

## **SPECIFICATION OF FEEDING DAIRY COWS IN THE CONDITIONS OF REPUBLIC OF MOLDOVA**

Larisa Caisin\*, Ludmila Bivol, Natalia Grosu

State Agrarian University of Moldova, 44, Mircesti Street, 2049, Chisinau, Republic of Moldova

\*Corresponding author: [caisinlarisa@mail.ru](mailto:caisinlarisa@mail.ru)

### **Abstract**

The researches, carried out on the farm of the State Agrarian University of Moldova in the period September - December, 2016, determined the nutritional status, food introduction levels, the ratio of feed groups and the effectiveness of the inclusion of the dietary supplement "Beta Stimul" in the structure of dairy cows' ration in order to improve the use of local fodders, to compare milk productivity of the cows and quality characteristics of milk. The determination of the chemical composition and nutritional value of some fodders intended for feeding dairy cows in the Republic of Moldova differs when being assessed by the exchange energy and fodder units of oats, there is no difference in the nutritional value of the grain of oats, wheat and green mass of maize. The use of the dietary supplement "Beta Stimul" influenced the content of fat and protein in the cows' milk.

**Key words:** dairy cow, fodder, nutritional value, milk

### **Introduction**

An effective feeding system allows maximum intake of a nutritionally balanced ration. As the level of production of dairy cows continues to improve the coverage of the nutritional needs of cows is a growing challenge for modern dairy producers. Aside from milk production, it is also important to provide the nutrients needed for reproductive purposes - conception and pregnancy.

Unlike full time agriculture, dairy farming alone does not prove to be financially rewarding. The main reason is the feed cost. Fodder is an important means of feeding with high energy concentration and good digestibility of nutritive stuffs. The livestock sector of agriculture directly depends on balanced feeding of animals. Rations for lactating dairy cows are usually formulated based on protein (e.g. CP) and energy (e.g. net energy for lactation) requirements. However, to achieve maximum production, dairy rations should be balanced for effective fiber, non-structural carbohydrates, ruminal undegraded protein, soluble protein (<http://smallfarms.oregonstate>). High-quality forages must be a major component of the diet throughout lactation.

Many different feeding systems are being used on dairy farms today. Balancing the diet of cows in various stages of lactation is very important. Nutrient requirements for lactating dairy cows vary with the stage and level of lactation, growth rate and stage of gestation. The results of forages tested, should be used to formulate a ration which fits your feeding system as well as supply the cows with the nutrients they need. Changes in the type and quality of forages can affect the amount of nutrients cows receive.

## Materials and methods

Due to the fact that there is practically no exact information on the actual nutritional value of the local forages of Moldova, the research task was to determine the nutritional value of feed ingredients traditionally used in dairy farming and to develop feeding diets which would include a variety of feeds that would provide the milk cows with sufficient energy and nutrients.

This study was carried out in order to develop an optimization feeding of dairy cows. The research was carried out from September till December, 2016. The chemical composition and energetic value of animal feed was determined at the Scientific Laboratory of Agrochemical Analyses of the State Agrarian University of Moldova. The content of general moisture, crude protein, fat, cellulose, ashes and NFE were defined in the forages. The quality of feed was assessed using the methods for assessing the quality and nutritional value of raw materials (Petuhova et al., 1989, Pop et al., 2006).

The obtained data facilitated the development of diets for dairy cows kept on the farm of the Agricultural University of Moldova. For the scientific and economic experiment, a group of ten cows was formed, taking into account their breed, age, live weight and productivity. A scientific animal experiment was conducted using dairy cows of Simmental breed according to the scheme presented in Table 1.

Table 1. Scheme of the experiment

Period	Number of animals, head	Feeding features
First (1 month)	10	Basic feed
Second (1 month)	10	Basic feed + 15 g/head of feed additive "Beta-Stimul"

During the whole experiment, the housing and care conditions were identical for all the groups of the experimental cows. During the first period of the experiment, the animals were fed the basic feed, and during the second experimental period, the "Beta Stimul" preparation in the amount of 15g per cow per day (which was injected and mixed directly with the concentrates) was included in the diet.

