Effect of quality management of pasture lands in the mountain zone of Central Caucasus on dairy cow production

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Journal of Livestock Science (ISSN online 2277-6214) 12: 317-320
Received on 25/8/21; Accepted on 20/10/21; Published on 2/11/21
doi. 10.33259/JLivestSci.2021.317-320

Abstract

One of the conditions for increasing livestock production is a solid forage base. Rational use of natural mountain pasture areas by farm animals is a significant reserve in obtaining high-quality meat, milk and wool. Experimental studies were carried out on the territory of a mountain hospital on aboriginal first-calf cows. Two groups of 6 heads were selected. The control group used green mass from the natural background of pastures. The experimental group grazed on the best version of the pasture. It was found that for the pasture period (154 days) from first-calf cows in the control group, the gross milk yield was 1634.04 kg versus 1901.79 kg in the experimental group, with an increase in the dry matter mass fraction of milk by 0.35%; fat by 0.13%; SOMO by 0.22% and protein by 0.09%. This contributed to the improvement of protein metabolism, providing the highest yield of cheese mass - 10.34 kg. The economic efficiency of selling milk per head in the control group was 24,424.12 rubles, in the experimental group the profit was 5020.12 rubles higher.

Key words: pastures; biologically active preparations; agricultural ore; first-calf cows; biological status of an organism; economic evaluation of results

Introduction

Natural pastures, which are the basis for increasing the summer productivity of livestock, reducing labor costs and increasing the profitability of the production of livestock products, are one of the sources of providing forage and vegetable protein for farm animals in the summer period in the mountains.Intensive grazing of cultivated pastures reduce feeding costs when compared to the traditional cut and carry system in farms with access to limited irrigation (López-González et al 2017).

Under the conditions of North Ossetia-Alania, the rational use and improvement of natural mountain fodder lands is of utmost importance, since of all fodder consumed by animal husbandry in the Republic, pasture accounts for 61.3% of all lands used by agriculture.However, the excessive load, the early use of pastures and haphazard grazing has led mountain pastures to an unsatisfactory state.They are littered with non-food and poisonous plants, their yield is low, the herbage is depleted, there is morphing and degradation of grassland phytocenoses. But due to non-compliance with the terms of use, overload and lack of care, mountain forage lands continue to deteriorate, increasing degradation processes (Soldatova I.E. et al. 2020). All this makes it necessary to streamline their use and take steps to study.

In this regard, various methods for improving mountain pastures are a necessary condition for creating a forage base in the mountains.One of the ways to stop the degradation of pastures, increase soil fertility and increase the productivity of agricultural products is the development of environmentally friendly systems of grassland management. The use of biologicals, - extrasol, minerals - zeolite-containing agro-ore and combined with rational use and comprehensive assessment of environmental consequences in the agricultural system, taking into account the consequences of the use of technologies on the productive qualities and physiological state of animals can be beneficial.

Based on this, the goal of our research is to improve and use forage lands by introducing biologically active preparations and local zeolite-containing agro-ores in mountain pastures and their effect on the productive qualities of herbage and the productivity of farm animals grazed on them (Ugorets et al, 2019; I. E. Soldatova, 2020; V.I. Ugorets et al., 2019), which at this stage in modern conditions is especially relevant.

The purpose of the research work was to substantiate the optimal system of grassland management, replacing a mineral nitrogen source with a biological one (applying agricultural ore, extrasol, manure), which affected an increase in the level of protein nutrition on restored, improved pastures and led to an increase in the amount of feed energy used for the formation of products (in the experimental group of animals), while reducing the total cost of feed per unit of production.

Material and methods

Experimental studies were carried out in the mountainous zone of the Dargav Basin (1640 meters above sea level, coordinates 44 ° 27 '16.5 "E, 42 ° 53' 02.8" N), separating the Main Ridge from the Skalisty. The Dargav Basin is located in the second agro-climatic region, characterized by mountainous terrain, on aboriginal first-calf cows. The cheese-making properties of milk were studied in the laboratory of the North Caucasian Scientific Research Institute of Mining and Foothill Agriculture, VSC RAS.

To achieve this goal, two groups of first-calf cows (6 heads each) in the control and experimental groups were selected for the experiment. In the summer, the animals of the experimental group used the green mass from the best variant of the experiment, and the control animals used the natural background of the pasture. In winter, hay was used, collected from the same plots, processed 1 hour before feeding a 0.1% solution of extrasol at the rate of 1 liter of an aqueous solution per 3 kg of hay and agro-ore (with free access to it in feeders together with table salt). All groups of animals were fed according to generally accepted standards. During the experiment, zootechnical and physiological studies were carried out, economic efficiency was determined according to generally accepted methods (Antonova et al., 2011;Bezverkhaya, 2020; Kulikova et al., 2006; Suchkova, 2015; Ryadchikov, 2012; Kozina, 2012).

Results and discussion

One of the indicators of zootechnical assessment of feed used by animals on pasture is their productive effect on animals. As our studies have shown, the grazing of pasture grass by first-calf cows had an unequal effect on their milk productivity and the chemical composition of milk, table 1.The data presented in Table 1 show that the grazing of first-calf cows depended on the quality of the pasture grass. Thus, grazing animals on a fertilized pasture had a positive effect on increasing their average daily milk yield. The gross milk yield of natural milk in first-calf cows of the control group, grazing on a primitive pasture, was 1634.04 kg for the pasture season, which is 16.38%

less than in the analogs of animals in the experimental group. And this affected not only the level of their milk productivity, but also the content of the main components of milk.

