

Development of New Recipes for Compound Feed for High-Yielding Cows

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Abstract

The article discusses the development of new recipes for compound feeds using extruded grain feed with the addition of cottonseed and sow meal and their impact on the milk productivity of cows. The obtained results of experimental studies showed that extrusion of corn and barley grain with the addition of cottonseed and soybean meal to the main diet of dairy cows improves the nutritional value and digestibility of feed, which affects the productivity of cows.

Keywords: Feed, Extrusion, Nutritional Value, Digestibility, Chemical Composition, Diet, Productivity

1. Relevance of the Topic

The most important condition for increasing the productivity of farm animals, realizing their genetic potential, maintaining health and obtaining high-quality livestock products is considered to be the creation of a solid feed base that allows balancing diets in terms of essential nutrients, minerals and biologically active substances [1].

In the Kyrgyz Republic, dairy farming was one of the leading branches of animal husbandry, where good results in milk yield were achieved [2]. It is enough to note that in 1989-1990, each cow in the Republic produced an average of 3,213 kg of milk, which was one of the best indicators in the Union [3]. However, in connection with the collapse of the Union and the reorganization of collective and state farm production, the transition to market relations, this sector has undergone significant changes [4-6]. Firstly, both the breeding and productive qualities of livestock have deteriorated, which is primarily due to the fact that many peasant and farm households have stopped engaging in targeted selection and breeding work and artificial insemination cows using semen from proven progeny of breeding bulls, which has led to an increase in the number of mongrel, low-yielding animals [7]. Secondly, many farms currently have a very poor feed base, and the diets of dairy cows do not meet the requirements for satisfying the needs of dairy cows for nutrients. According to numerous studies by scientists

and practicing livestock breeders, due to various objective and subjective reasons, in practice in many farms and peasant farms the quality of herbaceous feed does not always meet the necessary requirements, and animals, dairy cattle in particular do not receive the necessary level of not only energy, but also all vital nutrients, minerals and biologically active substances [8]. In such cases, their deficiency has to be replenished by an excess amount of grain feed (concentrates), as a result of which the structure of the feed in the diet is disrupted, in addition, the animal's body cannot more fully process the nutrients of grain feed due to the strength of the structure of these feeds.

In the Kyrgyz Republic, it is known that when feeding dairy cows, standard feed concentrates are used, which are added to the main ration. They were developed for stall and pasture methods of keeping cows [9]. However, such feed concentrates require constant improvement in the direction of increasing the nutritional value and digestibility of the constituent components, since the productivity of animals is constantly increasing. Therefore, we directed our research to the development of fundamentally new recipes for feed concentrates for dairy cows, used in the stall period of maintenance, in which part of the corn and barley were subjected to the extrusion method. This method of processing feed before feeding has a certain effect. The fact is that in the process of extruding feed, the digestibility of nutrients increases sharply as

a result of swelling and rupture of the membranes of plant cells, denaturation of proteins occurs.

The product acquires a fine-pored, easily digestible structure for the digestive system. All this happens in the feed as a result of intensive and short processing of grain with high temperature and pressure. In this case, complex structures of proteins and carbohydrates are broken down into simpler ones, fiber into secondary sugar, starch into simple sugars. During the short processing time of grain, the protein does not have time to coagulate, as a result, the vitamins and nutritional properties of the product are preserved. Due to the sharp drop in pressure when the heated mass of grain exits, an “explosion” (increase in volume) of the product occurs, which makes it more accessible to enzymes of the gastrointestinal tract of animals, thereby increasing the digestibility of the processed feed. In our opinion, feeding dairy cows with compound feed containing

extruded corn and barley, with the addition of soybean and cottonseed meal will improve the completeness of their nutrition and increase the level of productivity and quality indicators of dairy products.

2. The Purpose and Objectives of the Research

The main purpose of the work was to study the effect of new recipes for compound feed concentrates by including extruded corn, barley with the addition of cottonseed and soybean meal in the main diet when feeding dairy cows on milk productivity.

The scientific and economic experiment was conducted at the OJSC “MIS” in the Issyk-Ata region of the Kyrgyz Republic, where the Holstein-Friesian cattle breed is bred using the pair-analogue method.

