Qeios

Economics of Cattle Fattening: The Case of Bangladesh

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ABSTRACT

In Bangladesh, more than 90% of people are Muslim. During Eid-Ul-Azha, around 4.58 million cattle are slaughtered—almost half of the yearly total of 10.04 million cattle slaughtered. Thus, the demand for beef cattle is particularly high during Eid, and as a result raising and fattening of cattle is a popular trade. The present study was conducted to investigate cattle fattening profitability and its marketing. The data were collected through structured interviews with 90 farmers, 15 beparies, and 15 meat sellers. Descriptive statistics and multiple regression analysis were applied to determine the factors that affect profitability. According to the analysis, about 53% of farmers fattened cattle during the whole year, while 47% of farmers fattened cattle only before Eid-Ul-Azha. The average benefit-cost ratio was estimated to be 1.25, which implies that beef cattle fattening is a profitable enterprise. The coefficients of the variables of treatment cost, feeding cost, and labour cost were significant at the 1% level, indicating a positive association with profitability. The average net return for beparies was BDT 1,964, and the average net return of meat sellers was BDT 1,944. The predominant marketing channels were identified as (i) farmer–bepari–meat-seller–consumer and (ii) farmer–bepari–consumer. However, the preferable channel was farmer-consumer because this channel enabled farmers to maximise profit. Marketing efficiency was also the highest in this channel.

We recommend the provision of appropriate education and training as well as improved access and availability of market information to reduce the challenges of establishing sustainable cattle fattening practices in Bangladesh.

1. Introduction

Livestock systems represent a potential pathway out of poverty for many smallholders in developing countries like Bangladesh. Most of the world's rural poor, as well as a significant proportion of the urban poor, keep livestock and use animals in a variety of ways that extend far beyond income generation (Randolph et al., 2000; Bayer et al., 2004; and Ruhangawebare, 2010). In many cases, livestock is a central component of smallholder risk management strategies (Bailey et al., 1999). Livestock keeping in Bangladesh is largely a rural activity, with more than 85% of households keeping livestock (DLS, 2015). Statistics show that out of 3.33 million households in the country, 53% keep at least one type of livestock. It is estimated that the cattle population in Bangladesh is about 24.8 million, ranking 12th in the world and 3rd among Asian countries (FAO, 2010), and the livestock sector contributes 1.85% to the national GDP (Gross domestic products) (DLS, 2023). Although livestock production is the second most important among all sectors of agriculture in Bangladesh (BER, 2012), production and consumption of livestock products are still much lower in comparison to other countries. At the household level, livestock plays vital economic and social roles in the lives of pastoralists and agro-pastoralists. In addition, beef cattle fulfil an important function in coping with economic shocks, accumulating wealth, and storing value in the absence of formal financial institutions and other missing markets (Negassa et al., 2011). Although there are many cattle all over the country, the contribution of livestock to pastoral livelihoods is substantially limited due to market constriction (MLFD, 2010). Mlote et al. (2012) argued that among the factors that prevent farmers from benefiting from the potential markets of their beef animals is inadequate market information for their livestock. Other factors include inadequate marketing infrastructure (Mahabile et al., 2000; Williams et al., 2006; MLFD, 2006) and the prevalence of illnesses like tick-borne diseases and foot and mouth disease (FMD; Duvel and Stephanus, 2000). Livestock is not only a source of food and income but also a buffer against the main three pathways of poverty (1) securing the assets of the poor, (2) improving smallholder and pastoral productivity, and (3) increasing market participation by the economically disadvantaged people. Large ruminants comprise cattle and buffalo, while small ruminants include sheep and goats; the latter group constitutes the majority of livestock in Bangladesh. It is sometimes argued that the real contribution of the livestock sector to GDP is underestimated by more than a third because, in conventional GDP calculation, the values of draught power and animal dung (used as manure and fuel) are not included (Dickey and Huque 1986). Conversely, it can also be argued that the values of paddy straw and other crop residues, which are the main animal feeds, are not included in crop sector GDP calculation. Ideally, these items should be included in national input-output and social accounting matrices, but thus far this has not been done, likely because of a lack of accurate data. In fact, the available data on livestock are considered both inadequate and poor in quality compared to crop statistics (Jabber and Green, 1983). Animal fattening is a highly profitable venture that offers farmers premium returns. Bangladesh is a low-lying, densely populated country with more than 160 million people, about 75% of whom live in rural areas. The rural poverty rate is 20.5%, whereas the overall poverty rate is 18.2%, of which 12.9%

