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ORIGINAL ARTICLE

Selection of suitable crossbred cattle for beef fattening program in Dhaka district of Bangladesh

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Abstract

Background: This study evaluated four crossbred cattle groups used for beef fattening in Dhaka district, Bangladesh, by comparing production performance, feed intake, feed cost, daily meat value, and profit. The objective was to identify the crossbred group most suitable for commercial beef fattening under farm conditions.

Methods: Data were collected at Sadeeq Agro Farm, Dhaka, from April to July 2023, around the Eid-ul-Azha marketing period. Forty cattle were assigned to four breed groups (n=10 each): Holstein Friesian×local, Brahma×local, Sahiwal×local, and Red-Sindhi×local. Data were analyzed in SPSS version 26.0 by one-way ANOVA under a completely randomized design, and mean differences were separated using Duncan's multiple range test at $P<0.05$.

Results: Holstein Friesian×local cattle had the highest body weights at both 2-3 years (742.70±23.79 kg) and 3-4 years (903.90±17.68 kg). Brahma×local cattle achieved the highest average daily weight gain (0.68±0.02 kg/day), daily meat value based on weight gain (576.40±19.29 BDT/day), and profit (248.05±21.06 BDT/day). Holstein Friesian×local cattle consumed the most roughage (14.70±0.30 kg/day) and concentrate (5.30±0.15 kg/day) and had the highest feed cost (380.50±10.42 BDT/day), whereas Red-Sindhi×local cattle had the numerically lowest feed cost (313.50±9.13 BDT/day).

Conclusion: Among the four crossbred groups, Brahma×local cattle offered the most favorable balance of daily gain, feed cost, daily meat value, and profit. Brahma crossbreds therefore appear suitable for beef fattening when breeding is managed through controlled mating and supported by appropriate feeding.

Keywords: Beef fattening, daily weight gain, concentrate, feed cost, profit.

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Introduction

Cattle fattening has become an important livelihood activity in Bangladesh because it can generate income within a relatively short production cycle. It is particularly useful for small farmers, landless households, and vulnerable rural groups seeking practical income opportunities (Ahmed et al., 2012). At the same time, productivity remains constrained by unbalanced feeding, disease outbreaks, water shortages, limited extension support, weak data systems, and gaps in marketing and processing services (Aynalem et al., 2011). A clearer understanding of current fattening practices is therefore needed to design systems that function effectively from farm production through to the consumer market (Teshager et al., 2013).

Livestock is one of the major agricultural subsectors in Bangladesh and contributes directly to food security, employment, household savings, manure supply, draft power, and rural livelihoods (Sarma et al., 2014). Rising demand for ruminant meat in urban markets has created stronger opportunities for cattle fattening and improved market returns (Kamal et al., 2019). When properly managed, cattle fattening can be a profitable enterprise with strong potential for smallholders (Asem-Hiablie et al., 2018).

Farmers commonly buy young or underconditioned cattle from local markets, improve their condition through better feeding and care for three to seven months, and then sell them to butchers or other farmers. Although several studies have examined cattle marketing and fattening practices (Ahmed, 1992; Halim, 1998; Nabi, 1998; Begum et al., 2007), fewer have compared the cost and return of fattened crossbred beef cattle under specific district-level farm conditions.

Beef cattle fattening also helps meet the country's growing demand for high-protein food. In addition to supporting food security, it provides income, employment, investment opportunities, and a store of household value. It also contributes to crop production by supplying organic fertilizer and draft power. In northern Bangladesh and other cattle-producing areas, fattening programs supported by microcredit and improved management can strengthen household income and meat availability (Jean, 1993; Uza et al., 1999; Maikasuwa et al., 2012).

Common cattle types in Bangladesh include Sahiwal, Red-Sindhi, Holstein Friesian, Jersey, Brahman, and indigenous breeds. Indigenous cattle make up a large share of the national herd, but their mature live weight is usually lower than that of exotic and crossbred cattle (Bhuiyan, 2007). Some indigenous types, such as Red Chittagong, Pabna, and Munshiganj cattle, are valued for adaptive traits and local production potential (Hossain et al., 2005; Khan et al., 2012). Crossbreeding, however, may improve growth performance and meat production when paired with appropriate feeding and management.

