orally individually injected once a day in a dimension 10 ml per head a day. The medication had been given to the cattle for a month. Before the start of the experiment and at the end was a control weighting of young cattle. At the same time, the feeding of calves in both groups throughout the study was in accordance with the requirements of rationed feeding and was the same.

Before the start of the research and at the end of the experiment blood samples were taken from the cows using standard protocol described in [19].

The medication used in the experiment based on brewer's yeast are being patented.

3. Results and Discussion

The results of the studies to understand the effect of new medication on certain reproductive indicators are in Table 1.

Table 1 - Some Reproductive Indicators of Cows after the End of the Experiment. (n=10)

№	Indicators	Monitoring	Experimental group	+,-from monitoring
1	Service period duration, days	36,2	27,3	-8,9
2	Fruitfulness of insemination, %	50,0	100,0	+50,0

Outcome analysis of the Table 1 made it possible to establish that in the experimental group the first estrus appeared on average 27.3 days after calving, in the control group after 36.2 days. The duration of the service period in cows in control group was 8.9 days longer than in cows in the experimental group (36.2-control, 27.3 experimental).

The fruitfulness of the insemination in the control group was two times lower (50%) than in the experimental group (100%). It should be also noted than in cows in the experimental group were fruitfully inseminated after the first insemination and some cows in the control group only after the second.

Thus, the per os injection of medication in the last two months of pregnancy and at the first three months after calving in the dimension of 20 ml / head / day at the 7th month gestation period leads to the decrease frequency of attempts to the amount of artificial insemination by 0.75 unit per cow. It also reduces semen consumption by 1.5 doses per cow and increases fertility be 50%.

The cows in the experimental and in the control groups do not have any complications during pregnancy. In addition, the calving in all cows of both groups was normal without postpartum complications.

The results of weight gain of the replacement young cattle during completing of growing are in the Table 2.

Table 2 - Body Weight of Replacement Young Cattle (n=10)

	Experimental group		Monitoring	
	Beginning	Completing	Beginning	Completing
Control weight, kg	228,4±8,65	246,3±7,91	219,2±17,72	234,1±9,37
Difference between groups at the beginning and end of the experiment, kg	+9,2 -	+12,2	- 9,2	-12,2
Weight gain in the group at the end of the experiment	-	+17,9	-	14,2
Difference	-	5,7	-	2

As can be seen from the data in Table 2, by the end of the experiment, the average weight of young cattle in the experimental group increased by 17.9 kg and in the control group by 14.2 kg. The average weight of young cattle in the experimental group at the beginning of the experiment was 9.2

kg higher than in cattle in the control group. By the end of the experiment, the average weight of young cattle in the experimental group was 246.3 ± 7.91 kg what 12.2 kg more than in control group is where the average weight was 234.1 ± 9.37 kg. Thus, in the experimental group the average weight gain without the difference between groups was 5.7 kg (17.9-12.2). In the control group the same indicator was 2 kg (14.2-12.2).

The 2.6-fold difference can be explained only partly by the fact that the average weight of young cattle in the experimental was 9.2 kg higher than in the control group at the beginning of the experiment. Therefore, it can be argued that this medication contributes to the faster young cattle's muscle gain.

The results of studies of blood samples taken from cows of both groups during the research are presented in the Table 3 and in the Table 4.

Table 3 - The Level of Calcium and Phosphorus in the Cows' Blood Serum (n=10)

Indicators	Experimental group		Monitoring	
	Beginning	Completing	Beginning	Completing
Ca, mmol/l	$10,7 \pm 0,302$	$10,3 \pm 0,267$	$10,175 \pm 0,449$	$10,18 \pm 0,45$
P, mmol/l	$5,17 \pm 0,208$	$4,95 \pm 0,159$	$5,41 \pm 0,215$	$5,048 \pm 0,142$

Outcome analysis obtained during the study of the blood samples at the end of the experiment after statistical processing with descriptive statistic methods, showed that in cows of the control group the calcium level almost did not changed, and in the experimental group's cows the level of Ca slightly decreased but was within normal limits. This indicates an increase in Ca secretion through the produced milk, since there was also a simultaneously level protein decrease. In addition, in the experimental group's cattle the glucose level slightly decreased while in the control group it decreased by two times. This dynamic indicates the more intensive consumption of energy resources and utilization of glucose in cattle of the control group that was statistically recorded according to the research results. At the same time, comparing the level of lactation a slight increase in the received milk in the experimental groups was revealed in comparison with the control; it should be considered that these changes in indicators are associated with an increase in milk yield in cows of this group.

The level of ketone bodies increases with growing lactation, which is normal for cows, although this compound is detrimental to hepatocytes and causes ketosis. During the experiment, it was found that the level of ketone bodies increased in both groups, but in the control group, it was higher than in the experimental one. Consequently, the risk of developing ketosis in cows of the experimental group is lower than in cows of the control.

As for carotene, which regulates follicle maturation in the ovaries, it was found within the normal range in cows of both groups throughout the entire experiment.

Table 4 - Some Indicators of the Content of Proteins, Carbohydrates, Lipid Peroxidation Products and Vitamins (n = 10)

Indicators	Experimental group		Monitoring	
	Beginning	Completing	Beginning	Completing
Crude protein, g/l	50,32±1,87	42,65±1,142	41,44±0,956	24,95±1,83
Glucose, mmol/l	6,3±0,06	6,45±0,088	6,26±0,06	3,42±0,125
Ketone bodies	2,7±0,44	4,3±0,359	2,7±0,438	5,2±0,298
Carotene level	0,95±0,032	0,96±0,037	0,97±0,046	1,01±0,028

As a result of the made analyzes, it can be argued that there is a positive effect of the biologically active drug synthesized from brewer's yeast on the organism of cows and young cattle in rearing as a whole.

4. Conclusion

As a result of experimental studies on the new biologically active medication, synthesized by academic specialist from the Institute of Microbiology and Biotechnology on brewer's yeast, it can be said that claimed medication used in feeding pregnant cows and rearing calves has a positive effect on some aspects of reproductive performance in the postpartum period. In addition, it contributes to growth and development of young cattle.

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