The need for the main nutrients (total protein, etc.) and energy for 600 kg of cows with milk yield 20 kg per day was calculated according to the recommendations of the Kalashnicov A. et. al. (2003). By the optimization feeding research we studied the following parameters: nutritive values of the fodders, milk production and fat milk content.

The milk productivity of the cows was estimated on the basis of the results of the control milking, which was carried out three times a month during the whole period of the experiment.

Data derived from the research were processed using the method of variation statistics and the computer program EXCEL.

## Results and discussion

The optimization feeding research was carried out from September till December, 2016. The traditional cow feeding in this type of farm does not properly take into account the cows' need

for nutrients and energy. The fodders are not used properly. The nutrients are thus wasted since fodders are not totally consumed by cows; a fact that accounts for an increased milk production price.

After the analysis of the results of the chemical tests of the feeds that are traditionally used in rations for dairy cattle in the Republic of Moldova, it was found that the level of nutrient content in different samples of fodders varies and differs from the data given in the commonly used special normative literature.

It was found that the content of dry matter in the feed concentrates (dried wheat waste, corn, oats, wheat and sunflower seed cake) was about 81.14% in corn grain, and approximately 88.16% in sunflower cake, and that it was below the level indicated in the reference literature in which it amounts to 90.0% for each of them.

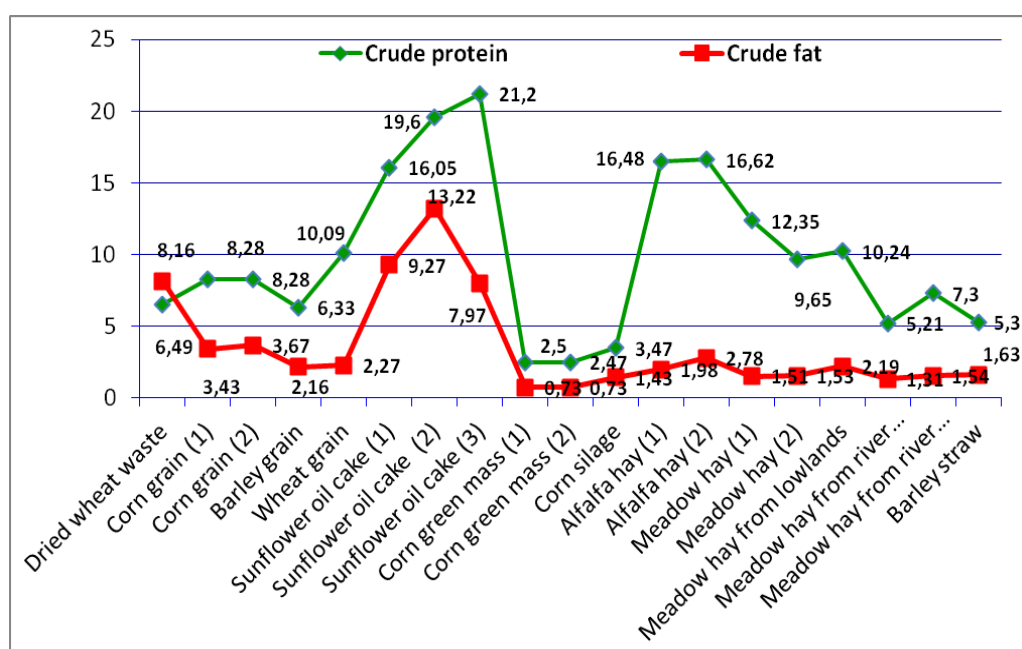


Figure 1. Content of crude protein and crude fat in the fodders, %

As for the content of fat in the fodders, it was determined that its level in the dried wheat grain was 8.16 %, in the corn grain it slightly varied from 3.43% to 3.67%, in the oat grain – 2.16%, in the wheat grain – 2.27%, in the sunflower cake – from 7.97% to 13.22%, in corn green mass – 0.73 %, and in corn silage – 1.43 %. In the hay of different types, the fat content varied from 1.31% to 2.78%. Thus, the actual fat content in fodders differed from the data given in the reference literature and the difference was 7.6, 4.3, 4.0, 2.0, 7.7, 0.6, 1.0 and 2.4% respectively (Figure 1).

