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COMPARATIVE EFFICIENCY OF SUNFLOWER MEAL AND COTTONSEED CAKES IN THE FEED OF CROSSBRED CALVES FOR MEAT PRODUCTION

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ABSTRACT

Thirty crossbred (Sahiwal x Friesian) male calves of 9-10 months age and weighing 70 to 90 kg, were used in completely randomized design to investigate the possibility of replacing cottonseed cakes (CSC) with sunflower meal (SFM), partially or completely, in rations for fattening of crossbred calves for meat production. Three concentrate rations viz. A, B and C were formulated. Ration A containing CSC was fed to the calves of group A, ration B containing SFM was fed to calves of group B and ration C containing both CSC + SFM was fed to calves of group C. The feed intake of calves belonging to group C was the highest (5.7 ± 2.3 kg) followed by group B (5.5 ± 1.3 kg) and group A (5.2 ± 2.0 kg). Average daily body weight gain was 0.73 ± 0.1, 0.72 ± 0.2 and 0.71 ± 0.1 kg for groups A, B and C, respectively. Calves fed SFM gained numerically less than the calves fed CSC but higher than SFM+ CSC. Feed conversion ratio was 7.1 ± 0.4, 7.7 ± 0.7 and 8.0 ± 0.6, for calves of groups A, B and C, respectively. Dressing percentage averaged 51.5 ± 1.3, 52.1 ± 1.2 and 52.3 ± 0.8 for the respective rations. However, the differences in feed intake, daily weight gain, feed conversion ratio and dressing percentages among calves of three groups were non significant. Considering the cost of feed and average growth, the cost of per kg body weight gain was 38, 30 and 37 rupees for the groups A, B and C, respectively. The lowest cost was observed in SFM based ration (B) that was about 19% less than ration containing CSC. Results indicated that for fattening of crossbred calves the use of SFM is as efficient as CSC but more economical and can successfully replace CSC in fattening rations.

Key words: Sunflower meal, cottonseed cake, crossbred calves, fattening

INTRODUCTION

In livestock production the major problem is the unavailability of quality feed and its high cost; resulting in reduced profitability and low productivity through adversely affecting health, production and reproduction. In Pakistan, production of sunflower for edible oil is gaining popularity and as a result sunflower seed meal (SFM) is available for its use in animal feed. Area under cultivation and production of sunflower were 264.00 thousand hectares and 327.65 thousand tons in 2004-05, respectively (MINFAL, 2005). Its use in poultry rations is limited because of higher fibre fraction (Mirza *et al*., 2004; Yunus *et al*., 2004). Ruminants have unique ability to utilize the fibrous material through anaerobic fermentation (Kibria *et al.,* 1991), therefore, SFM can be efficiently used as a sole source of supplemental protein for ruminants (Lardy and Anderson, 2002).

Cottonseed cakes (CSC) are being traditionally used in the feed of dairy animals. However, limited supply and seasonal availability of CSC result in high price. On the other hand, SFM is cheaper protein source and can be used in ruminants feed supplements (Yunus *et al*., 2004).

Limited data are available on nutritional value of SFM as protein source in feed for fattening of animals. The present study was therefore, conducted to investigate the possibility of replacing CSC with SFM, partially or fully, in the ration of crossbred calves for meat production.

MATERIALS AND METHODS

Thirty crossbred (Sahiwal x Friesian) male calves, aged 9-10 months and weighing 70 to 90 kg, were used as experimental animals at the Livestock Experiment Station Qadirabad, Sahiwal, Pakistan. Calves were randomly divided into three groups with 10 calves on each treatment following completely randomized design to test three concentrate rations viz. A, B and C. Calves in group A were fed ration A containing CSC, calves in group B were fed ration B containing SFM and calves in group C were fed ration

C containing both CSC and SFM as major source of protein, in such a away that all rations were isocaloric, isonitrogenous and isofibrous without varying in the notable ingredients (Table 1). All animals were offered green fodder at the rate of 2.5 kg per animal throughout the experiment. All the feeds were offered *ad libitum* on feed lot basis. The experiment lasted for 90 days. Measured quantities of rations were offered to these animals and after a week interval, left over feed in mangers was weighed back and recorded. Animals were weighed at the start and end of experiment.

Table 1: Ingredients and chemical composition (%) of experimental rations

Ingredients	Rations		
	A (CSC)	B (SFM)	C (CSC+SFM)
Cotton seed cake	40	-	20
Sunflower meal	-	28	15
Wheat bran	4	17	10
Rape seed cake	9	8	8
Molasses	15	15	15
Wheat straw	30	30	30
Mineral mixture[1]	2	2	2
Total	100	100	100
Analysis			
Dry matter	90.6	89.9	90.2
Crude protein	14.4	15.0	15.0
Total digestible nutrients	61.0	64.0	64.0

[1]Mineral mixture contained (per kilogram): Dicalcium phosphate 708 g; Magnesium sulphate 86 g; Sodium chloride 190 g; Ferrous sulphate 8.9 g; Manganese sulphate 4.9 g; Zinc sulphate 3.2 g; Copper sulphate 0.3g; Potassium iodide 0.087 mg and Cobalt chloride 0.0089 mg

An adaptation period of 15 days was given during which concentrate was gradually increased and the fodder was proportionally decreased until the calves were on complete rations. Before the start of trial, calves were de-wormed against endo and ecto parasites through the use of Ivomec injection. Vaccination was done against haemorrhagic septicemia and Foot and Mouth disease. Water was provided all the time in the barns and animals had free access to water. Five samples of each CSC, SFM, and all rations were analysed using AOAC (1995) methods.

