Global Advanced Research Journal of Agricultural Science (ISSN: 2315-5094) Vol. 5(12) pp. 428-431, December, 2016 Issue.
Available online http://garj.org/garjas/home

Full Length Research Paper

Productive Performance of Nili-Ravi Buffaloes by the Supplementation of Bypass Fat

Adnan Mobeen[-1], M. Riaz[-2], S.H.Raza[-2], M. Sharif[-2] and Aamir Usman[-1]

[-1]Institute of Dairy Sciences, University of Agriculture Faisalabad, Pakistan
[-2]Institute of Animal Sciences, University of Agriculture Faisalabad, Pakistan

Novelty statement

The present research project bears the novelty of use of non-conventional energy source in form of bypass fat supplementation to enhance milk production in indigenous buffaloes.

Accepted 25 November, 2016

The research project was conducted at the Livestock Experiment Station (LES), University of Agriculture Faisalabad to evaluate the effect of bypass fat supplementation on milk yield, milk composition and change in body weight in Nili-Ravi buffaloes. 12 animals of same parity, milk production and body weight were selected and randomly allotted to 4 treatments (bypass fat supplementation) viz., T^0 (control), T^1 (250g) , T^2 (350 g) and T^3 (450 g) in such a way that each treatment was comprised of 03 animals. The daily milk yield for seven weeks animal^{-1} was recorded. Milk composition and weight gain records were maintained on weekly basis. The statistical analysis showed significant ($p<0.05$) differences in milk yield. The highest production (9.44±0.62 Kg) was found in T^2 and the lowest (6.88±0.62 Kg) in control group. Whilst T^1 and T^2 were non-significant ($p<0.05$). Fat % differed significantly ($p<0.05$) in all treatments. The highest (6.9±0.09) was in T^3 and animals in T^0 yielded minimum fat% (6.19±0.09). T^1 and T^2 differed non-significantly ($p<0.05$). The protein, TS and SNF % did not differ in any treatment. Body weight gain and milk cost (/Kg) did not differ significantly. The supplementation increased milk yield and fat % in all treatments.

Keywords: Bypass fat, Milk production, Milk composition, Body weight, Nili-Ravi buffalo

INTRODUCTION

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. The productive performance can be improved by providing high energy diet. One option to enhance the energy level by the supplementation of bypass fat in the ration of dairy animals (Sirohi *et al*., 2010). Garg and Mehta (1998) reported that bypass fat feeding can improve the milk production during

*Corresponding Author's Email: adnanmobeen628@yahoo.com

the first quarter of the milking period, when feed intake is the lowest. Naik (2013) observed that in high yielding dairy animals the supplementation of bypass fat was so much effective for increasing energy density of the feedstuff. 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 result 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.

Overton (1999) 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. 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 (Economic Survey, 2015). Buffaloes take less time to adjust to changes in the diet composition as compare to cow.So this research was 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 Experiment Station, University of Agriculture Faisalabad. Twelve lactating Nili-Ravi buffaloes having almost same lactation and milk production level were divided randomly into four equal groups (T^0, T^1, T^2 and T^3) 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.

Feeding management and treatments: Green fodder base rations as per schedule of the farm was offered *ad libitum* in twice a day feeding frequency or two hour before every milking. Fresh drinking water was offered *ad libitum* thrice a day. Concentrate was offered @ 3kg day^{-1}animal^{-1} twice a day. An energy supplement with calcium salt of long chain fatty acids was used as bypass fat and offered by mixing in the supplements as per treatment designed for different groups for dairy animals. The bypass fat was supplemented in group T^1 @ 250 g day^{-1}animal^{-1}, group T^2 @ 350 g day^{-1}animal^{-1} and in group T^3 @ 450 g day^{-1}animal^{-1}. Animals of group T^0 was taken as control (without bypass fat) as per described in Table 1.

Data collection and sampling: The experimental animals were weighed before the trial and thereafter weekly basis for the 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 (4.30 am) and evening (4.30pm) milking. Composite milk samples (250ml) each of the animal were collected for analysis in the dairy laboratory, Institute of Dairy Sciences.

Milk composition and approximate analysis: Approximate analysis of the supplements was determined by (AOAC. 2005). Milk fat and protein were determined by Gerber method (Aggarwala and Sharma, 1961*)* and Kjeldahl method (Davide, 1977*),* respectively. Total solids (TS) and solid not fat (SNF) were calculated according to Fleischmann’s formula.