For rural households, cattle fattening is often carried out alongside crop production. Farmers are directly involved in feeding, housing, breeding, artificial insemination, health care, sanitation, marketing, and waste management (Rahman et al., 2002; Kamal et al., 2019). The present study was conducted to compare the growth performance, feed use, feed cost, daily meat value, and profit of different crossbred cattle groups and to identify a suitable crossbred type for beef fattening.

Materials and methods

Study area and period

The study was conducted at Sadeeq Agro Farm in Mohammadpur, Dhaka, Bangladesh. Data collection took place from April to July 2023, around the Eid-ul-Azha marketing period. Breed-group suitability for beef fattening was assessed using body weight, average daily weight gain, feed intake, feed cost, daily meat value, and profit.

Sampling procedure

A commercial beef-fattening farm was purposively selected so that relevant production and economic data could be collected directly from cattle managed under farm conditions.

Selection of breeds

Four crossbred cattle groups were included: Holstein Fieian×Local, Brahma×Local, Sahiwal×Local, and Red-Sindhi×local. Ten animals were selected from each group, giving a total sample size of 40 cattle (Table 1).

Table 1. Selection of different crossbred cattle groups.

Division	District	Name of breeds	No. of animals
Dhaka	Dhaka	Holstein Friesian×local	10
		Brahma×local	10
		Sahiwal×local	10
		Red-Sindhi×local	10
	Total		40

(Source: Field survey, 2023)

Data collection and reliability

Information was collected from farm owners and managers using a structured questionnaire. The schedule covered farm characteristics, production practices, management, marketing, and financial information. The objectives of the study were explained to respondents before and during interviews to support accurate and voluntary responses.

Parameters studied

The questionnaire recorded breed group, body weight, feed type and source, feed intake, treatment practices, management, marketing, and cost information. Feed was classified as roughage or concentrate and, by source, as naturally available feed or purchased market feed.

Data calculation

Average daily weight gain was calculated for each animal over the recorded fattening period as the change in body weight divided by the corresponding number of days and was expressed as kg/day.

Feed cost (BDT/day) was calculated as the sum of roughage cost and concentrate cost during the study period.

Daily meat value (BDT/day) was estimated as average daily weight gain multiplied by the market price of BDT 850/kg. Profit (BDT/day) was calculated by subtracting feed cost and other recorded operating costs from daily meat value: Profit = daily meat value - (feed cost + other costs).

Data processing and statistical analysis

After data collection, responses were checked, coded, organized, and entered into Microsoft Excel. The complete dataset was then analyzed in SPSS version 26.0 using one-way ANOVA under a completely randomized design. Duncan's multiple range test was used to compare means, and differences were considered significant at $P<0.05$.

Results and discussion

Production performance

The production performance of Holstein Friesian×local, Brahma×local, Sahiwal×local, and Red-Sindhi×local cattle was compared using body weight, average daily weight gain, feed intake, feed cost, daily meat value, and profit.

Body weight

Body weight differed significantly among the crossbred groups ($P<0.05$; Table 2). At 2-3 years of age, Holstein Friesian×local cattle had the highest mean body weight (742.70±23.79 kg) and differed significantly from Brahma×local (621.60±7.76 kg), Red-Sindhi×local (596.00±11.94 kg), and Sahiwal×local (592.30±13.58 kg), which shared the same superscript. A similar pattern was observed at 3-4 years, when Holstein Friesian×local cattle again had the highest mean body weight (903.90±17.68 kg), followed numerically by Brahma×local (766.10±12.30 kg), Red-Sindhi×local (736.10±9.75 kg), and Sahiwal×local (735.50±10.68 kg), with the latter three groups not differing significantly from one another.