3. Experience Scheme

Breed	Number of cows	Groups		
		control	Experimental №1	Experimental №2
		Features of feeding		
Holstein Friesian	10 heads in each group. Daily milk yield from 17 to 20 kg.	The main diet used in the farm	Basic diet + compound feed of our own production (barley, extruded corn 3.5 kg with the addition of cottonseed meal - 1.5 kg)	Basic diet + compound feed of our own production (barley, extruded corn 3.5 kg with the addition of soybean meal - 1.5 kg)
Indicators	On average, over 4 months of research			
	control		experienced	
Average daily milk yield, kg	15,2			17,6
Total amount of milk during the study period, kg	1824			2112

Table 1: Milk Productivity of Control and Experimental Cows

4. Research Results

During the research on the palatability of new feed recipes after grain extrusion, it was noted that the palatability and digestibility of feed nutrients were mainly improved. Feeding the experimental group of animals with extruded feed mixture with the addition of cottonseed meal resulted in an increase in milk productivity of cows, the data for which are presented in the table.

The data in the table show that the milk productivity of the cows during the experimental period was different. Thus, the average milk productivity of the cows in the experimental group was within 15.2 kg with a fat content of 3.82%, while the cows in the experimental group that received compound feed of a new recipe

using extruded grain (barley, corn with the addition of cottonseed meal) had a higher milk productivity compared to the experimental group. Thus, during the experimental period, the average daily milk yield of cows was 17.6, or compared to the control group of cows receiving the main diet of the farm, the difference was 2.4 kg (15.7%). At the same time, the fat content of milk improved significantly. If the milk fat content of the cows in the experimental group was 3.82%, then in the cows that received the new compound feed recipe, after extruding grain with the addition of cottonseed meal, it was 3.86% or 0.04% more.

The use of a new recipe for compound feed of our own production, using extruded grain (barley, corn) with the addition of cottonseed

meal has a certain effect on increasing the milk productivity of cows. In our opinion, extrusion of grains (corn, barley) has further increased the reduction of crude fiber compared to the original composition, which undoubtedly affected the digestibility and assimilation of nutrients and increased productivity. Feeding the

animals of the experimental group with extruded grain mixture with the addition of soybean meal also resulted in an increase in milk productivity and fat content of the cows' milk, the data for which are presented in the table.

Indicators	On average, over 4 months of research	
	control	experienced
Average daily milk yield, kg	20,4	22,8
Total amount of milk during the study period, kg	2448,0	2664,0
Milk fat content, %	3,82	3,87

Table 2: Milk Productivity of Control and Experimental Cows

Analysis of the data in the table shows that the milk productivity of the cows during the experimental period was different. Thus, the highest milk yields were obtained from the cows of the experimental group, the average daily milk yield of the cows of this group was 22.8 kg or 2.4 kg more (10.5%). In total, 2664.0 kg of milk with an average fat content of 3.87% were obtained from the cows in the experimental group, while from the cows in the control group that received the farm's main diet, these figures were respectively equal to: 2448.0-3.82%.

Thus, the use of self-produced compound feed with extruded grain (corn, barley) with the addition of soybean meal has a certain effect on increasing the milk productivity of cows. In our opinion, extrusion of grains (corn, barley) has further increased the reduction of crude fiber compared to the original composition, which undoubtedly affected the digestibility and assimilation of nutrients and increased productivity.

5. Conclusion

Based on the conducted research on the impact of new recipes for compound feeds of our own production (using extruded corn, barley with the addition of cottonseed meal), it is necessary to use it by adding it to the main diet of dairy cows with a milk productivity level of more than 15.0 kg of milk, when subject to careful analysis of the diet and balancing it in terms of energy and nutrients by including additional ingredients in the composition of the concentrated feed. The research revealed the most effective recipe for feed concentrate No. 3 for dairy cows with the inclusion of 15% extruded wheat and barley. Adding such feed concentrate to the main diet of the experimental animals contributed to an increase in the daily milk yield of cows by 6.5%, milk fat content by 0.1% and profitability by 4.6% compared to the control variant, where standard concentrated feed was fed without preliminary processing of grain components. Based on the conducted research, it is proposed to further use compound feeds of our own production (using extruded corn and barley with the addition of soybean meal) in the diets of dairy cows with a milk productivity level of 20 to 25 kg, subject to careful analysis of the diet and balancing it in terms of energy and nutrients by including additional ingredients in the composition of the concentrate feed.

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