Compared to the special literature, a lower protein content was observed in the dried wheat waste; the difference was significant – 13.61%. In corn grain it was 8.28 % against 9.2 %, in oat grain – 6.33 % against 10.8%, in wheat grain – 10.09 % versus 13.30 %, and in sunflower seed meal – from 16.05% to 21.20% against 40.50% (Figure 2). The analysis of laboratory data revealed differences, in comparison with standard indicators, in the content of crude protein in bulky feed. So, the content of protein was higher in the green mass of corn – 2.50% against 2.10%, in the corn silage – 3.47 % against 2.5%, and in the alfalfa hay – from 16.5%

to 16.6% against 14.40 %. Large fluctuations were observed in samples of meadow hay – from 5.21% to 12.35% against 9.70% (Figure 1).

The productive use of feed is largely determined by the digestibility of nutrients, which directly depends on the amount of fiber in the diet. In addition to the nutritional value, fiber also has the property of maintaining the necessary consistency of the contents of the digestive tract necessary for a normal digestion.

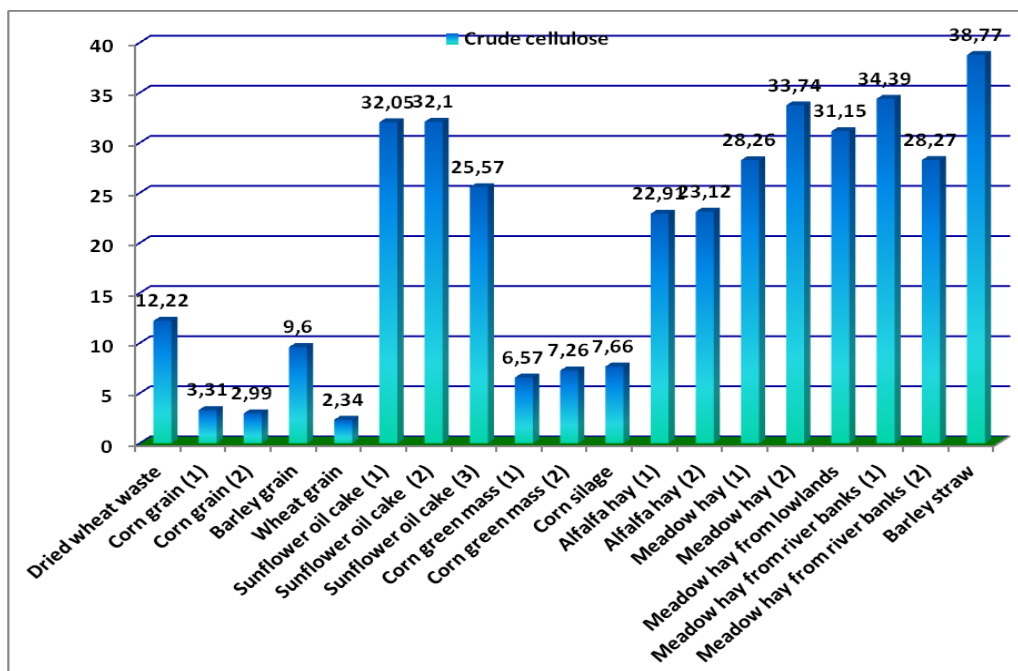


Figure 2. Content of crude cellulose in the fodders, %

On the basis of the data of chemical analysis it was established that the content of raw fiber in the dried wheat waste amounts to 12.22%, in corn grain – from 2.99% to 3.31%, in oat grain – 9.60%, in wheat – 2.34%, in the sunflower cake – from 25.57% to 32.10%, in the green mass of corn – from 6.57 % to 7.26 %, in corn silage – 7.96%, and in different types of hay – from 22.91% to 34.39%. The data that had come out from the analysis of raw fiber content in fodders differed from the normative data that are commonly used in the calculation of rations for cows. In comparison with the recommendations, the content of raw fiber was lower, namely: in dried wheat waste by 1.72%, in sunflower cakes (depending on the sample) – by 4.93-3.63 %, in alfalfa hay – by 2.18-2.90% (Figure 2).

