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Comparative Fattening Potential and Carcass Evaluation of Simmental and Brown Swiss Crossbred Calves

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ABSTRACT

Twenty (20) crossbred calves, 10 each from 50% Simmental: 50% Dajal and 50% Brown Swiss: 50% Dajal were used to compare their fattening potential and carcass characteristics. The experimental animals were divided into four groups: Group 1, Simmental crossbred male; Group 2, Simmental crossbred female; Group 3, Brown Swiss Crossbred Males and Group 4, Brown Swiss females. The initial weight of the animals ranged between 156 to 215 kg. They were given fattening ration *ad-lib* containing 13.7% crude protein and 70% total digestible nutrients along with 5 kg of green fodder daily for a period of 120 days. The animals were fed individually. Average concentrate intake, weight gain and feed conversion ratio (based on concentrate only) in male and female Simmental crossbred calves were 8.56±0.60 and 8.58±0.67 kg: 1.21±0.10 and 1.17±0.10 kg and 7.14±0.46 and 7.36±0.52, while corresponding values for Brown Swiss crossbred calves were 7.22±0.60 and 6.67±0.60 kg, 0.92±0.10 and 0.95±0.10 kg and 7.80±0.46 and 7.02±0.46, respectively. The dressing percentage was slightly higher in female than males (58.9 vs 57.9) in Simmental crossbreds as well as in Brown Swiss crossbred calves (59.3 vs 56.6). The meat bone ratio was 62:38 and 61:39 in Simmental male and female crossbreds, while 64:36 and 63:37 in Brown Swiss crossbred calves. Statistically, the difference for all these parameters was non-significant among the groups. The difference among the percentage of blood, edible offals, mesenteric fat, feet, head, skin and chemical composition were also non-significant for different groups. The crosses of Simmental and Brown Swiss with Dajal had similar fattening potential and carcass characteristics.

Key Words: Beef crossbred; Weight gain; Dressing percentage; Meat bone ratio

INTRODUCTION

The main objective in meat production is to obtain maximum weight gain in the form of marbled carcass and to avoid over fatness and to obtain high proportion of muscle having desirable eating characteristics. The beef quality is linked with main features of tenderness and flavour. In Pakistan there is no beef breed and beef is obtained from surplus buffalo/cattle male calves and culled animals. Buffalo/cow calves have lower weight gain and lesser dressing percentage as compared with dairy crossbred calves (Ahmad *et al*., 1995). Crossbred animals grow faster, mature at an earlier age and more efficient converter of feed to meat than native breeds (Khan, 1993).

Crossbreeding is very successfully being done in developing countries to improve productivity of native stock (Tigen & Vant, 1977). A crossbreeding project involving two beef breeds namely Simmental and Brown Swiss with local Dajal cattle has been initiated very recently. A crop of crossbred beef animals has been produced. The present study was planned to investigate and compare the fattening potential and carcass quality of Simmental and Brown Swiss crossbred calves.

MATERIALS AND METHODS

Crossbred calves Simmental (SxD) and Brown Swiss with local Dajal breed (BxD)were used in this study. Ten animals each (five males and five females) were selected from both the genetic group. These calves were divided into four groups: Group 1, Simmental crossbred males; Group 2 Simmental crossbred females; Group 3, Brown Swiss crossbred males and Group 4 Brown Swiss crossbred females.

Feeding trial. There were five animals in each group. All the animals were fed individually. Two weeks adjustment period was given to adjust the animals with new feeding regime during which all the animals were dewormed for internal parasites and vaccinated against prevalent contagious diseases. These animals were fed fattening ration containing 13.7% CP and 70.0% TDN (Table I) for a period of 120 days.

Ration was offered *ad-lib* and refusal was weighed. In addition to the ration five kg green fodder per head/day was also offered. The animals were weighed at fortnightly intervals.