Although Holstein Friesian×local cattle were heavier overall, Brahma×local cattle maintained the highest numerical body weight among the remaining three groups. These findings are broadly consistent with earlier reports that crossbred animals generally weigh more than local non-descript cattle (Sarder et al., 1997). Alam et al. (2010) also reported variation in mean body weight among Holstein Friesian, Jersey, Sahiwal, Red-Sindhi, Brahman, and Haryana crosses.

Table 2. Selection of suitable crossbred cattle for beef fattening based on body weight and average daily weight gain.

Breed	**Body weight at 2-3 years (kg) Mean±SE**	**Body weight at 3-4 years (kg) Mean±SE**	Average daily weight gain (kg/day) Mean±SE
Holstein Friesian×local	742.70a±23.79	903.90a±17.68	0.62b±0.02
Brahma×local	621.60b±7.76	766.10b±12.30	0.68a±0.02
Sahiwal×local	592.30b±13.58	735.50b±10.68	0.52c±0.01
Red-Sindhi×local	596.00b±11.94	736.10b±9.75	0.58b±0.01
Average	638.15±12.31	785.40±12.76	0.60±0.01
Level of significance	*	*	*

Means with different superscripts differ significantly ($P<0.05$). Means with the same superscripts do not differ significantly ($P>0.05$). SE = standard error.

Average daily weight gain

Average daily weight gain also varied significantly among breed groups (P<0.05; Table 2). Brahma×local cattle showed the highest gain (0.68±0.02 kg/day), while Sahiwal×local cattle showed the lowest gain (0.52±0.01 kg/day). Holstein Friesian×local and Red-Sindhi×local cattle recorded intermediate gains of 0.62±0.02 and 0.58±0.01 kg/day, respectively, and did not differ significantly from one another.

The stronger gain of Brahma×local cattle supports previous findings on Brahman-derived crossbreds. Habib et al. (2003) reported much lower gain in indigenous cattle, while Taslim (2014), Saha (2016), and Tahira (2018) observed that location, sire, and sex influenced Brahman crossbred growth. Haque et al. (2016) also reported higher average daily gain in Brahman crosses with greater Brahman inheritance, suggesting that genotype and environment both contribute to growth performance.

Feed intake

Feed intake differed significantly across the groups (P<0.05; Table 3). Holstein Friesian×local cattle consumed significantly more roughage (14.70±0.30 kg/day) than the other groups, whereas Sahiwal×local cattle had the numerically lowest roughage intake (13.30±0.30 kg/day). Concentrate intake was also highest in Holstein Friesian×local cattle (5.30±0.15 kg/day). Brahma×local cattle had the numerically lowest concentrate intake (4.35±0.11 kg/day), although Brahma×local, Sahiwal×local, and Red-Sindhi×local cattle shared the same superscript for concentrate intake.

Feed quality and feeding practice are central to growth, health, and productivity. A balanced diet is required for maintenance and production, and concentrate supplements often include agro-industrial and animal by-products such as wheat bran, broken maize, soybean meal, oil cakes, fishmeal, and blood meal (Huq et al., 1993). Kamal et al. (2019) reported that most beef-fattening farmers supplied both roughage and concentrate, although many animals still received diets that were not fully adequate for maintenance and production.

Table 3. Selection of suitable crossbred cattle for beef fattening based on feed intake and feed cost.

Breed	**Roughage intake (kg/day) Mean±SE**	**Concentrate intake (kg/day) Mean±SE**	Feed cost (BDT/day) Mean±SE
Holstein Friesian×local	14.70a±0.30	5.30a±0.15	380.50a±10.42
Brahma×local	13.90b±0.10	4.35b±0.11	318.75b±5.81
Sahiwal×local	13.30b±0.30	4.70b±0.15	335.00b±9.83
Red-Sindhi×local	13.40b±0.27	4.60b±0.16	313.50b±9.13
Average	13.83±0.15	4.74±0.09	336.94±6.03
Level of significance	*	*	*

Means with different superscripts differ significantly (P<0.05). Means with the same superscripts do not differ significantly (P>0.05). SE = standard error.