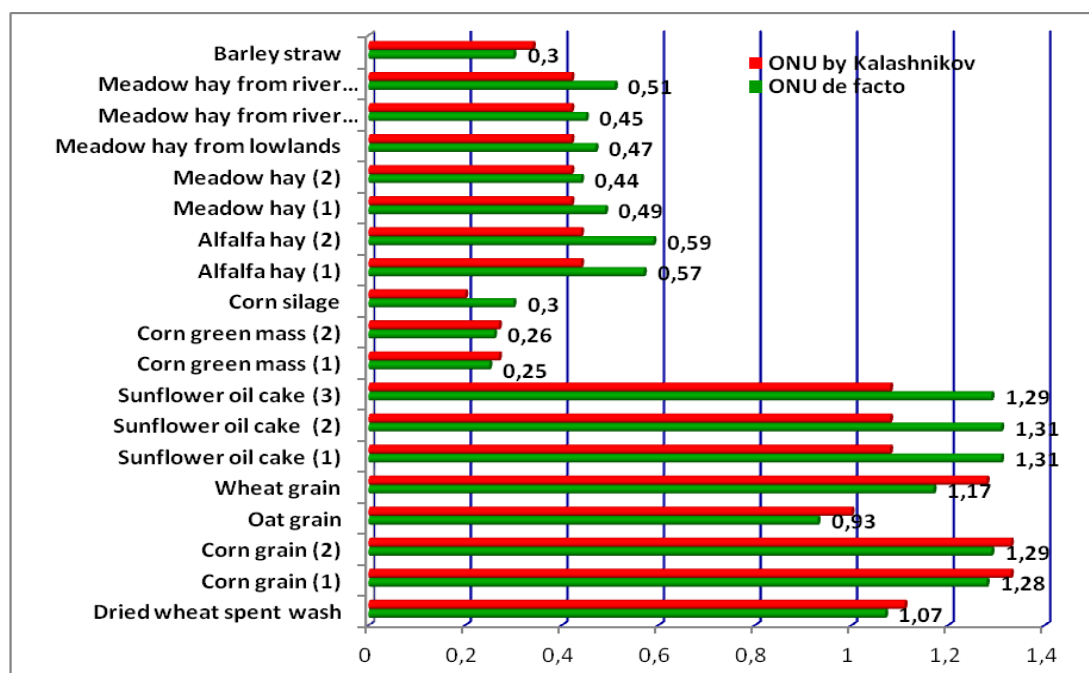


Figure 3. Nutritional value of fodders in Oat Units

A higher content of crude fiber was observed in corn maize – by 4.3%, in wheat – by 0.64%, in green corn mass – by 1.07 and 1.76%, and in meadow hay – by 1.96 to 7.44%. There was no difference in the content of raw fiber in oat grain and corn silage. The results of the calculations of the actual nutritional value of fodder for cattle in oat fodder units on the indicators of the chemical composition showed their variability in comparison with the data given in the works of different authors (Burlacu et al. 2002; Kalashnikov, 2003; Donosa, 2010). Practically, only the nutritional value of oat grain, wheat and green corn mass did not differ (Figure 3).

In the system of animal feeding, the measure of energy availability is the exchange energy of the feed, which depends on the balance of the main nutrients, endogenous losses during digestion, energy balance and protein nutrition, which determine the loss of energy in urine and gases. The exchange energy of fodder resources was established by calculation using the chemical composition of fodders, the indices of nutrients digestibility according to the corresponding regression equations. It was determined that the exchange energy indices selected for the analysis of feed for cattle differed a little from the data specified in the norms edited by Kalashnikov (2003). Large fluctuations in terms of nutritional value were observed in feeds when they were estimated in the exchange energy for cattle (Figure 4).

