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The Relative Feeding Efficiency in Kankrej and Kankrej x Holstein Friesian Halfbred Female Calves

N. S. Radadia, K. R. Tajane, A. B. Fulsounder and V. M. Jhala

Livestock Research Station, GAU, Sardar Krushinagar 385 506 (Gujarat)

ABSTRACT

Four criteria of judging the feeding efficiency in Kankrej and Kankrej x *Holstein-Friesian* halfbred female calves were estimated and found that halfbreds were significantly more economical in attaining the puberty.

Almost during all age groups (0-3, 3-6, 6-9, 9-12, 12-15 and 0-15 months of age) estimates of feed efficiency were not significantly different for two breeds, while cost of feeding and dry matter intake during different age groups were significantly higher in halfbreds. The cost of feeding upto puberty was 59.25 per cent less in halfbreds in contrast to that in Kankrej. The growth rates were 13.21 and 12.78 per cents respectively in halfbred and Kankrej female calves during any time upto 15 months of age per month.

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INTRODUCTION

The motivation of dairy farmers towards crossbreeding with exotic inheritance for improving their economy will be enhanced if more and more information on feeding economics for crossbreds is supplied to them. The economics of feeding dairy animals has been studied by Chaturvedi (1972), Reddy *et al.* (1974), Sethi and Arora (1977), Shrivastava *et al.* (1979), Kukreja and Arora (1981) and Satyanaryana and Murty (1981). The available information on comparative feeding efficiency was, however scanty. Hence an attempt was made to ascertain the relative feeding efficiency for growth in Kankrej and Kankrej x Holstein-Friesian halfbred female calves raised under semi-arid conditions.

MATERIAL AND METHODS

Nine calves from each breed group born within the range of 3 months, have been weaned at birth and reared in a shed under individual care. Three liters of whole milk was fed daily upto one month of age. The whole milk and skimmed milk powder mixed in equal part was fed at the rate of 4 liters daily during second month of age. During third month of age, six liters of skimmed milk powder was given daily to each calf. Subsequently the feeding was according to NRC standards (1971). The dry and green fodders consisted of *Chharodi* hay (*Dicanthium annulatum*) and either lucrene or hybird napier or cowpea or green jower, respectively. The feeding schedule was prepared in the begining of every week upto 6 months of age and

every fortnight beyond 6 months of age. The left over was measured in the end of every schedule and subtracted from the total feed offered to determine the feed intake. The dry matter percentage was estimated frequently during the experiment but only the averages (Table 1) for various feeds were used in further analysis. The experimental animals were weighed weekly and fortnightly upto and beyond six months of age respectively. The growth rate was calculated as per cent weight gain per kilo of initial body weight. The exponential growth curve was fitted as described by Snedecor and Cocharan (1968). The four criteria of judging the feeding efficiency were calculated as below :

F_1=Dry matter intake (kg)/per cent of growth/day.

F_2=Dry matter intake (kg)/kg weight gain/day.

F_3=Feeding cost (Rs)/per cent of growth/day.

F_4=Feeding cost (Rs)/kg weight gain day.

The breed differences were tested for significance by F test.

TABLE 1

The average dry matter percentage and cost for various feeds.

Sr. No.	*Name of the feeds*	*Dry matter* (%)	*cost/kg* (*Rs*) *
1.	Whole milk	13	1.50
2.	Skimmed milk powder	13	1.25
3.	Concentrate mixture (Banasdan)	90	1.03
4.	*Chharodi* hay (*Dicanthium annulatum*)	90	0.50
5.	Green fodder	25	0.06
	a. Lucerne	22	0.04
	b. Hybrid Napier	28	0.05
	c. Jowar	30	0.09
	d. Cowpea	20	0.06

*Included transport charges.

RESULTS AND DISCUSSION

I. Feed intake and cost of feeding:

The average daily dry matter intake and feed cost during various age groups have been given in Table 2. It was observed that the average daily consumption was significantly more in halfbreds

TABLE 2

The daily average dry matter intake, cost of feeding, growth rate and weight gain in Kankrej and Kankrej x Holstein Friesian (halfbred) at various ages.

