THE IMPORTANCE OF COMPUTERIZED RATIONS AND THEIR IMPACT IN A DAIRY COW FARM IN THE BOTOȘANI REGION

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Abstract

The nutrition of dairy cows plays a very important role especially in terms of farm economy, efficiency and health of dairy herds. Unfortunately, in many farms this aspect is treated superficially and economic efficiency is not maximized in order to obtain the highest milk yields and efficient use of feed. In view of the above, we have chosen this topic in order to achieve the most efficient computerized ration in the herd under study. In this case we followed, over a period of 10 weeks, the impact of the computerized ration and the control ration on milk production both in terms of quantity and quantity, and on feedstuff usage optimization. Another aspect followed was the economics of forage and finance in the farm. The study also relied on chemical analysis of the feed to determine the quality of the feed. For this we determined the chemical composition of the feed by looking at the amount of protein, cellulose, fat, then followed the actual implementation of the ration and at the end all the data was collected to show the efficiency of this study. There were two experimental batches, grouped by weight and productivity, also the control batch was followed. During the 10 weeks we noticed that the feed quantity was lower and the milk yields remained relatively constant with little impact on milc chemical composition. In this way we have successfully highlighted the importance of implementing such specialized computer software in a dairy farm where rations are made without a scientific basis.

Key words: dairy cows, ration, economy

INTRODUCTION

Nowadays, a new approach to animal husbandry is being pursued, especially dairy cows. In this sense, many years ago, the political situation imposed an increase in cattle in the collective system, in farms of impressive size but after de-collectivization disappeared over time. Small family farms reemerged and those of very large size being in smaller numbers. The current trend is changing, in the sense that family farms tend to expand and farms with a number of 2-3 cattle are beginning to disappear. That is why is consider that a more efficient way comes through mechanization of physical work because the labor force is deficient, and at the same time another important thing is rational feeding of dairy cows. This goal is to avoid wasting feed, increase production and milk quality. One last thing pursued for an efficient development is related to the fact that a genetic improvement of the breeds is also tried for productivity as advantageous as possible for the farmers. (Gutierrez-Reinoso et al., 2021) In animal husbandry the aim is to obtain productions with lowest possible costs. In this sense, it must be considered animal growth in an manner that ensures a microclimate as favorable as possible so that energy losses to be as small as possible. To achieve this, over the years cow farms have adopted various breeding systems. Today, in some high-tech farms, human intervention is minimal and the need for staff is much lower, which helps to maximize profits. Also, today's genetics helps farmers to obtain significant milk production, in some farms the average being over 40 l. per animal. (Acatincăi S., 2004) This advantage also comes with a major disadvantage related to the fact that these animals are extremely dependent on the environmental conditions and the ration administered and any major change leads immediately to significant losses. The maintenance systems are diverse, but they are divided into 3 categories, namely: maintenance in the stable system, maintenance in the summer camp system, maintenance in the mixed system. (Pașca et al., 2007)

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MATERIAL AND METHOD

The purpose of this paper is to assess the impact of computerized rations on milk characteristics and quantity and also on farm efficiency. The quality of feedstuffs used in the feeding of dairy cows used for both production and reproduction was observed. Samples were taken to highlight the quality of rations used on the farm and to assess their chemical composition. Thus, the organoleptic examination was performed, the raw chemical composition was determined by Weende Method and the rations was analyzed used by means of a computer program were assessed. (Hybrimin Flutter 5.1 ®).

The number of cattle on the farm is 44, of which 22 are adult dairy cows, 16 are young females and 6 are males. After determining the chemical composition of the feed that enters the ration of the cows on the farm, the animals were subdivided according to their weight and the amount of milk produced daily. Of the 17 lactating cows at the time of the experiment, we chose a number of 16, of which 8 were selected in the control group and another 8 in the group subjected to computerized ration. The group of cows subjected to computerized ration was further divided into 2 other groups of 4 in order to have homogeneous groups. We chose to carry out this process because there was a much too big difference between the least productive and the most productive cattle and the ration in this way would not have been balanced and correct. The computerized rations were implemented for 10 weeks, investigating at the end of each week the quantity of milk. The quality was appreciated in the first week, the fifth and also in the last week using apparatus Lactoscan SAP®. To determine the optimal ration, we used the computer program Hybrimin Futter 5.1®. In order to adapt the ration as accurate as possible for each category of animals, we made two experimental groups of animals. Thus, the first experimental group had an initial production average of 14 liters and a body weight of 550 kilograms, and experimental group 2 initially had an average of 20 liters and the average body weight was 570 kilograms. On the other hand, the control group has an average milk production of 14 liters and the average body weight is 550 kilograms. The number of animals per group was 4 with similar body weights and productive performance. The computer software mentioned above, in addition to the structure of the groups of animals and the establishment of milk production, the types of utilized feedstuffs was necessary. The investigated feedstuffs ware represented by: maize silage, natural hay, maize grains, wheat grains, alfalfa hay, combined fodder, sunflower meal. Ration for the tree experimental groups are presented in table 1.

