The Journal of Animal & Plant Sciences 19(1): 2009, Pages: 6-9
ISSN: 1018-7081

EFFECT OF REPLACING COTTON SEED CAKE WITH SUNFLOWER MEAL ON MILK YIELD AND MILK COMPOSITION IN LACTATING NILI-RAVI BUFFALOES

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ABSTRACT

A feeding trial was conducted on thirty multiparous lactating Nilli-Ravi buffaloes to observe the effect of replacement of cottonseed cake with sunflower meal on their milk yield, milk composition and body weights. Thirty experimental animals were randomly divided in to three groups with similar stage of lactation. These animals were offered three different rations containing sunflower meal (SFM) and cottonseed cake (CSC) in the ratios 0: 48 (A-control), 18: 25 (B) and 39.5: 0 (C). All the rations were iso-nitrogenous and iso-caloric. Average daily milk production in buffaloes with rations A, B and C was 7.84 ± 2.06, 8.22 ± 2.05 and 7.35 ± 2.51 Kg respectively and difference was significant ($P<0.05$). Average body weights were recorded as 606 ± 64.49, 615.70 ± 80.82 and 591.50 ± 58.33 Kg in animals fed rations A, B and C respectively. The differences in fat percent in milk among three groups fed diets A, B and C were statistically significant ($P<0.05$), while the difference in solids-not-fat (SNF) and total solids (TS) percentage was non-significant. In a complementary experiment palatability of SFM in six Friesian x Sahiwal cross bred heifers was studied. The intake was 20.68, 17.50 and 24.68 kg/day in crossbred heifers receiving concentrate rations A, B and C, respectively showing higher palatability of sunflower meal compared to that of cotton seed cake.

Key Words: Cottonseed cake, sunflower meal, milk production, composition, Nili-Ravi buffaloes

INTRODUCTION

Dairy animals are generally given energy and protein concentrate supplements to increase milk production and stocking rates (Gracia *et al*., 2000). Supplementation also helps to correct changes in the amount (increasing total dry matter intake) and quality of basal diet. The basal diet may contain all the essential nutrients for the animals but not in the quantity necessary to achieve the desired level of animal production. Under these circumstances a supplement would provide additional balanced nutrients preferably without reducing the intake of basal diets (Preston and Leng, 1984).

In recent years high-oil varieties of sunflower are being grown in Pakistan, primarily as a source of vegetable oils. The area under cultivation of sunflower is continuously increasing and was grown on 937000 acres of land during 2006-07 with seed production of 65600 tons (Anonymous, 2006-07). Sunflower meal (SFM) is the by-product of oil industry. After extraction of oil it is available in large quantities for the feed industry. Sunflower meal usually contains 26 to 40% crude protein and 13 to 15% crude fiber, the amounts varying with the degree of hull removed.

Traditionally, farmers have been using cottonseed cake (CSC) or rapeseed cake as a source of vegetable protein in livestock feeding in Pakistan. Due to its limited supply, the cost of CSC has increased. Hence, there is a need for replacing CSC with some other local protein sources to release the pressure on this product. Earlier studies (Ahmed *et al.*, 2004, Gracia *et al.*, 2004) indicated that SFM was equally good in performance, while cost of production of SFM based rations was the lowest. The present experiment was conducted to evaluate the effects of feeding different levels of sunflower meal on performance of lactating Nili-Ravi buffaloes.

MATERIALS AND METHODS

Experiment I

Buffaloes and diets: The experiment was conducted at Livestock Experiment Station Bahadur Nagar, Okara. Thirty lactating Nili-Ravi buffaloes were randomly selected from the herd maintained at the station. All these animals were in their second or higher lactation with same stage of lactation. Daily milk production ranged from 7.0 to 9.0 kg. Animals were randomly divided into 3 groups. These groups were offered three different rations, namely, A, B and C (Table-1). The animals were fed on individual basis. Ration A mainly contained CSC (48%) as a major source of protein with zero inclusion of SFM. In ration B, the percentage of CSC and SFM was 25 and 18 % respectively. While, in ration C, SFM was increased to the level of 39.5 as major protein source with zero inclusion of CSC. These rations were iso-caloric and iso-nitrogenous in composition (Table-1). These were offered to the animals at the milking time in the morning and evening. One kg of concentrate ration was given for every 2 kg of milk production while 50 kg Sada bahar

(Sorghum x Sudan grass) green fodder was offered per animal on daily basis. The experimental period was of three months duration with first fifteen days as adaptation period.

Measurements: Animal body weights were recorded on monthly interval. The weight was recorded early in the morning with the help of weighing balance. Fodder and feed samples were analyzed for proximate analysis (AOAC, 1990) at fortnightly interval. Milk samples of morning and evening were collected at weekly interval and were mixed, preserved and analyzed for fat, solid-not- fat (SNF) and total solids (TS) according to AOAC (1990).

Experiment 2: A complementary trial of sixteen days duration was conducted to determine the palatability of total mixed rations (based on cottonseed cake and sunflower meal in different proportions). Composition of these rations is given in Table-2. Six crossbred (Friesian x Sahiwal) heifers, aged two years were used as experimental animals and were housed in the same barn. During adaptation period, ration B having both CSC and SFM was offered to all animals for 7 days followed by 9 days data collection. On the completion of adaptation period, experimental rations (A, B and C) were weighed and then offered in separate mangers. Each animal was given free access/choice to these three rations same as in cafeteria system. The refusal was weighed for each ration daily and ration consumed were recorded and finally relative palatability was estimated.