Age periods	*Dry matter intake (kg)*		*Cost of feeding (Rs)*		*Growth rate (%)*		*Weight gain (g)*	
	Kankrej	*Halfbred*	*Kankrej*	*Halfbred*	*Kankrej*	*Halfbred*	*Kankrej*	*Halfbred*
0-3	0.58±0.00	0.58±0.00	5.83±0.00	5.83±0.00	1.04±0.28	1.57±0.22	277±39	358±49
3-6	1.33±0.10	2.26±0.21**	0.79±0.06	1.31±0.13**	0.52±0.06	0.72±0.07*	242±29	380±58**
6-9	2.90±0.12	3.97±0.24**	1.70±0.08	2.31±0.13**	0.63±0.04	0.59±0.05	410±43	526±72**
9-12	4.54±0.21	5.36±0.31**	2.66±0.17	3.33±0.17**	0.47±0.02	0.44±0.02	496±55	598±51*
12-15	6.19±0.27	7.34±0.28**	3.58±0.16	4.25±0.16**	0.34±0.03	0.27±0.02	490±62	526±60
0-15 upto puberty	3.11±0.12	3.96±0.18	2.91±0.08	3.40±0.10**	1.76±0.08	2.10±0.13*	392±34	483±27**
	4.95±0.76	3.78±0.42*	3.68±0.44	2.28±0.24*	1.78±0.09	1.92±0.26**	395±19	418±59*

* and ** indicated significantly different from that of Kankrej at 5 and 1 per cent levels respectively.

as compared to that in purebred Kankrej calves during all age groups beyond 3 months of age (Table 2). The purebreds consumed on an average 1399 ± 54 kg dry matter as against 1980 ± 80 kg consumed by halfbreds upto 15 months of age, the differences being significant ($P<0.01$). However, the dry matter's need to attain the puberty was (1722 ± 191 kg) significantly much less in halfbreds in contrast to that (2208 ± 490 kg) in purebreds. Shrivastava *et al.* (1979) reported similar dry matter intake in crossbreds.

The highest cost of feeding in both the breeds was noted during milk feeding. The increasing trend of feeding cost in later age groups was obvious as dry matter requirement increased with the increase in body weights at later ages. The average daily cost of feeding was significantly more in halfbreds as compared to that in Kankrej calves during all age groups studied (Table 2).

The halfbreds consumed the feed, costing Rs. 1532 ± 47 upto 15 months of age as compared to the purebreds (intake of feed costing Rs. 1310 ± 34). The variation was found to be significant ($P<0.01$). However, the feeding cost upto the age of puberty in halfbreds (Rs. 1497 ± 109) was significantly less by 59.25 per cent than that in purebreds. It was obvious because purebred had to be fed for more time as compared to halfbred. The average age at puberty was found to be 22 ± 2 months in purbred and 15 ± 1 months in halfbred. Similarly feeding crossbreds was observed to be economical upto the age of maturity and first calving by various workers (Reddy *et al.* 1974 and Satyanarayana and Murty, 1981).

II. Growth responses :

On an average body weights at birth 1,2,3,4,5,6,9,12, and at puberty were respectively 22 ± 1, 32 ± 2, 38 ± 6, 47 ± 4, 54±5, 61 ± 5, 69 ± 5, 107 ± 5, 153 ± 8 and 279 ± 12 kg in purebreds and 23 ± 1, 35 ± 2, 45±3, 56 ± 3, 67 ± 4, 77 ± 5, 92 ± 5, 140 ± 6, 195 ± 7 and 241 ± 13 kg in halfbreds. This revealed that the halfbreds weighed heavier than purebred Kankrej calves. However, the breed differences were significant for the body weights beyond 4 months of age. Nonsignificant breed differences for birth weight were reported by D'souza *et al.* (1978) in Gir and Gir X Friesian crosses. On the contrary, Taneja *et al.* (1981) reported significant differences in birth weights of non descript and Holstein-Friesian crosses. The body weights of HF halfbreds upto six months of age were lower than that reported by Taneja and Bhat (1970), Parekh *et al.* (1976) Bhat *et al.* (1978) and Taneja *et al.* (1981) for various HF crosses (Sahiwal, Tharparkar, and Hariana). The increase in body weights beyond six months of age in both the breeds were higher than at earlier ages, while Taneja and Bhat (1970) and Tajena *et al.* (1981) reported opposite to the present observations which might be due to breed and managemental differences.

The exponential growth curves were fitted to the body weights at various ages for both the breeds. It was found that the growth curves in purebreds and halfbreds were respectively $W = 31.83e^{0.1278t}$ and $W = 38.59e^{.1321t}$, which revlealed the superiority of later. Thus, the growth rate in halfbred calves was 13.21 per cent monthly at

any period upto 15 months of age as compared to 12.78 per cent in purebred.

