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Study on the Effect of Bypass Fat Supplementation on, Milk Production, Milk Fat Weight Gain in Nili Ravi Buffalo in Geo-Climatic Conditions of District D.I. Khan, Khyber Pakhtunkhwa, Pakistan

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ABSTRACT

The research project was conducted at the Livestock Research and Development Station (LR and DS) Paharpur, Dera Ismail Khan to determine the impact of supplementation of bypass fat on Milk Production, Milk Composition, Effect on body weight and Economic aspect of the trial on Nili-Ravi buffaloes. For the said trial, 12 number of Nili Ravi buffaloes of same parity, milk production and body weight were selected and randomly divided into 4 group, T0 (control), T1 (250 g), T2 (350 g) and T3 (450 g) in such a way that each treatment was comprised of 3 animals. The daily milk production of the trial animals were recorded for 12 weeks. The Milk composition was determined on fortnight basis whereas weight gain was records on the first day of trial and last day of trial. Prior to initiation of trial, precautionary measures (Vaccination and Deworming) was carried out and period of acclimatization was provided to animals to get acclimatized to the circumstances and feeding protocol. The statistical analysis showed significant ($p<0.05$) differences in milk yield among the trial groups. The highest production (7.9 Kg) was found in T2 and the lowest (4.5 Kg) in control group, whilst T1 and T3 were non-significant ($p<0.05$). Fat percentage differed significantly ($p<0.05$) in all treatments. The highest (6.6%) was noted in T3 and animals in T0 yielded minimum fat% (6%). Fat percentage between T1 and T2 differed non-significantly ($p<0.05$). The Body weight gain was significantly different between group T0 and T3 ($p<0.05$) whereas for Group T1 and T2, the difference was non-significant ($p>0.05$). In case of milk cost (/Kg) differed non-significantly. It was concluded that supplementation of Bypass fats increased milk yield and fat percentage in all treatments but Treatment T2 was found more productive and economically feasible.

Key Words: Bypass fat; Nili-Ravi; Milk production; Milk composition; Body weight; Economics

INTRODUCTION

Pakistan's milk supply depends majorly on buffaloes (up to 60.23%) which contain bulk of nutrients in terms of more milk protein, fats and lactose contents compared to cow's milk [1]. Interestingly, in Pakistan the traditional dairy farmers use vegetable oil as component of buffalo feeding to improve health status, milk yield and fat contents. The price structure of milk market rely on total solids components where milk fats play a pivotal role in this regard. Mostly farmers have to face two scarcity seasons of fodder in severe winter and summer. The steep decrease in area for fodder production is also aggravating the situation. The ration available to the dairy animals is deficient both in energy and protein which significantly affect the health and production performance of dairy animals. The high yielding animals remain in negative energy balance in their early lactation and cannot produce up to their optimum potential in addition to nourishment of their health [2]. The productive

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performance can be improved by providing high energy diet. Use of fats in different form is already a routine practice in high yielding buffaloes [3]. Studies in dairy animals showed an increase in milk fat after utilization of fats as an energy source [4-7]. The positive relationship between supplementation of fats with milk fats is related with a higher demand of energy in different phases especially in early lactation when animal in under production stress. Mostly the farmer community use oils for the supplementation as source of energy and fats, but the use of oils (or rumen available fats) could be hazardous to the rumen environment as it may affect the rumen fermentation process as the unsaturated fatty acids bind more to the bacteria especially fibrolytic micro flora [8]. On the other hand, modern dairies are using by-pass fats. These by-pass fats enhance the energy level by supplementing in the ration of dairy animals [3]. Lounglawan et al. reported that bypass fat feeding can improve the milk production during the first quarter of the milking period, when feed intake is the lowest [9]. Purushothaman et al. observed that in high yielding dairy animals the supplementation of bypass fat was so much effective for increasing energy density of the feedstuff [10]. No negative effect of bypass fat on rumen fermentation, dry matter intake and digestibility was observed. The body condition up gradation, enhanced yield and improvement in reproductive efficiency results of bypass fat supplementation. Bypass fat feeding to dairy animals gave an extra profit both in term of production and reproductive health of dairy animals. Thakur et al. accentuated that to decrease the negative energy balance and calving interval; feeding of high energy diet and proper feeding management in early lactation and in transition period remained helpful [11]. High quality feed also helped in maintenance of rumen health, improved synthesis of microbial protein and it also provided the rich energy source for dairy cows. Buffalo is the major contributor in national milk production with the contribution of more than 60% to the total milk supply in Pakistan [12]. Buffaloes take less time to adjust to changes in the diet composition as compare to cow. So this research is planned to evaluate the effect of bypass fat supplementation on milk yield, composition of milk and any change in body weight in Nili-Ravi buffaloes.

MATERIAL AND METHODS

Experimental Animals

The trial was conducted at the Livestock Research and Development Station, Paharpur which is located in the temperate region having hot climate. Twelve lactating Nili-Ravi buffaloes having almost same lactation and milk production level were divided randomly into four equal groups (T0, T1, T2 and T3) in such a way that each group had same number of animals and similar overall milk production. The precautionary measures were taken in term of vaccination and deworming. The experimental animals were managed in individual stalls under similar climatic conditions of the same shed. This trail was conducted for three months period.

