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308 Lasani Town, Sargodha Road, Faisalabad - Pakistan
Mob: +92 300 3008585, Fax: +92 41 8815544
E-mail: editorpjn@gmail.com

Evaluation of Production and Economic Feasibility of Using the Recommended Nutrient Requirement for Lactating Cows

Ahmed Nabaweia, T¹., K.E. Elabid², A.M. Fadel Elseed³ and A. Elhag⁴

¹Ministry of Animal Resources and Fisheries, Khartoum, Sudan

²Department of Dairy Production, Faculty of Animal Production, University of Khartoum, Khartoum, Sudan

³Department of Animal Nutrition, Faculty of Animal Production, University of Khartoum, Khartoum, Sudan

⁴Department of Economics, Faculty of Agriculture, University of Khartoum, Khartoum, Sudan

Abstract: An experiment was carried out to evaluate production and economic feasibility of using the recommended nutrient requirements for lactating cows in small scale dairy farms in Khartoum state. The study consisted of two parts; a survey of 90 dairy farms in Khartoum State and an experiment carried out on 16 lactating dairy cows in the Judiciary farm. These cows were divided into two groups: A and B (8 cows in each group). Group A was distributed in eight pens and given balanced ration, whereas group B was fed as practiced in the farm. The experiment lasted for seven months extending from January to July 2007. The survey results revealed that the balanced ration costs were only 23, 38 and 55% of unbalanced ration at 10, 15 and 20 lbs level of milk production respectively. The results of the experiment revealed that the use of balanced ration increased the cow milk production by 27% compared with the unbalanced ration. The four months milk yield of cows fed balanced and unbalanced ration were significantly different ($P < 0.05$). The mean cost of four months milk production for cows fed balanced ration was significantly ($P < 0.05$) lower than these fed unbalanced ration, being 435 and 578 SDG, respectively. The mean cost of production per pound of milk for cows fed balanced ration was significantly ($P < 0.05$) lower than the cows fed unbalanced ration; it was 0.107 and 0.206 SDG, respectively. The balanced ration has a greater trend coefficient of 32.36 compared with 18.56 for the unbalanced ration. In conclusion, the balanced ration increased the level of cow milk production and decreased the cost milk production compared to unbalanced ration.

Key words: Balanced ration, lactating cow, economic feasibility

INTRODUCTION

The dairy cow has special requirements which her diet has to provide. Dairy cows require feed nutrients for maintenance, growth, lactation and reproduction (Orskov, 1998). The dairy cow feeding program affects productivity and profitability more than any other single factor. The effects of good breeding and management program can not be fully realized without good feeding program. Good management of cows with good genetic potential will result in the most efficient response to good nutrition (Krober *et al.*, 1999; Niels *et al.*, 2003). Some of the livestock breeders are proved to be accustomed to feed their herds with unbalanced rations which are negatively affected the well being of animals (Shing Field *et al.*, 1999) and increased the price of animal products and so adversely affect the revenues and profit gained by the animal owners (Ferguson and Chalupa, 1989; Fadel Elseed *et al.*, 2008). Hence the present work was conducted to study the effects of feeding balanced to dairy on milk production and its economic feasibility.

MATERIALS AND METHODS

Data collection: Data collection was made through the following methods:

- Field investigations (site visit) via structured questionnaire
- Experiment

Field investigation: The study covered 90 milk farms which all located within Khartoum state. The process of data collection continued for three months. Data were collected from Khartoum (namely Jabra, Salama, Jereif west and soba hilla) and from Khartoum North locality (namely shambat, Hillat koko and halfaya) and from Omdurman locality (Fettemat village and Jebel Toriyya).

Experiment: The experiment was carried out in Judiciary farm, in which the herd is housed in barns constructed by Iron bars and Zinc roofs, with soil floor, the water basins were made of Cement and Iron containers, and water is available *ad libitum*. There were barns for calves, elders, dry cows, lactating cows, isolating barns for isolation of sick animals and newly purchased

animals. Both natural and artificial insemination were practiced; the cows almost mated two months after calving, while heifers were mated when they reach puberty. Also there was vaccination against brucellosis and other infectious diseases and medication against external and internal parasites, with routine cleaning and spraying of all premises of the farm by antiseptics. The experiment lasted for four months extending from April to July 2007.

The experiment consisted of one feeding trial in 16 mature cross bred cows with similar average weight, age and production level, which divided to two equal (eight cows for each ration) groups A and B. Group A was given the balanced ration of concentrate according to their nutrient requirements (NRC, 2001), twice daily after milking in morning and evening while group B was given a fixed amount of concentrate irrespective to their nutrient requirement (8 kg per day) twice daily. Ration A composed of 50.9% sorghum grains, 12.6% groundnut cake, 31.8% wheat bran, 1.8% sodium chloride and 2.9% oyster shell, while ration B composed of 24.9% sorghum grain, 28.6% groundnut cake, 23.8% wheat bran, 1.8% sodium chloride and 2.9% oyster shell. Chemical composition of both rations (Table 1) was analyzed according to AOAC (1990). Experimental ration was formulated, based on the locally available concentrate feeding stuffs to contain varying levels of energy and crude protein. In addition roughages (Abu 70, berseem and Bagasse) were also given to these animals. The effect of the feeding of the two rations on Milk yield of cows and economics feasibility of feeding was observed.