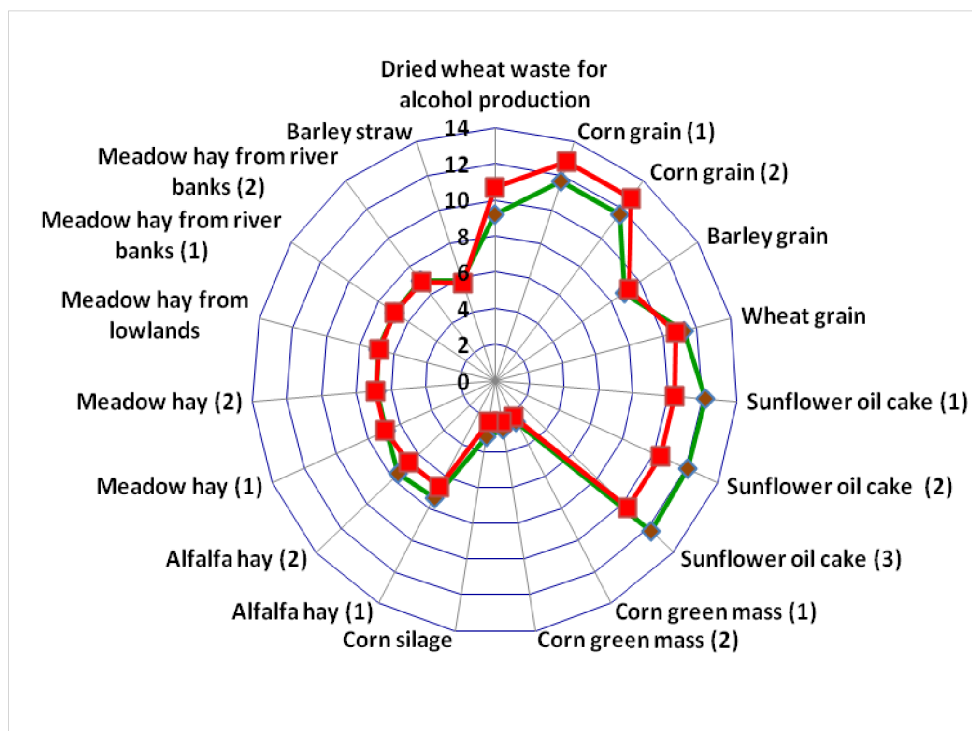


Figure 4. Nutritional value of fodders, MJ

Also balancing of the feed ration according to the content of the main nutrients (protein, mineral substances etc.) and energy supply is of great importance. The optimal diets were calculated depending on nutrients need for cows and the available fodders from the studied farms (Table 2). In Table 2 are presented the data regarding the fodder used in dairy cows diets during the research period. The traditional diets were composed mostly from dry fodders (hay) which represented in average 14.5% from the diet and the silage represented 44.0%. Analyzing data from the table 3, it can be noticed that through rational diet feeding had a positive influence on milk quality as well. Before the experiment, the average milk yield of cows was 17.1 kg; the fat content was 2.85% (Figure 3). The milk quality indicators are of particular interest for the overall productivity.

Table 2. Ration for cows, with the live weight of 600 kg, and the milk productivity of 20 kg

Indices	Daily supply, kg	Feed units, kg	Exchange energy, MJ
Alfalfa hay	3.0	1.3	20.16
Meadow hay	3.0	1	17.43
Silage	35.0	7	80.5
Corn grain	2.0	2.7	24.4
Wheat grain	0.9	1.2	0.72
Barley grain	0.8	0.9	8.4
Sunflower cake	0.8	0.8	8.48
Wheat bran	1.3	1	11.505
Salt, g	110.0	-	-
Contained in the ration		15.9	171.595
The difference to the norm, ±		0.8	-5.405
The difference to the norm, %		5.3	-3.05

The use of fodder additives in the diets for cows changed the qualitative composition of milk. The use of the dietary supplement "Beta Stimul" influenced the fat and protein content in the cow's milk: the fat content increased by 0.88%, and the protein content – by 0.11%. The use of "Beta Stimul" in the cow feeding presumably improves the state of the cows' health and, as a result, increases the milk productivity.