Statistical analysis: The data obtained was analyzed using analysis of variance technique under completely randomized design (Steel *et al*., 1997) and differences in means were tested by Duncan's Multiple Range Test (Duncan, 1955).

Table 1: Composition of concentrate rations (Expt.1)

Ingredients	Ration-A	Ration-B	Ration-C
Cottonseed cake	48.0	25.0	0.0
Sunflower meal	0.0	18.0	39.5
Wheat bran (WB)	3.5	6.0	20.0
Rape seed cake	11.0	8.0	3.0
Molasses	18.0	15.0	15.0
Maize grain	17.0	25.5	20.0
Mineral mixture	2.5	2.5	2.5
Total (kg)	100.0	100.0	100.0
Chemical Composition			
Dry Matter (DM) %	90.45	89.92	89.36
Crude Protein % in DM	19.19	18.55	18.95
Metabolizable energy (Mcal/kg DM)	2.53	2.61	2.67

Table 2: Composition of total mixed ration rations for experiment 2

Ingredients	Ration-A	Ration-B	Ration-C
Cotton seed cake	40.0	20.0	0.0
Sunflower meal	0.0	15.0	28.0
Wheat bran	4.0	10.0	17.0
Rape Seed Cake	9.0	8.0	8.0
Molasses	15.0	15.0	15.0
Wheat Straw	30.0	30.0	30.0
Mineral mixture	2.0	2.0	2.0
Total (kg)	100.0	100.0	100.0
Chemical Composition			
Dry Matter (DM) %	90.58	90.22	89.89
Crude Protein % in DM	14.36	14.99	15.09
Metabolizable Energy (Mcal/kg DM)	2.18	2.25	2.2.31

RESULTS AND DISCUSSION

Milk yield: The average daily milk yield in Nili-Ravi buffaloes was 7.84, 8.22 and 7.35 Kg for ration A, B and C. respectively (Table-3). The milk production was higher in group B than other two groups and the difference was statistically significant ($P<0.05$). This indicated that combination of CSC and SFM resulted in higher milk production as compared to rations A and C containing CSC and SFM as sole source of supplementing protein, respectively. These results agree with the concept that when protein from more than one source is used it gives better results as the deficiency of any limiting amino acid from one source is compensated with amino acid from other source of protein. However, Bade *et al*. (2008) did not observe any significant effect of replacing cotton seed meal with sunflower extraction based ration in dairy animals. Similarly, Mpelipasakes *et al*. (1985) also reported no significant difference in milk production among rations containing different levels of cotton seed meal or sunflower meal. However, the feed cost per kilogram milk decreased as the proportion of SFM increased. In the present study the cost of per kg milk production was also lower in sunflower meal based ration as compared to cottonseed cake based ration and amounting to Rs 21.2 and Rs. 23.4, respectively.

Milk composition: Milk composition in terms of fat, SNF and total solids (TS) is presented in Table-3. Statistically different ($P<0.05$) fat percent was recorded with ration-B. Difference in SNF and TS percentage were non significant ($P>0.05$) among the three rations, however, slightly higher values were obtained with ration-B having both SFM and CSC as a source of protein. Sharma *et al.* (2004) assessed the replacement value of undecorticated sunflower meal (SFM) in the

diets of dairy animals and concluded that milk composition did not differ among the dietary treatments. Similarly, Bade *et al.* (2008) in his study on effect of replacing cotton seed meal with sunflower extraction in dairy cows reported that total solids, fat and SNF percentages among different groups were statistically similar.

Body weight: No significant change in body weight was observed in experimental animals during the study period. Schingoethe *et al.* (1977) also found no significant changes in body weight in lactating cows. Similarly, Pop *et al.* (2001) studied the influence of dietary level of SFM on three groups of lactating animals where no influence of supplements was observed on body weight gain.

Palatability of SFM: Average intake of ration-A containing CSC was 20.69 ±5.81 kg while for ration B and C was 17.50±7.18 and 24.69±6.55 kg, respectively. Statistically significant difference (P<0.05) was observed between rations C and B, however ration-A was statistically similar to both the rations. The relative intake was 32.90, 27.84 and 39.26 percent. The results indicated that feed intake was highest in SFM based ration-C while, in ration-B it was the lowest. Relatively higher intake of SFM based ration showed that SFM is quite palatable. These results agree with the findings of Jabbar *et al.* (2006) who found highest intake with sunflower meal based ration. Similarly, results those of Kuldip *et al.* (1995) and Sihage *et al.* (1997) also partially agreed to our results who reported that intake of sunflower meal based ration was similar to other vegetable protein based supplements.

The study suggests that SFM can safely be replaced with CSC without affecting production performance in lactating buffaloes. Due to lower price and higher protein contents, the use of sunflower meal in the lactating animals is considered more economical than CSC.

Table 3: Milk yield and milk composition in lactating Nilli-Ravi buffaloes (Mean ± S.E)

Treatments	Milk yield (Kg/day)	Fat (%)	Solid Not Fat (SNF) (%)	Total Solid (TS) (%)
A	7.84 ±0.22	6.20 ± 0.03	9.14 ± 0.03	15.31 ± 0.05
B	8.22 ± 0.22	6.32 ± 0.03	9.15 ± 0.03	15.43± 0.05
C	7.35 ± 0.26	6.31 ± 0.03	9.11 ± 0.03	15.38 ± 0.05
Significance difference	P<0.05	P<0.05	NS	NS

Acknowledgement: The financial assistance from Pakistan Oil Seed Development Board (PODB) for project on "Sunflower meal - An economical substitute of cottonseed cake in livestock feeding" is thankfully acknowledged

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