Carcass evaluation. On the completion of feeding trial, two calves from each group were slaughtered for carcass evaluation. The calves were fasted for 12 h prior to slaughter. The carcass evaluation included the dressing percentage, edible offals (heart, lungs, liver, spleen and kidneys), mesenteric fat, head, feet, blood and skin percentage. Proportion of lean meat, bone, fat and other tissues were recorded by dissecting the left side of the 7^{th} to 12^{th} rib area of longissimus and dorsi muscle. The chemical composition in terms of moisture, protein, ether extracts and ash percentage was also determined by the method of AOAC (1984). The data thus obtained were statistically analyzed by using the Analysis of Variance technique (Steel & Torrie, 1984).

Table I. Composition of ratio

Name of the Ingredient	Percentage
Maize grain(crushed)	15.0
Wheat Bran	20.0
Canola Mea	08.0
Maize Gluten 30%	15.0
Vegetable Oil	01.0
Molasses	19.0
Wheat Straw	20.0
Mineral Mixture	02.0
Total:	100.0
C.P.	13.7
T.D.N.	70.00

RESULTS AND DISCUSSION

The results have been presented in Table II and III.

Weight gain. Average daily weight gain in Simmental crossbreds was 1.21±0.10 and 1.17±0.10 kg in male and female calves, respectively. The corresponding values for Brown Swiss crossbreds were 0.92±0.10 and 0.95±0.10 kg, respectively. Analysis of variance revealed that difference between the two genetic groups was statistically non-significant. Muftuoglu *et al*. (1980) observed similar (1.36, 1.34 kg) daily weight gain in Simmental and Brown Swiss bulls, respectively. Whereas, daily weight gained averaged 1.10 kg in Simmental crossbred calves (Dobicki *et al*., 1980).

Feed conversion ratio. Feed conversion ratio for Simmental crossbreds were 7.14±0.46 and 7.36±0.52 kg in male and female calves, respectively. The corresponding values for Brown Swiss calves were 7.80±0.46 and 7.02±0.46 kg for male and female calves, respectively. The difference between the two genetic groups was non-significant (P>0.50). However, Romer *et al*. (1980) reported lower values (6.5 and 6.9 kg) for Simmental crossbreds males and females, respectively. This may be due to difference in initial weight of the calves used in these studies.

Dressing percentage. Dressing percentage is determined by dividing the total dressed meat by the total live weight of the calves. The dressing percentage in Simmental crossbred was 57.85±1.55 and 58.92±1.42 in male and female calves, respectively. The corresponding values for Brown Swiss crossbred calves were 56.55±0.11 and 59.13±4.41 in male and female, respectively. The dressing percentage in females was somewhat higher than males for both the genetic groups. However, the difference was statistically non-significant. These values are in accordance with the study of Dobicky *et al*. (1980) and Romer *et al*. (1980) who reported 58.8 and 58.5 dressing percentage respectively for Simmental crossbred calves . Dressing percentage in Sahiwal and buffalo calves has been reported as 49.4 and 48.5%, respectively (Ahmad *et al*., 1995). Thus there is an increase of 16% in beef production of crossbred calves compared with our local animals.

Meat bone ratio. The meat bone ratio as determined by dissection of 7th to 12th rib of the left half of the carcass was 62:38 and 61:39 in Simmental male and female crossbred calves, respectively and the corresponding ratio for Brown Swiss calves was 64:36 and 63:37, respectively. The values of lean meat, bone, fat and other tissues for Simmental crossbreds were 50.50±1.50 and 47.50±0.50; 30.50±2.50 and 30.50±0.50; 13.50±1.50 and 17.50±0.50, and 5.50±0.50 and 4.50±0.50% for male and female, respectively. Whereas the corresponding values for Brown Swiss male and female crossbred were 51.0±1.00 and 52.00±2.00; 28.50±0.50 and 29.50±0.50; 16.00±1.00 and 15.00±2.00, and 4.50±0.50 and 3.50±0.50%, respectively. However, the difference between the two genetic groups was non-significant. Locher (1973) reported 76.7, 73.5, 73.2 and 70.7% lean meat; 16.5, 15.19, 17.7 and 16.1% bone and 3.5, 7.6, 4.3 and 6.4% fat in trials on Aberden-Angus x Simmental and Herens x Simmental crosses, respectively. These values are higher for lean meat and lower for bone and fat as compared with the present study. The difference may be due to breed, management etc. However, Ahmad *et al*. (1995) reported 53.33% lean meat, 32.87% bone, 6.0% fat and 5.13% other tissues in crossbred calves. All these values of lean meat, bone, fat and other tissues obtained in the present study are comparable with those of buffalo and Sahiwal calves (49.63, 31.79, 12.96, 4.01 and 48.33, 33.14, 7.04, 4.83%, respectively).