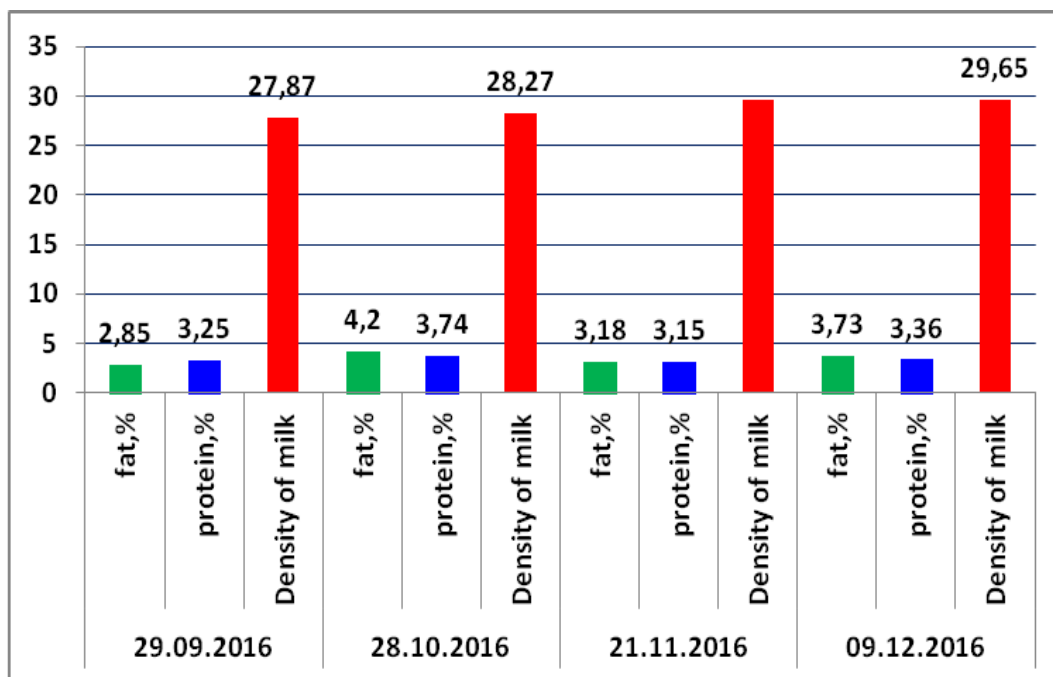


Figure 5. Milk content

## Conclusions

Dairy cows breeding represents one of the most important activities developed in the small agricultural farms in Moldavian zone due to the possibility to obtain monthly incomes regularly.

The concentrate fodders (corn grain, wheat grain, barley grain, wheat bran and sunflower cake) were mixed depending on cows' need for energy and protein.

Our research in feeding cows with the optimal diets has shown that the milk production has increased from quantitative and qualitative point of view. The fat milk content increased by 0.88%, from 2.85% to 3.73%.

For a better milk production, need to calculate the diets depending on the production level, cow's needs in nutrients and fodder's nutritive value.

## Acknowledgements

The results presented in the paper are an output from study supported by Grant Agency of Research and Science (GARS) SAUM, project no.: 07/2016-1, established by Czech development project "Modernization and improvement of education and research at State

Agrarian University of Moldova (SAUM”. The authors wish to thank for the opportunity to perform investigation.

## References

- Burlacu, Gh., A. Cavache, R. Burlacu (2002): Potențialul productiv al nutrețurilor și utilizarea lor, Ed. Ceres, București.
- Feeding the dairy cow during lactation. Dairy Production 342-450 A. p.1-8.[http://smallfarms.oregonstate.edu/sites/default/files/feeding\\_milking\\_cow.pdf](http://smallfarms.oregonstate.edu/sites/default/files/feeding_milking_cow.pdf), visit 28.06.2017.
- Kalashnicov, A. et. al., (2003): Standards and diets of animal feeding. A Reference Guide. Moskva: ISBN, 455.
- Petuhova, E., R. Bessarabova, L. Haleneva, O. Antonova (1989): Chemical analysis of fodder. Moskva: Kolos, - 238.
- Pop I. M., P. Halga, T. Avarvarei (2006): Nutriția și alimentația animalelor. Vol. 12-3. Edit. TipoMoldova. Iași
- Donoșă, R. E. (2010): The nutritive value of fodder beet in some dairy cow farms from Verșeni Village (Iași County). *Lucrări Științifice - vol. 53, Nr. 1, seria Agronomie.*207-210.