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Original Article

The Evaluation Status of Dairy Cows Nutrition Management in the Rural Areas of Chaharmahal and Bakhtiari

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ABSTRACT

Objective: This study carried out to monitor the status of nutritional management and measuring difference between present and desired feeding system in dairy cattle of rural conditions of Chaharmahal and Bakhtiari. **Methods:** 334 rural flocks consisting of 1442 dairy cows were selected from seven towns of this province. The experiment was lasted for in a year and using completely randomized design. Data of feed intake and production obtained directly and measured monthly. Feed intake sample was collected from all dairy farms and then the amount of nutrients was determined in laboratory. **Results:** Results showed that type of township had significant effect on net energy lactation (NEL), crude protein percentage (%CP), as well as calcium and phosphor percentage ($p<0.05$). Highest mean of crude protein percentage (%13.10±0.59) and NEL (1.33±0.03 Mcal/d) belonged to Shahrekord township. Results showed that calcium and phosphor levels received in all units under study were less than the amounts recommended in National Research Council (NRC 2001). So that, Ardal township with %0.66±0.04 and Shahrekord with %0.38±0.01 respectively had highest levels of these two elements as compared to other township. Statistically significant difference was observed between various townships regarding the amounts of Neutral Detergent Fiber (NDF) and Acid Detergent Fiber (ADF) ($p<0.05$). Numerically, highest and lowest % NDF belonged to Ardal township (%53.74±1.32) and Shahrekord township (%41.31±0.77), respectively. % ADF in Ardal, Borujen, Shalamzar, Shahrekord, Farsan, Kouhrang, and Lordegan were gained %37.24±0.97, %30.67±0.74, %31.60±1.06, %28.59±0.64, %29.66±0.85, %31.56±1.18, and %30.34±0.91, respectively. These indicate the imbalance of dairy cows rations in rural areas. **Conclusions:** Results obtained in this study indicate that the dairy cattle, based on the recommendations of the NRC, 2001 with a deficiency of protein, minerals and fiber are facing excess usage.

1.INTRODUCTION

Today, there is an increasing demand for animal proteins in human societies and all countries have always made attempts to evaluate and improve animal protein production systems. Among these protein resources is meat which plays a great part in satisfying this need (Heydari, 2009). Today, cow breeding is considered to be one of the main stock breeding industries in the world in terms of producing meat, milk, and other economic aspects. To exploit this industry best, new research is presented around the world everyday regarding different factors affecting production (Zamiri, 2006). In breeding dairy cow, %60 - %75 all costs are related to feeding, so

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that, to achieve maximum cattle efficiency, we need to accurately know its nutritional requirements and physiological status (Abbasi, 1998; Mosharraf, 2003). Regarding the role of nutrition in the amount of lactation, a dairy farms income is also directly related to nutrition level. In a program appropriate diet, feed quality (both physically and chemically) and the amount of it must be proportionate to cattle needs (Tolesma, 2006; Bauman and Eliot, 1983). In rural areas, dairy cows face malnutrition due to stockbreeders' lack of knowledge regarding nutritional techniques, lack of feed in village, high costs of feed and lack of access to cattle feed distribution centers (Nouri Naeini, 1994). In rural areas, dairy cows ration is more similar to maintenance ration and this poor nutrition has negative effect on dairy cows production and reproduction performance, so that, their milk production (Nouri Naeini, 1994). Protein is one of the main parts of ration; its shortage will bring about irreversible damages regarding reproductive attributes and consequently lactation. Hence, Molina and Venut (1976) modified nutrition management method and applied a concentrate containing %16 crude protein, able to enhance lactation in mixed Jersey and pure Jersey cows browsing on farms up to %30. Improving nutrition management status will have direct effects on dairy cows efficiency and production performance. This phenomenon has become significant in developed countries during recent decades. Results are proved, but in Iran, there is no adequate knowledge of nutrition management status in dairy farms and especially in traditional units. In our country, rural areas with traditional breeding styles still play a main role in producing milk and meat. Therefore, the nutritional status of a flock can play a critical role in its economic efficieny and income. Hence, accurate information this part of dairy farms is always required, that, it has always been overlooked even in statistics released by Agricultural Jahad and (or) Iran Statistics Center. Hence, in this study, Chaharmahal and Bakhtyari dairy farms were selected to evaluation the status of nutrition management.