It was revealed that before grazing on pasture, the chemical composition of milk slightly differed between groups of animals, which is apparently associated with the individual characteristics of animals (Table 1). Thus, grazing of first-calf cows on a fertilized background of pastures contributed to an increase in the dry matter mass fraction in milk by 0.35 (12.34% versus 11.99%), due to a significant increase in the fat mass fraction in it - by 0.13%. SOMO - by 0.22% and protein - by 0.09%.

The existing differences in the milk of first-calf cows (Table 1) in terms of physicochemical parameters did not negatively affect its usefulness. It met the requirements of GOST 13 264-88 and was biologically complete, which approached the requirements for milk in cheese making. From the milk of the experimental cows, we produced Ossetian cheese.

Table 1. Milk productivity and chemical composition of milk of first-calf cows for the grazing season

SOMO,% Total protein,% Albumin,%	Group			
	Control		Experienced	
	Period			
	preliminary	experienced	preliminary	experienced
Average daily milk yield, kg	7.30±0.46	10.68±0.65	7.70±0.10	12.43±0.95
Dry matter,%	11.62±0.08	11.99±.010	11.80±0.15	12.34±0.12
SOMO,%	8.26±0.07	8.36±0.04	8.38±0.10	3.76±0.05
Fat,%	3.36±0.02	3.63±0.06	3.42±0.10	3.76±0.05
Total protein,%	3.20±0.02	3.25±0.02	3.25±0.04	3.34±0.03
Casein. %	2.632±0.02	2.670±0.02	2.674±0.03	2.743±0.02
Albumin,%	0.568±0.01	0.580±0.004	0.576±0.01	0.597±0.02
Milk sugar,%	4.280±0.03	4.344±0.02	4.350±0.05	4.446±0.04
Ash,%	0.634±0.004	0.644±0.004	0.644±0.01	0.662±0.01
Calcium, g /%	1.225±0.004	1.248±0.01	1.231±0.01	1.260±0.004
Milk yield in 153 days of lactation, kg	-	1634,04	-	1901,79

Table 2. Cheese-making properties of experimental milk first-calf cows

Index	Group	
	Control	Experienced
Average protein content in milk,%	3.25±0.04	3.34±0.03
Share of casein,%	2.67±0.02	2.74±0.05
Curling duration, min	32	26
Milk type	2	2
Output of cheese mass of 45% fat content from 100 kg of milk, kg	9.88±0.21	10.34±0.25
% To control	100	104.7
Cheese chemical composition,%: dry matter	51.65±0.21	53.44±0.29
Fat in dry matter	44.39±0.19	46.07±0.38
Protein in dry matter	20.10±0.03	21.03±0.06
Cheese score	87	88

In a comparative assessment of the technological properties of normalized cream (depending on the pastures used by animals), there were some differences in the duration of clot formation under the influence of the introduced milk starter culture and rennet (Table 2). The duration of clot formation in the control group was 32 minutes, while in the cows of the experimental group it was 6 minutes. faster. Moreover, the cheese curds obtained from the milk of the experimental group were distinguished by a denser consistency, when cut, whey was released faster, which accelerated the time for curd grains by an average of 3-5 minutes. Improvement of protein metabolism in cows of the experimental group made it possible to provide the highest yield of cheese mass with 45% fat content - 10.34 kg, which is significant ($p < 0.05$) than in the control - by 4.7%.

The resulting cheeses had an overall point score of 87.0 in the control and 88.0 in the experimental batch and were assigned to the highest grade.Consequently, the grazing of animals on a biologized pasture contributed to the better assimilation and use of nutrients by the animals of the experimental group for the technological properties of milk and ecologically clean animal products. Analyzing the material obtained by us on feeding and keeping animals on mountain pastures, it was possible to identify the economic efficiency of the results of the experiment, Table 3.

During the pasture season, 1901.79 and 1634.04 kg of natural fat milk were obtained from each first-heifer cow (experimental and control group). When converted to basic fat content (3.4%), the milk yield of first-calf cows in the experimental group was 2103.16 kg, which is 358.58 kg more than in the control animals. Milk sales per head in the control group amounted to 24,424.12 rubles, in the experimental group this indicator was 5020.12 rubles higher.Thus, the results of the study confirmed the validity of the use of full-fledged animal feeding, which is achieved by using biologically active substances on mountain pastures that contribute to the production of environmentally friendly livestock products and the further development of this branch of agriculture in the mountains, which is confirmed by studies conducted earlier (Gogaeva, 2001; Teziev et al., 2014, 2015)

Table 3. Economic efficiency of milk production by cows (per 1 head) when grazing on mountain pastures.

Index	Group	
	Control	Experienced
Milk yield per grazing season (153 days) kg	1634.04	1901.79
Fat content,%	3.63	3.76
Milk yield of base fat, (3.4%)	1744.58	2103.16
Average increase in milk yield, kg	110.54	201.37
%	6.76	10.50
Selling price of 1 kg of milk, rubles	14.00	14.00
Proceeds, RUB	24424.12	29444.24
Profit	100	5020.12

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