Other carcass traits. The average feet percentage was 2.19±0.04 and 2.11±0.01 in Simmental crossbreds in male and females, respectively while the corresponding values were 2.29±0.17 and 2.06±0.08 in Brown Swiss crossbreds, respectively. The present findings are in line with those of Ahmad *et al*. (1995) who observed the feet value of dairy crossbred calves as 2.29% while the value for crossbred dairy calves observed by Pasha *et al*. (1988) was lower (1.86%) than

Table II. Performance of beef crossbred calves

Parameters	Simmental x Dajal		Brown Swiss x Dajal	
	Male(1)	Female (2)	Male(3)	Female(4)
Average initial weight (Kg).	215	229	162	156
Average final weight (Kg).	360	369	272	270
Average daily weight gain (Kg).	1.21±0.10	1.17±0.10	0.92±0.10	0.95±0.10
Average daily ration intake (Kg).	8.56±0.60	8.58±0.67	7.22±0.60	6.67±0.60
Feed conversion ratio.	7.14±0.46	7.36±0.52	7.80±0.46	7.02±0.46
Meat bone ratio.	62:38	61:39	64:36	63:37

Table III. Carcass evaluation of two beef crossbred groups (mean±se)

Parameters	Simmental x Dajal		Brown Swiss x Dajal	
	Male	Female	Male	Female
Dressing Percentage	57.85±1.55	58.92±1.42	56.55±0.11	59.13±4.41
Lean Meat (%)	50.50±1.50	47.50±0.50	51.00±1.00	52.00±2.00
Bone (%)	30.50±2.50	30.50±0.50	28.50±0.50	29.50±0.50
Fat (%)	13.50±1.50	17.50±0.50	16.00±1.00	15.00±2.00
Offal Tissues (%)	5.50±0.50	4.50±0.50	4.50±0.50	3.50±0.50
OFFAL'S				
Head (%)	3.64±0.14	3.70±0.16	3.77±0.29	3.73±0.35
Skin (%)	11.52 ±0.19	10.32 ±0.02	10.87±0.47	9.94 ±0.44
Intestine (%)	4.15 ±0.28	4.97 ±0.53	4.77±0.30	4.47 ±0.14
Punch (%)	14.45 ±1.12	15.67 ±0.67	16.19 ±0.52	14.90±1.10
Fat (%)	1.12±0.06	1.146 ±0.06	1.00 ±0.04	1.30 ±0.21
E. Tissue (%)	3.16 ±0.26	3.04 ±0.14	3.70 ±0.25	3.40 ±0.00
Trotters (%)	2.19 ±0.04	2.11 ±0.01	2.29 ±0.17	2.06 ±0.08
Blood (%)	2.87 ±0.30	3.64 ±0.04	2.84 ±0.37	2.50±0.10
CHEMICAL COMPOSITION OF LEAN MEAT				
Moisture (%)	77.12 ±0.09	75.85 ±0.14	76.97 ±0.27	76.98 ±0.62
Crude Protein (%)	19.85 ±0.51	19.09 ±0.76	19.48 ±0.52	18.85 ±1.63
Dry Matter (%)	22.88 ±0.09	24.15 ±0.14	23.03 ±0.27	23.02 ±0.62
Ether Extract (%)	7.01 ±0.70	5.88 ±0.88	6.98 ±0.05	6.74 ±0.16
Ash (%)	1.19 ±0.20	1.27 ±0.29	1.31 ±0.24	1.02±0.06

those of the present study. The difference may be due to the genetic make up of the crossbreds