The growth rate/day as a per cent of weight gain over the initial body weight was significantly higher during 3 to 6 months of age and also overall upto 15 months of age in halfbreds as compared to those in Kankrej calves (Table 2). The average weight gains during 3 to 6, 6 to 9, 9 to 12 and 0 to 15 were significantly superior in halfbreds than those in purebreds (Table 2). The various workers (Taneja and Bhat, 1970; Parekh *et al.*, 1976; D'souza *et al.* 1978 and Taneja *et al.*, 1981) also reported the compartively superior grwoth rates in different Holstein-Friesian crosses.

The body weight at puberty was apparently higher in Kankrej heifers, but the difference was nonsignificant. However, the daily weight gain and growth rate were significantly better in halfbreds as compared to those in Kankrej heifers at puberty. The similar observations were reported by Tajena *et al.* (1981).

III. Feed efficiency :

The input-output ratio was considered as a criterion of judging the comparative efficiency of feed conversion for growth performance. The average daily dry matter intake and feed cost per per cent of growth and per kg weight gain, as estimates of four criteria have been given in Table 3, for different age groups in both the breeds. It was seen that mostly the estimates of feed efficiency criteria were more or less same in both the breeds upto the age of 15 months (Table 3). Present findings were in close accordance with those reported by Shrivastava *et al.* (1979) while the present estimates (F_2 and F_3) were higher and lower as compared to those reported by Kukreja and Arora (1981) on Holstein x Tharparkar and Sethi and Arora (1977) on Karanswiss repsectively. The breed differences during almost all age groups studied for all four criteria of feed efficiency were nonsignificant except during 6-9, 9-12 and 12-15 months of age groups, when halfbreds required significantly more dry matter and feed cost per per cent of growth. The feed efficiency was better during earlier age groups in both the breeds except during three months of age when cost of feeding was comparatively more (Table 3).

All four criteria of judging the feeding efficiency indicated that the halfbreds were more efficient ($P < 0.05$) in converting feed for growth to attain puberty as compared to Kankrej heifers (Table 3). Similar conclusion was also drawn by Reddy *et al.* (1974).

Thus, it could be concluded that the feeding of halfbreds (Holstein-Friesian) upto puberty was more economical in contrast to Kankrej heifers, though the cost of feeding was higher in halfbreds at different ages, the obvious reason being the early maturity in halfbreds.

TABLE 3

Various criteria of feeding efficiency for growth during different ages in Kankrej and Kankrej x Holstein Friesian (half-breds) heifers.

Age periods	F_1		F_2		F_3		F_4	
	Kankrej	*Halfbred*	*Kankrej*	*Halfbred*	*Kankrej*	*Halfbred*	*Kankrej*	*Halfbred*
0-3	0.58 ± 0.12	0.44 ± 0.08	2.63 ± 0.31	1.83 ± 0.27	5.92 ± 1.20	4.46 ± 0.76	26.60 ± 5.50	18.50 ± 2.70
3-6	2.85 ± 0.44	3.22 ± 0.29	5.75 ± 0.50	5.62 ± 0.20	1.69 ± 0.26	1.87 ± 0.17	3.41 ± 0.27	3.23 ± 0.11
6-9	4.76 ± 0.40	7.33 ± 0.99*	6.84 ± 0.28	7.63 ± 0.61	2.80 ± 0.28	4.27 ± 0.59*	4.04 ± 0.13	4.46 ± 0.36
9-12	9.84 ± 0.60	13.16 ± 1.34*	9.04 ± 0.34	9.29 ± 0.61	5.75 ± 0.36	7.79 ± 0.78*	5.29 ± 0.19	5.48 ± 0.31
12-15	19.18 ± 1.83	29.26 ± 2.56**	13.10 ± 1.44	15.11 ± 1.47	11.99 ± 1.06	16.92 ± 1.48**	7.57 ± 0.83	8.73 ± 0.85
0-15	1.78 ± 0.18	1.90 ± 0.73	8.01 ± 0.29	8.19 ± 0.25	1.67 ± 0.06	1.65 ± 0.06	7.52 ± 0.26	7.08 ± 0.13
Upto puberty	2.80 ± 0.36	1.83 ± 0.11*	12.14 ± 1.40	7.88 ± 0.35*	2.09 ± 0.19	1.61 ± 0.06*	9.10 ± 0.73	6.96 ± 0.13*

* and ** indicated significantly different from that of Kankrej at $P < 0.05$ and $P < 0.01$ respectively.

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