2. MATERIALS AND METHODS

In this study, 1442 dairy cows from 7 townships (Shahrekord, Ardal, Kouhrang, Farsan, Borujen, Shalamzar, and Lordegan) were used; in completely randomized design. Experiment was carried out in a year and once in every month. Here, dairy farms were selected that only used feeds listed in Table 1. To keep accurate records and minimize error, a questionnaire was designed and distributed among stock breeders in these townships. To correct and unify information related to dairy cows, cattle were used with following specifications: multi parturition, peak lactation period, 4±1 years of age, body weight 400±50 Kg, body status score 2-2.5, and calving interval 15±1 months Feed was weighed by manual bascule during recording. Feed sample was collected from dairy farms with respect to consumption portion in form of a mixture of all consumed matters in nylon bags and submitted to laboratory. There, after being ground in grams by laboratory mill, they were used for determining the composition of each nutrient including moisture, crude protein, fat, and ash using AOAC (2006) method. In the end, results from questionnaires were collected and classified in Excel (2010) tables and then analyzed using SAS (2002), and the means were compared by Duncan test at $p<0.05$ level of significance.

Table 1:

Different feeds composition of collected from rural dairy farms

Feeds	DM	CP	NEL	NDF	ADF	Ca	P
Alfalfa	89.48±0.20	15.37±0.07	1.55±0.32	42.0±0.30	31.25±0.14	0.26±0.01	0.13±0.01
Corn Silage	28.90±0.75	8.24±0.15	1.36±0.02	52.0±0.28	33.26±0.35	0.29±0.02	0.27±0.02
Wheat Straw	91.30±0.29	3.38±0.05	0.83±0.01	74.66±0.43	48.64±0.34	0.31±0.01	0.17±0.01
Wheat Bran	88.65±0.26	16.48±0.12	1.64±0.02	41.29±0.20	16.03±0.13	0.21±0.03	1.15±0.01
Rice Bran	86.50±0.64	14.42±0.14	1.56±0.01	41.37±0.45	16.95±0.25	0.27±0.02	0.36±0.01
Barley	90.0±0.53	12.18±0.08	1.80±0.03	21.20±0.47	8.15±0.29	0.06±0.01	0.35±0.02
Clover	86.25±0.47	13.80±0.14	0.90±0.23	50.97±0.30	30.67±0.18	0.36±0.02	0.26±0.01

3. RESULTS AND DISCUSSION

3.1. Net Energy Lactation (NEL) and Crude Protein percent (%CP)

Based on Table 2, the effect of township on net energy lactation and crude protein percentage was significant ($p<0.05$). Highest and lowest net energy lactation mean was observed as 1.33±0.03 Mcal/d and 1.11±0.02 Mcal/d in Shahre-Kord and Ardal township, respectively. Low mean net energy lactation in Ardal town can be due to low level of stock breeders' knowledge toward ration used. Among other reasons for net energy lactation in this township can be high fiber content. It is reported that there is reverse relationship between lactation and ration fiber concentration, so that, if the concentration of Neutral Detergent Fiber is over what is needed, it will lead to the slow passage of feed through digestive tract and consequently dry matter consumption is reduced and leads to the reduction of lactation, this is mostly seen in rations with high contents of low quality fiber feed (Martinez, 1997). This also agreement with the results of this study. Based on Table 2, highest and lowest protein percentages of belonged to Shahre-Kord (%13.10±0.59) and Ardal (%9.79±0.47) township, respectively ($p<0.05$). Low crude protein percentage in Ardal township can be due to the fact that stock breeders are reluctant to spend high costs by using concentrated matters and high energy and protein levels when preparing ration. On the other hands, providing crude protein required for ration and its components as recommended is necessary for increasing the growth and development of rumen, fetus and mammary gland, intestine and liver as well as protein storage transferrable in body to support lactation in early lactation (NRC, 1989; Olsen *et al*, 1998). To enhance energy and protein density, it is required that stock breeder use suitable sources for providing protein specially a variety of press meal as well as reducing the percentage of roughage and increasing the percentage of dense matters in ration (Fringenz *et al*, 1998).

3.2. Minerals percent (Ca and P)

Results of calcium and phosphor consumption in different townships are shown in Table 2. Results experimental showed statistical difference between township regarding different in the percentage of calcium and phosphor in rations ($p<0.05$). As seen, the amount of calcium and phosphor consumed regarding breeding standards (respectively, %3.49 and %1.82) is always lower than the amount recommended by NRC 2001 and Imbalance is observed in regulating rations used. This shortage is mainly resulted from using feed deprived of minerals such as hay, barley, and corn. This is also resulted from ignoring their minerals content when balancing ration and theoretical recommendations to use minerals - especially, calcium carbonate – in dairy cows ration in rural stock breeding. Hoffman *et al* (2008) concluded that %2 ration phosphor do not suffice the growth of dairy heifers from 3 to 18 months. Dairy heifers weights increase between 90 and 125Kg when phosphor content of ration is 0.24 based on dry matter. Increasing the phosphor content of ration from %0.24 to %0.31 dry matter enhanced average daily gain, strength against rib and tibia breakage, as well as mineral phosphor concentration in dairy heifers blood plasma (Tah *et al*, 1982). Assessing the nutritional status of cattle and dairy buffalo in Indian rural regions showed, reason lack of fertility and poor reproduction performance were are mineral deficiency and with increasing the mineral up to 40% of the need of the with cattle unestrous showed estrus symptoms(Signal, 1998).