Economic analysis of data was done using the technique of Perrin *et al*. (1979). In calculating economics, ingredient cost of ration A (CSC) was used as Rs.7.36/kg; that of ration B (SFM) as Rs. 5.50/kg, and that of ration C (CSC+SFM) as Rs. 6.44 kg.

Data on live weight gain, feed intake, feed conversion ratio and carcass percentage were analysed using analysis of variance technique using MSTAT C computer software. Duncan's Multiple Range Test was used to compare means (Steel and Torrie, 1986).

RESULTS AND DISCUSSION

Average chemical composition (%) of CSC in terms of DM, CP, CF, EE, NFE and total ash, was 92.5, 21.1, 22.2, 8.5, 34.6 and 6.0 respectively. For SFM, the values were 89.5, 38.3, 13.7, 7.7, 23.8 and 6.1 for these parameters, respectively (Malik *et al.*, 1996). Less CP but higher contents of DM, CF and NFE were noted in CSC compared to SFM. Ingredient and chemical composition of experimental rations is given in Table 1.

Production performance of crossbred calves fed rations A, B and C respectively containing CSC, SFM and both (CSC + SFM) as vegetable protein sources is presented in Table 2. The feed intake of calves belonging to group C was found to be higher (5.7 ± 2.3 kg), followed by group B (5.5 ± 1.3 kg) and groups A (5.2 ± 2.0 kg). However, the difference among the treatments was not significant (P>0.05). Lack of differences in average feed intake per animal among the three rations is an indication that palatability of SFM is as good as CSC. These results agree with the findings of Nishino *et al*. (1980), Kuldip *et al*. (1995) and Sihage *et al*. (1997), who reported that intake of sunflower meal based rations was similar to other vegetable protein based supplements.

Average daily body weight gains were 0.73 ± 0.1, 0.72 ± 0.2 and 0.71 ± 0.1 kg for groups A, B and C, respectively, and the difference was again statistically

Table 2: Performance of crossbred calves fed different rations

Parameters	Rations		
	A (CSC)	B (SFM)	C (CSC+SFM)
Number of calves/treatment	10	10	10
Avg. daily gain (kg)	0.73 ± 0.1	0.72 ± 0.2	0.71 ± 0.1
Avg. feed intake (kg)	5.2 ± 2.0	5.5 ± 1.3	5.7 ± 2.3
Feed conversion ratio	7.1 ± 0.4	7.7 ± 0.7	8.0 ± 0.6
Carcass percentage	51.5 ± 1.3	52.1 ± 1.2	52.3 ± 0.8
Economics*			
Cost of feed/day (Rs.)	38.0	30.0	37.0
Feed cost/kg weight gain (Rs.)	52.0	42.0	52.0

*Ingredient cost per kg Ration A: Rs 7.36; Ration B: Rs 5.50 and Ration C: Rs 6.44.

non-significant (P>0.05). However, calves fed SFM as a main protein source gained numerically less than the calves fed CSC. Fielding and Kyomo (1979) noted weight gain of 0.88 ± 0.09 and 0.87± 0.8 kg/d in steers fed sunflower meal and cottonseed meal based diets, respectively, and found non significant difference between the treatments. Almost similar weight gain was observed in calves in the present study. Richardson *et al*. (1981) substituted cottonseed meal with sunflower meal in growing finishing feedlot diets at level of 0, 5.5, 11 and 22% and observed no difference in digestibility and performance of steers.

Feed conversion ratio, which is the kg of feed eaten for each kg of body weight gain, averaged 7.1 ± 0.4, 7.7 ± 0.7 and 8.0 ± 0.6, for calves in groups A, B and C, respectively. The FCR for calves fed CSC was better than that for other calves but these differences were non significant (P>0.05). Carcass percentage was found to be 51.5 ± 1.3, 52.1 ± 1.2 and 52.3 ± 0.8 for calves in groups A, B and C respectively and non significant differences was found among the treatments.

Economics return was calculated by comparing the cost of supplements with the value of the live weight produced. The average daily cost of feed per calf was 38, 30 and 37 rupees for the groups A, B and C, respectively. Considering the cost of feed and average daily growth, the cost of per kg body weight gain was Rs. 52.0; Rs. 42.0 and Rs. 52.0 for the groups A, B and C, respectively. The lowest cost was observed in SFM based ration (B) that was about 19% less than CSC based ration. These results indicated that for fattening of growing calves, the use of SFM is as efficient as CSC and can successfully replace it in fattening rations. The economics of this experiment is supported by the findings of Mirza *et al*. (2004) and Yunus *et al*. (2004).

The results of this study showed that SFM could be incorporated in the fattening rations of crossbred calves without any harmful effect on production parameters and due to its lower market price, is more economical than CSC which is a conventional protein source for livestock.

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