

EFFECT OF FEEDING SUNFLOWER MEAL AS A SUBSTITUTE OF COTTON SEED CAKES ON GROWTH AND AGE AT MATURITY IN HOLSTEIN FRIESIAN HEIFERS

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ABSTRACT

A feeding trial was conducted in nine Holstein Friesian heifers to observe the effect of replacement of cottonseed cakes with sunflower meal on their growth rate and age at maturity. Experimental animals were divided into three equal groups A, B and C. The major protein source in three experimental rations 1, 2 and 3 was based on cottonseed cakes (100%), cottonseed cakes (50%) + sunflower meal (50%) and sunflower meal (100%), respectively. These rations were fed to three groups respectively, for 183 days. The average daily weight gains of groups A, B and C were 0.849 ± 0.056 , 0.756 ± 0.122 and 0.914 ± 0.027 kg, while feed efficiency averaged 2.72 ± 0.172 , 2.73 ± 0.426 and 2.53 ± 0.072 , respectively. Age at maturity for these groups averaged 376.33 ± 16.83 , 425 ± 46 and 333.67 ± 4.84 days, respectively. Sunflower meal based ration showed equally good performance in terms of growth rate, feed efficiency and age at maturity while cost of production of sunflower meal based ration was the lowest.

Key words: Cottonseed cake, sunflower meal, growth rate, age at maturity, Holstein Friesian heifers.

INTRODUCTION

The growth rate and age at maturity are directly linked with productive and reproductive performance of a female. A cow maturing at an early age will also calve at an early age, give more number of calves, complete more lactations and thus will produce more milk in her lifetime. Reduction in age at first calving is also desirable for progeny testing programme.

Age at first calving is affected by environmental, as well as by genetic, factors. Environmental effects can be eliminated by providing balanced ration and improved management. Animals reared on high plan of nutrition are younger and heavier at puberty than those kept on restricted plan of nutrition (Hartigan, 1995). Puberty in cattle is markedly influenced by level of nutrition at which animals have been reared. The faster an animal grows, the earlier it attains sexual maturity (McDonald *et al.*, 1995).

Traditionally, the farmers have been using cottonseed cakes for feeding their livestock as a source of vegetable protein and its prolonged use can affect the fertility of animals (Zahid *et al.*, 2003). Moreover, due to its limited supply, the cost of cottonseed cakes has gone high. There is a need for replacing cottonseed cakes with some other vegetable protein source like sunflower meal which is a rich source of crude protein, has better nutritional profile and low cost as compared to cottonseed cakes. Moreover, sunflower is getting

popularity as oil seed crop among farmers and its production is increasing very fastly. Ultimately, this increased production will increase the production of sunflower meal and its future prospect is very bright as far as the availability and cost is concerned. Therefore, this project was planned to study the extent of replacement of cottonseed cakes with sunflower meal in rations of Holstein Friesian heifers maintained at the Livestock Experiment Station, Bhunikey, Pattoki, District Kasur.

MATERIALS AND METHODS

This feeding trial was conducted on Holstein Friesian heifers maintained at the Livestock Experiment Station, Bhunikey, Pattoki, District Kasur. Nine animals having almost similar age and body weight were divided into three equal groups A, B and C. They were offered three different rations 1, 2 and 3, respectively. The ration 1 contained cottonseed cakes, ration 2 had both cottonseed cakes (50%) and sunflower meal (50%) while ration 3 contained sunflower meal only as a major source of protein (Table 1). All the rations were isonitrogenous with 16% crude protein and 70% TDN.

A preliminary period of two weeks was allowed to get animals accustomed to the experimental rations, which were given to the animals at a rate of 1% of their body weights in the morning daily and the refusal was noted. The experiment lasted for 183 days. Seasonal

green fodder and fresh clean water were provided *ad libitum*. Body weight was recorded on weekly basis. Daily weight gain and age at maturity were calculated. The means for various parameters between groups were compared by using analysis of variance (Steel and Torrie, 1984).