RESULTS AND DISCUSSIONS

Following the laboratory analyzes for the 8 feed samples taken from the farm, different nutritional values were found depending on the type of feed. Juicy-silage (maize silage), coarse fodder (alfalfa hay, hay from natural pastures), combined concentrates, but also the ingredients from which they were obtained were analyzed. The quality of the feed was assessed in terms of its raw chemical composition. From this point of view, we appreciated the fact that the fodder had values of humidity within normal limits, except for maize. Their composition in organic substances such as: protein, fat, cellulose, ash and non-nitrogenous extractive substances is close to values or are in the range of normality of those specified in the international literature. (Preston, 2013) (Souvant et al., 2004)

The humidity measured in the case of maize grains (18.36%) was above the limits that have been cited in the literature. This aspect is quite important because, in agriculture, the humidity of cereals plays an important role due to the desideratum related to storage. In this sense, a high moisture content of cereals can lead to significant losses, especially in the case of grain depots where there is no dryer upon receipt. The danger of harvesting and storing such fodder occurs when they are stored and after a period there is a great possibility of developing the phenomenon of mold. Thus, the fodder affected by this phenomenon ends up becoming an economic loss for farms, in case of neglect of this aspect reaching significant losses. From the point of view of farms raising cows for milk production, the danger of using concentrates with high humidity is significant, because they can develop mycotoxins, which are excreted in the milk secretions of animals. Mycotoxins are considered according to recent studies with carcinogenic potential and their detection in milk delivered to processing plants has very serious consequences on the responsible farm. (Sultana and Hanif, 2009)

According to a study, in some farms milk production is higher than other farms where chemical structure of feedstuffs is ignored. In other words, the milk production varied in proportion to the amount of protein in the analyzed feed. (Assaminew and Ashenafi, 2015). After obtaining the computerized ration, the administration of the ration for the two experimental groups started on the farm.

In the first week after administering the optimized ration, both experimental groups underwent quantitative changes in milk (*table 2*), so that the average of both groups decreased by about 1 liter and in the third week the decrease continued in the case of the second group with more1 liter,. Also, in the third week, group 1 reached a minimum of milk production (1.5 liters) compared to the average initial production. In the following weeks, milk production began to increase slightly to values close to the initial ones, reaching similar values in weeks 9 and 10 and the average in both groups being 0.5 liters lower compared with the initial measurement. Milk production was affected by the implementation of the optimized ration, but the decrease in production was not significant. Another fact is that, in the last 3 weeks, for the experimental groups the milk production was constant. Studies on this aspect indicate that optimized rations help to achieve milk production without significant fluctuations (Coșman, 2017).

During the 10 weeks of the experiment, an analysis of the main constituents of milk was performed (*table 3*). The chemical structure of the milk was affected in the case of group 1 and group 2. These changes are more relevant in the case of fat percentage and amount of protein. The decrease in the first 5 weeks was 0.2 percent for both groups in the case of fat, respectively 0.1 grams for group 1 and 0.3 grams, values that refer to the amount of protein. However, these decreases were not found in the last determination in week 10, the values being very close to the initial ones. The initial decrease can be attributed to the fact that there has been a change in the ration and its content is no longer with an excess of fat and protein. However, recent studies by Cavallini et al (2018) shows that, for dairy cows with optimized ration the fluctuations of milk production and quality are not significant and on another hand, in those that are not intervened to optimize the ration, the fluctuations were significant.