The average values for percentage of head to total live weight were 3.64±0.14 and 3.70±0.16 in Simmental crossbreds male and female, respectively. The corresponding values for Brown Swiss crossbreds were 3.77±0.29 and 3.73±0.35, respectively. The difference between the two genetic groups was non significant. These figures show that percentage of head to the total live weight in males of both the genetic groups are higher than from females. Ahmad *et al*. (1995) and Pasha *et al*. (1988) reported the average value for percentage of head to live weight as 4.06 to 4.10 in crossbred animals. The percentage of skin in Simmental crossbred for male and female was 11.52±0.19 and 10.32±0.02, respectively. The corresponding values for Brown Swiss crossbreds were 10.87±0.47 and 9.94±0.44, respectively. The percentage of blood drained varied from 2.87±0.30 to 3.64±0.04% in Simmental crossbreds and 2.84±0.37 to 2.50±0.10 in Brown Swiss crossbreds. The difference between the two genetic groups was non significant. The values recorded in the present study are in agreement with those of Pasha *et al.* (1988) who recorded this value as 2.92% for dairy crossbred calves. The amount of blood drained during slaughtering may depend on the slaughtering method and the physical condition of the animals.

Chemical Composition of Lean Meat

Moisture. The average values for moisture percentage observed in the present study in the lean meat of Simmental crossbreds were 77.12±0.09 and 75.85±0.14 for male and female, respectively. While the corresponding values for Brown Swiss crossbreds were 76.97±0.27 and 76.98±0.62, respectively (Table III). The difference between the two genetic groups was non significant. These values coincide with the findings of Joksimovic and Ognjanoic (1977) who observed 76.43% moisture in lean meat of crossbred calves. Also the results obtained by Ahmad *et al*. (1995) supports the finding of the present study who reported 77.78 and 73.34% moisture in lean meat of Sahiwal and buffalo calves, respectively.

Crude protein. The crude protein percentage in the lean meat of Simmental crossbreds were 19.85±0.51 and 19.09±0.76 in males and females, respectively and the corresponding values for Brown Swiss crossbreds were 19.48±0.52 and 18.85±1.63 in male and female, respectively (Table III). The difference between the two genetic groups was non significant. These results are in agreement with the study of Ahmad *et al*. (1995) who reported 20.12% crude protein in the lean meat of dairy crossbred calves.

Ether extract. The ether extract percentage in the lean meat of Simmental crossbreds were 7.01±0.70 and 5.88±0.88 in males and females, respectively while the corresponding values for Brown Swiss crossbreds were 6.98±0.05 and 6.74±0.16, respectively. These figures show that males have slightly higher values of ether extract than those of females (Table III). The difference between the two genetic groups was non significant. These values are higher than the findings of Tunguskor and Balkin (1971) who recorded 5.09% ether extract in the lean meat of dairy crossbred calves. However, these values are in agreement with those of Ahmad *et al*. (1995) who reported 7.76% in crossbred calves.

Ash. The ash contents in the lean meat of Simmental crossbreds were 1.19±0.20 and 1.27±0.29% in males and females, respectively. The corresponding values for Brown Swiss crossbreds were 1.31±0.24 and 1.02±0.06%, respectively (Table III), The difference between the two genetic groups was non significant. These values are similar to the findings of Pasha *et al.* (1988) who observed 1.63% ash contents in the lean meat of crossbred calves.

CONCLUSION

This was a preliminary study. However, it indicated that either of the two beef breeds i.e. Simmental and Brown Swiss may be used in beef crossbreeding program. It further indicated that beef crossbreds have better growth rate and dressing percentage than our local animals as well as dairy crossbreds. More studies on beef crossbreds regarding their adaptability, carcass evaluation on different slaughtering ages etc. in field conditions are suggested.

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