RESULTS AND DISCUSSION

The daily weight gains in animals of groups A, B and C were 0.849 ± 0.056 , 0.756 ± 0.122 and 0.914 ± 0.02 kg, respectively, while feed efficiency values for these groups were 2.72 ± 0.172 , 2.73 ± 0.426 and 2.53 ± 0.072 , respectively. Age at maturity of groups A, B and C averaged 376.33 ± 16.83 , 425 ± 46 and 332.67 ± 4.84 days, respectively (Table 2). However, the differences in these parameters between three groups were non-significant.

The results of the present study indicate that the daily weight gain, daily ration intake, feed efficiency and age at maturity were similar for the three

experimental rations. This indicates that cottonseed cakes in heifer's rations can be replaced partially or completely with sunflower meal without any adverse effects. However, it was also noted that there was one weak animal in group B with stunted growth, inspite of observing good managemental practices. Neglecting this animal from study, the highest daily weight gain and the best feed efficiency were noted in group B. This indicates that replacement of cottonseed cakes 50% with sunflower meal in ration shows better results. Similar findings have been reported by Karim *et al.* (1996) and Jabbar *et al.* (1998), who narrated that better results were achieved when sunflower meal was fed in combination with cottonseed cakes to Sahiwal male calves, cross bred cows (50% Friesian x Sahiwal) and Nili Ravi buffaloes. This agrees with the concept that use of protein from more than one sources gives better results, as the deficiency of limiting amino acids from one source is compensated with amino acids of other source.

Economically, sunflower meal based ration C had the lowest cost of production (Rs. 6.56/kg) as compared

Table 1: Composition of experimental rations

| Ingredients | Ration 1 | Ration 2 | Ration 3 |
|-------------------|----------|----------|----------|
| Maize grains | 8 | 9 | 10 |
| Wheat bran | 35 | 38 | 40 |
| Cottonseed cake | 30 | 15 | - |
| Rapeseed cake | 6 | 6 | 6 |
| Sunflower meal | - | 8 | 17 |
| Corn gluten (30%) | 9 | 9 | 7 |
| Molasses | 10 | 13 | 18 |
| Mineral mixer | 1 | 1 | 1 |
| Salt | 1 | 1 | 1 |
| Total | 100 | 100 | 100 |
| CP value (%) | 16.07 | 16.28 | 16.12 |
| TDN value (%) | 70.34 | 70.89 | 70.26 |

Table 2: Weight gain, feed efficiency, cost of weight gain and age at maturity of Holstein Friesian heifers (mean \pm SE)

| Parameters | Group A | Group B | Group C |
|---|----------------------|---------------------|---------------------|
| Daily weight gain (Kg) | 0.849 ± 0.056^a | 0.756 ± 0.122^a | $0.914 \pm .027^a$ |
| Daily ration intake (Kg) | 2.31 ± 0^a | 2.061 ± 0.077^a | 2.31 ± 0^a |
| Feed efficiency (feed consumed/kg weight gain) | 2.72 ± 0.172^a | 2.73 ± 0.426^a | 2.53 ± 0.072^a |
| Cost of ration (Rs)/kg of feed | 7.08 | 6.82 | 6.56 |
| Cost of ration (Rs) for 1kg increase in body weight | 19.26 | 18.67 | 16.56 |
| Age at maturity (days) | 376.33 ± 16.83^a | 425 ± 46^a | 332.67 ± 4.84^a |

Values with same superscripts in the same row differ non-significantly ($P > 0.05$).

to ration A (Rs. 7.08/kg) and ration B (Rs 6.82/kg). The results relating to cost of production in this study are also in line with those of Jabbar *et al.* (1998), who narrated that sunflower meal based rations were 27% cheaper than cottonseed cakes. Rafique *et al.* (1996), Shehzad *et al.* (1999) and Jabbar *et al.* (2000) recorded similar findings and reported that best feed efficiency was achieved by using sunflower meal based rations for dairy cattle, Lohi lambs and Sahiwal heifers, as it had high voluntary feed intake and high crude protein values.

The results of the present study reflect that the use of sunflower meal is as efficient as cottonseed cakes but more economical and it can safely be used to replace cottonseed cakes in rations of growing heifers.

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