Table 2:

Effects of Treatment(towns) on Net Energy Lactation(NEL), % Crude Protein (%CP), % Calcium(% Ca) and % Phosphor (% P) in Dairy Cows Ration

Treatment	NEL(Mca/d)	% CP	% Ca	% P
Ardal	1.11 ± 0.02^{b}	9.79 ± 0.47^{b}	0.66±0.04^{a}	0.26±0.02^{b}
Borujen	1.27 ± 0.01^{a}	11.48 ± 0.33^{ab}	0.58±0.02^{ab}	0.34±0.01^{a}
Shalamzar	1.25 ± 0.02^{a}	10.72 ± 0.50^{b}	0.54±0.03^{b}	0.33±0.01^{a}
Shahrekord	1.33 ± 0.03^{a}	13.10±0.59^{a}	0.61±0.01^{ab}	0.38±0.01^{a}
Farsan	1.28 ± 0.02^{a}	11.89±0.38^{ab}	0.57±0.02^{ab}	0.36±0.01^{a}
Kouhrang	1.26 ± 0.02^{a}	10.80±0.43^{b}	0.51±0.03^{b}	0.33±0.01^{a}
Lordegan	1.27 ± 0.02^{a}	11.75±0.37^{ab}	0.57±0.03^{ab}	0.38±0.01^{a}

3.3. Fiber percent (ADF and NDF)

Evaluation the status of the necessary amounts of ADF consumed for cows under study showed the excess consumption of these nutrients among them ($p<0.05$). As seen in Table 3, Ardal township (% 37.24 ±0.97) and Shahre-Kord township (%28.59±0.64) had highest and lowest %ADF among different township, respectively. The difference can mainly be due to from further hay consumption and concentrate in daily ration and bulky rations as compared to dense rations full rumen and they are considered to be a constraint on consuming feed. Hence, excessive consumption of such rations leads to the reduction of feed consumption (Tatcher, 1986). Results from some reports show that there is negative relationship between ration energy and crude protein percentage. Generally, the higher the fiber content of food is, the less its energy will be (Ghorbani, 2005). Highest and lowest Neutral Detergent Fiber (NDF) were %53.74±1.32 and %41.31±0.77 in Ardal township and Shahre-Kord township, respectively ($p<0.05$). It can be due to the use of high roughage content such as low quality straw and hay and bran leads to NDF density increase in dairy cowships ration. This correlates with results reported by Movafegh Ghadiri (2011). In a study of dairy cows nutrition status in the rural areas of two township of Isfahan – Barkhar and Maymeh - Arab et al (2008) concluded that the status of necessary amounts of NDF and ADF consumed were significantly higher as compared to the amounts recommended by NRC 2001, that it agreement with the results of the present study. Martinez (1994) suggested that NDF shall be used for defining highest and lowest levels of dry matter consumed. In high concentrations of NDF – full rumen, dry matter intake is reduced. So that, in low concentrations of NDF, control feedback limits the energy level consumed and dry matter consumed**.**

Table 3:

Effects of Treatment(townships) on Acid Detergent Fiber (ADF) and Neutral Detergent Fiber (NDF) in Dairy Cows Ration

Treatment	% ADF	% NDF
Ardal	37.24±0.97^{a}	53.74 ± 1.32^{a}
Borujen	30.67 ± 0.74^{b}	47.0 ± 0.97^{bc}
Shalamzar	31.60 ± 1.06^{b}	48.71 ± 1.43^{b}
Shahrekord	28.59 ± 0.64^{b}	41.31±0.77^{c}
Farsan	29.66 ± 0.85^{b}	46.25±1.04^{bc}
Kouhrang	31.56 ± 1.18^{b}	48.37±1.58^{bc}
Lordegan	30.34 ± 0.91^{b}	47.11±1.28^{bc}

Different letters in the same column indicate significant differences ($P<0.05$).

CONCLUSION

In general, results indicate that feeding dairy cows with rations containing protein meal as well as mineral and vitamin supplements can compensate for the lack of nutrients including dry matter intake, crude protein percentage, minerals, vitamins, and non-fiber carbohydrates, reduce the amount of ADF and NDF approach reproductive attributes toward standard number, and increase milk production. In addition, if lactation improvement, milk protein percentage, and lactation period long increase be among primary objectives, dairy cattle feeding with balanced rations based on NRC2001 recommendations will be necessary.

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