Statistical analysis: Data generated for milk production and milk composition for protein, fat, solid not fat (SNF) & total solid (TS) and body weight for seven weeks was analyzed statistically under completely Randomized Design using computer software MINITAB (2000, version 17.0) and the significance of means was compared using the Tuckey’s test to draw the valid conclusion at certain significance level.

RESULTS

Milk Production, milk composition and change in body weight: The analysis of data showed a significant ($P<0.05$) improvements in milk production (Table 2). The highest (9.44±0.62 Kg) milk production was observed in T^2 and the lowest in T^0 (6.88±0.62 Kg) treatment. Whilst milk production was found (9.33±0.62 Kg) and (7.86±0.62 Kg) in T^1 and T^3 respectively. The butter fat % also differed significantly ($p<0.05$). T^3 showed the highest fat % whilst control group showed the lowest fat % (Table 2). The sold not fat (SNF), total solids (TS) and protein did not differ significantly ($p<0.05$). Their average values are given in table 2.

Milk cost: The cost per kg milk produced in differed groups varied significantly (Table 3). The highest cost (Rs. 45.20±2.80) was revealed in group T^3 whilst the lowest was found in animals on T^2 where 350g supplement was offered. The highest feeding cost was observed in group 4 (Rs.356.00) and lowest in control group (Rs.280.00). The milk cost between T^2 and T^1 did not differed significantly.

Body weight gain: The data on body gain revealed that on an average body weight ranged from 65.68±6.02 to 73.22±6.02 (Kg) during the experimental period (Table 3) and did not differ significantly in any treatment ($p<0.05$).

DISCUSSION

Milk production: Average increase in milk production (in Kg) animal^{-1}day^{-1} with the supplementation of bypass fat was improved ($P<0.05$) significantly in T^1 (9.33±0.62) and

Table 1: Proximate analysis of the supplements offered to animals in various groups

Nutrients	T^0	T^1	T^2	T^3
Dry matter (%)	85.56	87.96	90.06	92.06
Crude protein (%)	18.5	17.23	15.31	15.17
Crude fiber (%)	5.2	4.7	4.4	4.1
Ether extract (%)	3.4	4.3	5.1	5.7
Ash (%)	5.17	6.12	7.43	8.25

Table 2: Effect of by-pass fat on milk yield and composition on Nili-Ravi buffaloes

Parameter	Group 1	Group 2	Group 3	Group 4
Average Milk yield ($kgday^{-1}$)	6.88±0.62^b	9.33±0.62^a	9.44±0.62^a	7.86±0.62^b
Average Fat (%)	6.19±0.09^b	6.46±0.09^{ab}	6.65±0.09^a	6.90±0.09^a
Average Protein (%)	5.21±0.30	5.24±0.30	5.72±0.30	5.40±0.30
Average SNF (%)	10.20±0.55	10.17±0.55	9.71±0.55	10.43±0.55
Average Total solids (%)	16.40±0.58	16.63±0.58	16.37±0.58	17.33±0.58
Average Weight gain(kg)	65.68±6.02	66.52±6.02	68.12±6.02	73.22±6.02

Mean ± standard deviation. Values in same rows, sharing same letters differ non-significantly (P>0.05)

Table 3: Effect of by-pass fat on milk cost at different levels of supplementation and weight gain

Parameter	Group 1	Group 2	Group 3	Group 4
Feed cost Rs./day	285.00	335.00	340.00	375.00
Milk yield (kg day^{-1})	6.688±0.62^b	9.33±0.062^a	9.44±0.62^a	7.86±0.62^b
Milk Value (Rs./d)	550±42.8^b	716±42.8^{ab}	836.±0.53^a	610±0.53^b
Milk cost (Rs./Kg)	41.15±2.80	34.91±2.80^{ab}	34.91±2.80	45.20±2.80
Average Wt. gain (Kg)	65.68±6.02	66.52±6.02	68.12±6.02	73.22±6.02

Mean ± standard deviation. Values in same rows, sharing same letters differ non-significantly (P>0.05)