Also, in addition to the nutritional factor, qualitative and quantitative fluctuations in milk production may also be due to hormonal causes. According to the study conducted by Lopez et al. which found that cows with an average production of 30 liters per day can have a decrease of 5-10 liters due to the estrous period. The administration of excess feed is a common problem, because dairy cows reach a maximum of productivity with a certain amount of nutrients, but above this threshold the administration is in vain and leads only to losses. A one-year study of dairy farms in Kosovo shows that their production is optimal, constant, but most do not calculate the necessary nutrients related to the weight and productivity of each animal (Shkodra, 2020). During the 10 weeks, there was a significant change in consumption in the sense that for the experimental groups, there was a decrease in ingested feed. However, this decrease was not negatively affected on milk production because, as mentioned above, the quantity and quality of milk fluctuated but returned to values close to the initial ones. Analyzing the feed economy achieved we can see that there are quite large quantities and such surplus feed can be capitalized on in several ways. First of all, the farmer can consider an increase in the number of animals or the feed that is in surplus can be capitalized by sale. For both cases, the farmer's profit is higher, compared to the case where he continues with the ration from the control group where he manages surplus fodder that is not capitalized efficiently by the animal.

The calculations refer to the 10 weeks in which the computerized ration was implemented, and these are based on the consideration of only one animal in the group. In other words, in the case of group 1, for a single animal, the economy from the financial point of view, during 10 weeks was of 440 lei and in the case of the second lot, the amount was represented by 381 lei. Extrapolating the financial result, for one year we come to the conclusion that the economy on the farm can reach an amount of about 2,500 lei per single animal. For a medium capacity farm, where there is a herd of 20 cows, we can reach the amount of 50,000 lei. According to a study by Dean et al. In the United States, in 1972, for a year, they managed to implement a computerized ration to minimize overfeeding. They noticed stabilization of the average milk production, and in the end, the financial result showed that for each animal in the group, the saved feed was worth $ 1.6 per day.

CONCLUSIONS

The feed, from an organoleptic and chemical point of view, was classified as good and very good quality. Milk chemical composition was similar to control after 10 weeks. Adapting the ration of cows to requirements reduced the quantity of feedstuffs and so the cost of animal feeding. Computer designed rations help to achieve significant feed savings.

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Table 1

Ration structure used in the experimental groups

Name of ingredient	*DM (g / kg)*	*Group 1*		*Group 2*		*Control group*	
		Total DM (kg)	Quant. (kg)	Total DM (kg)	Quant. (kg)	Total DM (kg)	Quant. (kg)
Natural hay, older	860	3.338	3.882	3.010	3.500	6.880	8.000
Alfalfa hay	860	4.674	5.434	5.354	6.225	8.600	10.000
Maize silage	250	3.000	12.000	2.643	10.574	3.000	12.000
Sun flower cake	899	0.483	0.538	0.774	0.861	0.450	0.500
Maize grains	870	1.740	2.000	3.480	4.000	3.045	3.500
Wheat grains	870	0.384	0.400	0.950	1.092	0.435	0.500
Oat grains	870	0.522	0.600	0.261	0.300	0.870	1.000
Sodium cloride	970	0.021	0.021	0.028	0.029	0.049	0.050

Table 2

Average milk production (l/animal/day) during experimental period with optimized and control rations

Date	*Week 1*	*Week*	*Week*	*Week*	*Week*	*Week*	*Week*	*Week*	*Week*
Group 1	12.25	11.22	10.57	10.72	10.92	11.22	11.55	11.62	11.67
Group 2	17.12	16.05	15.30	15.45	15.62	16.05	16.55	16.47	16.50
Control	14.00	15.30	14.80	16.00	16.20	15.60	14.20	14.70	15.40

Table 3

Milk analyses in first, fifth and tenth week of study

	Somatic cells x1000	Fat (%)	Protein (%)	Lactose (%)	Urea (mg/100g)	Casein (g/l)	Density (g/l)	pH
Milk analyze – week 1								
Group 1	120	4.26	3.81	4.82	31	29.3	1032	6.27
Group 2	168	4.22	3.83	4.89	38	28.5	1031	6.32
Control	118	4.24	3.76	4.77	35	29.1	1029	6.22
Milk analyze – week 5								
Group 1	120	3.98	3.71	4.83	34	28.3	1033	6.17
Group 2	168	4.11	3.53	4.81	32	28.9	1030	6.22
Control	118	4.27	3.96	4.71	33	29.5	1027	6.12
Milk analyze – week 10								
Group 1	120	4.19	3.73	4.79	33	29.3	1030	6.29
Group 2	168	4.17	3.63	4.72	37	28.5	1031	6.20
Control	118	4.2	3.46	4.82	34	29.1	1031	6.25