Table 1: Chemical composition of ration A and B

Chemical component	Ration (A) %	Ration (B) %
DM	94.91	94.91
Fat	5.09	5.09
CP	18	24.89
CF	20.65	20.65
Ash	12.95	12.95
NFE	36.43	36.43
ME	11.35	10.7

Statistical analysis: The collected data was subjected to statistical T test and standard statistical economic analysis. All analysis was done by the computer program (SPSS, 1998).

RESULTS AND DISCUSSION

Field survey: Table 2 and Fig. 1 shows the percentage of the cost of balanced rations to the cost of unbalanced ones at different levels of milk production. The balanced ration costs are only 23, 38 and 55% of unbalanced ration at 10, 15 and 20 lbs of milk level of productivity respectively. On average, the costs of balanced rations are only 38% at the different levels of milk production.

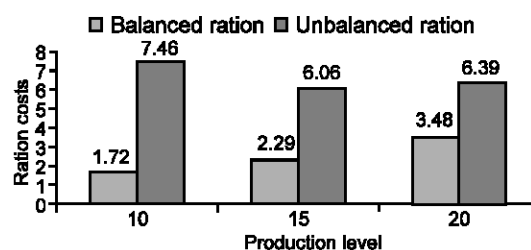


Fig. 1: Ration costs at different level of milk production (Cow/day in SDG)

Table 2: Costs of the balanced and unbalanced rations (Cow/day in SDG) in Khartoum State

Productivity level Lbs of milk	Costs of balanced ration (1)	Costs of unbalanced ration (2)	(1) as % of (2)
10	1.716	7.46	23
15	2.288	6.06	38
20	3.484	6.39	55

Source: Field Survey 2007

Table 3: Comparison between four month milk yield of the two experimental groups

Groups	Mean milk yield/Lb	SD
A	3987.41 ^a	±348.15
B	3145.12 ^b	±536.82

These results agreed favorably with Muller and Fales (1998) and Fadel Elseed *et al.* (2008) who reported that some of the livestock breeders accustomed to feed their herds with unbalanced ration which are known to increase the cost of production due to inefficient use of diet content.

On farm trial: The data in Table 3 illustrated that balanced ration significantly ($P > 0.05$) increased the level of cow milk production by 27% compared to that of unbalanced ration. The recorded values for cows fed balanced and unbalanced ration for four month milk yield were 3987.41 ± 348.15 lb and 3145.12 ± 536.82 lb, respectively. Similar results were recorded by Ferguson and Chalupa (1989), Krober *et al.* (1999) and Niels *et al.* (2003), who reported that feeding excess protein to requirement reduce energy availability and affect cow productivity and this may be attributed to that excess N will be emitted in the environment.

The data in Table 4 dedicated that the mean cost of four months milk production for cows fed balanced ration was significantly ($P > 0.05$) lower than that of cows fed unbalanced ration. The recorded values for the cost of milk production for cows fed balanced ration were 435.00 ± 83.41 and 578.43 ± 37.49 SDG, these results agreed favorably with Muller and Fales (1998) who reported that total mix ration system is more profitable over most changes in feed cost or milk revenues. The data in Table 5 illustrated that the mean cost of production per pound of milk for cows fed balanced

Table 4: Comparison between the cost/of four months milk production of the two experimental groups

Groups	Mean cost/SP	SD
A	435.00 ^a	±83.41
B	578.435 ^b	±37.49

Table 5: Comparison between the cost/Lb for the two experimental groups

Groups	Mean cost/SP	SD
A	0.107 ^a	±0.0
B	0.206 ^b	±0.08

*Mean in the same column carrying similar superscripts are not significantly different at (P<0.05) level

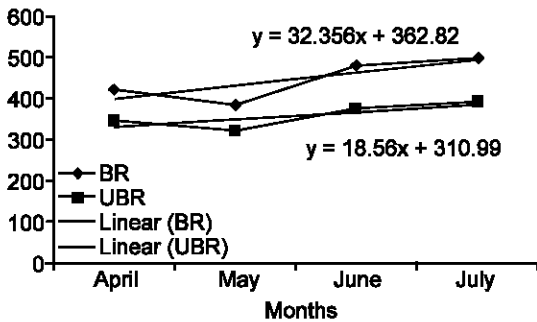


Fig. 2: Milk production trend for balanced and unbalanced rations

ration was significantly (P>0.05) lower than that of cows fed unbalanced ration it almost half of it, the recorded values for the cost per pound of milk for cows fed balanced and unbalanced rations were 0.107±0.00 and 0.206±0.08 SD.

Figure 2 show that both rations showed a ppositive trend of milk production. How ever the balanced ration has a greater trend coefficient of (32.36) compared to (18.56) for the unbalanced ration this result illustrated that balanced ration significantly increase the milk production with advancement of the time and this will ultimately lead to lower price for consumer and higher benefit for producer.

Conclusion and recommendations: The balanced ration increased the level of cow milk production and

decreased the cost milk production when compared with unbalanced ration. So it is highly recommended to use balanced ration in feeding of dairy cows.

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