Feeding Management and Treatments

Green fodder base rations as per schedule of the farm was offered twice a day feeding frequency about two hour before every milking. Fresh drinking water was made available round the clock to the animals under trial. Concentrate in the form of Shandar Wanda was offered @ 3 kg/day/animal twice a day. Commercially available product in the market namely was used as bypass fat and was offered by mixing in the concentrate feed as per treatment designed for different groups for dairy animals. The bypass fat was supplemented in group T1 @250 gm/day/animal; group T2 @350 gm/day/animal and in group T3 @450 gm/day/animal. Animals of group T0 was kept as control without bypass fat.

Data Collection and Sampling

The experimental animals were weighed before the trial and on last day of trial for the determination of performance of body condition of animals on bypass fat supplementation. The data for daily milk production was collected in twice milking per day both in the morning (5:00 am) and evening (5:00 pm) milking. Composite milk samples (250 ml) each of the trial group was collected for analysis at the Dairy Technology Section of Livestock Research and Development Station, Paharpur.

Milk Fat

Milk fat was determined by using Lactoscane.

RESULTS

The mean of all the data collected on daily, fortnight and 3 months basis is as following (**Tables 1 and 2**).

Table 1: Effect of feeding bypass fat on milk production, Fat (%), Average weight gain (grams/day) and Supplementation cost/ animal/day (RS).

Parameters	Group T0	Group T1	Group T2	Group T3
Average Milk Production (Kg/day)	4.5 kg	6.9 kg	7.9 kg	7.2 kg
Milk Fat (%)	6	6.26	6.45	6.6
Average Weight Gain	60 gm/day	80 gm/day	86 gm/day	108 gm/day
Supplementation Cost/animal/day (Rs)	0	50	70	90

T0 Control group, T1 @ 250 gm/day/animal, group T2 @ 350 gm/day/animal and in group T3 @ 450 gm/day/animal

Table 2: Effect of feeding bypass fat on Cost, Milk yield, Milk value and Profit Ratio.

Parameters	Group T0	Group T1	Group T2	Group T3
Supplementation cost Rs/day/Animal	0	50	70	90
Milk yield (kg/day)	4.5	6.9	7.9	7.2
Milk Value (Rs/day)	450/-	690/-	790/-	720/-
Profit (Increase in milk production)	0	240/-	340/-	270/-

T0 Control group, T1 @ 250 gm/day/animal, group T2 @ 350 gm/day/animal and in group T3 @ 450 gm/day/animal

DISCUSSION

Milk Production

Average increase in milk production (in Kg) per animal per day with the supplementation of bypass fat was improved in T1 (6.9 kg) and T2 (7.9 kg) as compared to T0 (4.5 kg) and T3 (7.2 kg). By the supplementation of different levels of bypass fat it was concluded that group T1 and T2 showed significant ($P<0.05$) results with other treatments but differed non-significantly with each other. In group T3 (450 g bypass fat) milk production was decreased ($P<0.05$) significantly as compared to the T1 and T2. The result of this study are in close appropriation with the study conducted by Mobeen A et al. and Garg et al., work supported our results [9,13]. Vahora et al. and Nawaz et al. concluded that there was significantly ($P<0.01$) increase in milk production and FCM (fat corrected milk) yield in group having bypass fat as compared to control group [7,8]. Nasim et al. studied the effect of vegetable oil and rumen bypass fats with or without supplementing niacin in rations for buffaloes and revealed that oil and addition of by-pass fat increased milk fat and lactose concentration with or without using niacin compared to control [6]. It was concluded that bypass fat or oil supplementation increased milk fat contents.

Milk Composition and Change in Body Weight

By the supplementation of bypass fat, there was a significant improvement in fat percentage in all the groups having different levels of bypass fat as compared to control group. The group T1 (6.26%) had significantly ($P<0.01$) higher fat % than control (6%). The group T2 (6.45) also had higher ($P<0.01$) fat % than T1 and T0. The group T3 (6.6%) had highest fat % than T1, T2 and T0. The supplemental effect of rumen inert fat (fat bypass) on fat yield was reported due to the profile and level of CaLCFA. This increase in fat % was also observed by Mobeen et al. who concluded that milk fat yield and fat % improved due to the supplementation of bypass fat as compared to control [13]. These results are in agreement with Lounglawan et al. who described that there was non-significant effect of supplementation of bypass fat on protein content of milk in dairy animals [9]. Similar results were also described by Purushothaman et al. There was significant difference observed for any change in body weight in all the groups ($p>0.05$) [10].

CONCLUSION

The results of all the treatments having bypass fat showed significant increase in milk production and fat percentage while there was little change on body weight of lactating Nili-Ravi buffaloes.

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None

CONFLICT OF INTEREST

The authors declare that they have no conflict of interests.

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