T^2 (9.44±0.62) as compared to T^0 (6.88±0.62) and T^3 (7.86±0.62). By the supplementation of different levels of bypass fat it was concluded that group T^1 and T^2 showed significant (P<0.05) results with other treatments but differed non-significantly with each other. In group T^3 (450 g bypass fat) milk production was decreased (P<0.05) significantly as compared to the T^1 and T^2. Hammon *et al*. (2008) and Garg *et al*. (2012) work supported our results. Vahora *et al*. (2013) and Nawaz *et al.* (2007) 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. Nasim *et al.* (2014) studied the effect of vegetable oil and rumen by-pass 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. It was concluded that by-pass 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 T^1 (6.46±0.09) had significantly (P<0.01) higher fat % than control (6.19±0.09). There was 4.17% increase in fat in T^1 than T^0. The group T^2 (6.65±0.09) also had higher (P<0.01) fat % than T^1 and T^0. There was 6.91% increase in fat% in T^2 than control (T^0) while there was 2.85% increase in fat% compared to T^1. The group T^3 (6.90±0.09) had highest fat % than T^1, T^2 and T^0. About 10.28% increase was observed in fat % in group T^3 as compared to T^0. The supplemental effect of rumen inert fat (fat bypass) on fat yield was reported due to the profile and level of CaLCFA (Chouinard et al., 1998). This increase in fat % was also observed by Vahora *et al.* (2013) who concluded that milk fat yield and fat % improved due to the supplementation of bypass fat as compared to control. The protein contents had shown non-significant (P>0.05) results in all of the experimental groups. These results are in agreement with Lounglawan *et al*. (2007) who described that there was non-significant effect of supplementation of bypass fat on protein content of milk in dairy animals. Similar results were also described by Purushothaman *et al*. (2008) and Thakur and Shelke (2010). Total solids and solid not fat (SNF) increased with bypass fat supplementation but statistically it showed non-significant (P>0.05) results. It had already been reported by Naik *et al*., (2009) that there was no change observed in SNF content of milk. It might be improved by the supplementation of bypass fat (Wadhwa *et al*., 2012). There was no significant difference observed (Table 3) for any change in body weight in all the groups (p<0.05).

CONCLUSION

The results of all the treatments having bypass fat showed significant increase in milk production and fat percentage while there was little or no change in protein content and body weight of lactating Nili-Ravi buffaloes.

ACKNOWLEDGMENTS

The authors are very thankful to “M.J Foods and Dairies” for providing “M.J Synerlac” (bypass fat) and also for financial support to carry out this study.

REFERENCES

Aggarwala AC, Sharma RM (1961). A Laboratory Manual of Milk Inspection. Asia Publishing House, India.

A.O.A.C. (2005). Official Methods of Analysis (18th Edn.). Association of Official Analytical Chemists.

Chouinard PY, Girard V, Brisson GJ (1998). Fatty acid profile and physical properties of milk fat from cows fed calcium salts of fatty acids with varying unsaturation. J. Dairy Sci. 81:471-481.

Davide CL (1977). Laboratory Guide in Dairy Chemistry Practical. FAO Regional Dairy Development and Training Centre For Asia and Pacific, Dairy Training and Research Institute, University of Philippines.

Garg MR, Mehta AK (1998). Effect of feeding bypass fat on feed intake, milk Production and Body Condition of Holstein Friesian Cows. Indian J. Anim. Nutr. 15: 242-245.

Hammon HM, Metges CC, Junghans P, Becker F, Bellmann O, Schneider F, Nurnberg G, Dubreuil P, Lapierre H (2008). Metabolic changes and net portal flux in dairy cows fed a ration containing rumen-protected fat as compared to a control diet. J. Dairy Sci. 91:208-217.

Lounglawan P, Suksombat W, Chullanandana K (2007). The effect of ruminal bypass fat on milk yields and milk composition of lactating dairy cows. J. Sci. and Tech. 14:109-117.

Naik PK (2013). Bypass fat in dairy ration-A review. Anim. Nutr. Feed Technol. 13:147-163.

Nawaz H, Yaqoob M, Abdullah M (2007). Effect of feeding supplemental tallow on the performance of lactating nili-ravi buffaloes. Turk. J. Vet. Anim. Sci. 31:389-398.

Overton TM (1999). Update and new perspectives on interactions of nutrition and reproduction in lactating dairy cows.

Purushothaman S, Kumar A, Tiwari DP (2008). Effect of feeding calcium salts of palm oil fatty acids on performance of lactating crossbred cows. Asian-Aust. J. Anim. Sci. 13:376-385.

Sirohi SK, Walli K, Mohanta R (2010). Supplementation effect of bypass fat on production performance of lactating crossbred cows. Indian J. Anim. Sci. 80:733-736.

Vahora SG, Parnerkar S, Kore KB (2013). Productive efficiency of lactating buffaloes fed bypass fat under field conditions: Effect on milk yield, milk composition, body weight and economics. Iranian J. Applied Anim. Sci. 3:58-53.

Wadhwa M, Grewal RS, Bakshi MPS, Brar PS (2012). Effect of supplementing bypass fat on the performance of high yielding crossbred cows. Indian J. Anim. Sci. 82:200203.