Feed cost

Feed cost differed significantly among breed groups (P<0.05; Table 3). Holstein Friesian×local cattle had the highest feed cost (380.50±10.42 BDT/day), while Red-Sindhi×local cattle had the numerically lowest feed cost (313.50±9.13 BDT/day). Brahma×local cattle had a numerically lower feed cost (318.75±5.81 BDT/day) than Sahiwal×local cattle, but Brahma×local, Sahiwal×local, and Red-Sindhi×local cattle shared the same superscript and therefore did not differ significantly from one another.

Feed is typically the largest cost in cattle production (Duguma and Janssens, 2016; Belachew et al., 1994). Shamsuddin et al. (2006) reported feed costs ranging from BDT 289.43 to BDT 423.12, while Kamal et al. (2019) found that cattle-fattening farms used intensive, semi-intensive, and extensive management systems. Differences in management system and feed strategy can therefore strongly influence profitability.

Profit

Profit based on daily weight gain varied significantly among breed groups (P<0.05; Table 4). Brahma×local cattle generated the highest profit (248.05±21.06 BDT/day), followed numerically by Red-Sindhi×local (165.20±14.90 BDT/day), Holstein Friesian×local (127.25±21.89 BDT/day), and Sahiwal×local (84.10±14.03 BDT/day). Superscripts indicated that Brahma×local cattle differed significantly from all other groups, while Holstein Friesian×local cattle were statistically intermediate and overlapped with both Red-Sindhi×local and Sahiwal×local cattle.

Although beef cattle farming remains a promising enterprise, many farmers still follow traditional

fattening practices, especially when marketing cattle for Eid-ul-Azha. Ahmed et al. (2021) reported a profit margin of BDT 15,947.56 per animal in small-scale beef fattening. Sarma et al. (2014) also reported positive returns from rural cattle fattening, with an average return of 52% on each BDT invested, showing that well-managed beef fattening can remain financially attractive.

Table 4. Selection of suitable crossbred cattle for beef fattening based on daily meat value and profit.

Breed	**Average daily weight gain (kg/day) Mean±SE**	Daily meat value at BDT 850/kg (BDT/day) Mean±SE	Profit (BDT/day) Mean±SE
Holstein Friesian×local	0.62b±0.02	522.75b±15.89	127.25bc±21.89
Brahma×local	0.68a±0.02	576.40a±19.29	248.05a±21.06
Sahiwal×local	0.52c±0.01	438.60c±12.17	84.10c±14.03
Red-Sindhi×local	0.58b±0.01	495.10b±12.43	165.20b±14.90
Average	0.60±0.01	508.21±10.81	156.15±13.07
Level of significance	*	*	*

Means with different superscripts differ significantly ($P<0.05$). Means with the same superscripts do not differ significantly ($P>0.05$). SE = standard error.

Conclusion

This study compared four crossbred cattle groups for beef fattening using production, feeding, and economic indicators. Holstein Friesian×Local cattle had the highest body weight at both age points, but Brahma×Local cattle achieved the highest average daily weight gain, required less concentrate than Holstein Friesian×Lsocal cattle, and produced the highest daily meat value and profit. These results indicate that Brahma×Local cattle offer the strongest overall balance for beef fattening under the conditions of this study. With controlled mating and appropriate management, Brahma crossbreds can be considered a suitable choice for beef fattening programs in Dhaka district.

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Authors' contributions

Lam Yea Asad (LYA), Md. Sharif Ahmed (MSA), Al-Nur-Md. Iftekhar Rahman (ANMIR), and Md. Abdur Raihan Ratul (MARR) contributed to the study. LYA handled project administration, conceptualization, supervision, and manuscript review. MSA contributed to data collection, investigation, methodology, formal analysis, and original draft preparation. ANMIR reviewed and edited the manuscript. MARR contributed to data analysis, review, and editing. All authors read and approved the final manuscript.

Conflicts of interest

The authors declare that they have no conflicts of interest.

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