is extreme (HIES, 2022). Northern Bangladesh is currently working to develop its agribusiness through potential cattle fattening practices. Cattle fattening, which is mostly conducted through micro-credit activities, could form an appropriate tool for poverty alleviation and improvement in food security (Maikasuwa et al., 2012). Bangladeshi cattle are an inseparable and integral part of the agricultural farming and agribusiness system. Beef fattening is an emerging sector for employment and income generation for the rural poor, especially landless, destitute, and divorced women (Ahmed, 2010). One of the advantages of cattle fattening for rural farmers is that farmers use locally available cattle feed resources during the Eid-Ul-Azha (the most important Islamic religious festival) festival. In recent years, female Bangladeshi farmers have been involved in beef fattening programs in rural areas of the country. Cattle fattening practice was assessed considering general husbandry issues like major feed resources, watering, housing and healthcare, source of fattening cattle, selection criteria for purchasing of fattening cattle, method and length of feeding, season of fattening, and live-weight change of the fattening cattle. The marketing system of fattening cattle was assessed by considering the purchasing and selling place, market participants, and purchasing and selling price of fattened cattle in the study areas. In Bangladesh, numerous studies have been conducted on growth trials for local male cattle based on different diets, with findings demonstrating different growth responses. During the holy Eid-Ul-Azha festival, Muslims practice Kurbani (i.e., the sacrifice of livestock), slaughtering animals including cows, goats, camels, and sheep. Bangladeshi Muslims celebrate Eid-Ul-Azha, and approximately 1.8 million cattle are sacrificed within two or three days for this occasion each year (Sujan et al., 2011). Accordingly, the demand for cattle, and especially beef cattle, increases by several times during Eid-Ul-Azha. The price of beef has also risen worldwide currently. Hence, many poor people are involved in bull fattening in the three to four months prior to Eid-Ul-Azha because they can sell the animals for a high margin. Understanding these points is important for cattle-fattening farmers and market analysts. The present research provides further insight into the design and improvement of strategies for alleviating the shortage of quality live animals (cattle) in markets; to this end, the study assesses the beef cattle fattening system, marketing, and marketing challenges and opportunities.

Though Bangladesh has hosted beef fattening programs in rural areas of the country, the literature on cattle fattening by small farmers in rural areas is sparse (Hossain et al., 1996; Huq et al., 1997 and Hashem et al., 1999). To develop a sustainable beef cattle production system in Bangladesh beginning with the farmer level and production and ending with the consumer level and consumption, it is necessary to understanding the existing beef cattle production, marketing, and processing systems. Many studies have demonstrated that beef cattle fattening has substantial potential to improve the standard of living both through improved nutrition due to increased meat consumption as well as improved incomes from the sale of cattle and beef products.

Despite the significance of the beef cattle sub-sector in Bangladesh, there are a number of constraints facing livestock farmers. These include inadequate marketing information, especially on prices; poorly

developed marketing infrastructure; weak institutional, legal, and regulatory frameworks; and inadequate access to financial services for livestock-rearing activities.

The overall objective of this study is to identify the profitability and marketing system of cattle fattening. The specific objectives of the study are as follows: (i) to assess the socioeconomic characteristics and factors influencing beef cattle profitability, (ii) to identify the marketing channels of fattened cattle and evaluate marketing margin obtained by market actors along the channel, (iii) to determine the marketing efficiency in various fattened cattle marketing channels, and (iv) to identify the problems faced by cattle fattening farmers and market intermediaries.

The rest of the article is organised as follows. Section 2 provides the review of the literature on cattle fattening around the world. Section 3 then presents a detailed description of the study areas and methodology. After this, Section 4 outlines the profitability of cattle fattening as well as its marketing channels and marketing margin in terms of marketing efficiency. Section 5 offers the conclusion and recommendations of the study.

2. Literature Review

This chapter reviews previous studies on cattle fattening, marketing systems, and marketing margins. As of the time of writing, no specific study on cattle fattening and marketing systems has been conducted in Bangladesh. However, Nabi (1998) conducted a study on beef cattle marketing in Bangladesh, demonstrating that meat sellers most often slaughtered aged draft animals or aged milk cows. Of the animals slaughtered, 47% were cows, 30% bullocks, 10% bulls, and 13% heifer calves and bull calves. Hossain and Chandra (2002) studied the beef cattle marketing system in Bangladesh, focusing on the marketing margin and marketing costs of beef cattle. They used primary data collected randomly from 71 intermediaries from different market levels. Farmer, Bepari-1, Bepari-2, Dalal[1], and Meat Seller involved in beef cattle marketing formed the four different marketing channels in the study area. Approximately 15% of the total cattle sold in the study area were brought from abroad, while the rest were produced locally and purchased through dalals. Alemayehu (2003) conducted a study on the marketing process in Ethiopia, which generally follows a three-step system consisting of primary, intermediate, and terminal markets; marketable animal and animal products are passed through these markets from producers to small traders and on to large traders and meat sellers. However, most producers sell their stock and livestock products at local markets directly to consumers or small traders at relatively low prices.

Baset et al. (2003) studied beef cattle production in Bangladesh. They determined that a large number of farmers are involved in bull fattening only in the three to four months before Eid-Ul-Azha, when they can sell the animals at profitable prices. Farmers in Baset et al.'s (2003) sample used three-year-

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[1] Dalal is an agent who takes a commission from the sellers and buyers. Sometimes takes commission from the sellers or buyers only.

old cattle for beef fattening. The cattle fattening period is 4.5 months in rural areas of Bangladesh. Lapar et al. (2003) conducted a study in Vietnam and found that most farmers do not have access to organised markets. Beef cattle marketing is composed of four middlemen: trader, wholesaler, slaughterer, and retailer. Abeyrante (2007) conducted a study in Sri Lanka and concluded that the Sri Lankan marketing system has evolved through the active participation of private meat sellers and agents; the farmer receives less than 40% of the retail price of meat, while the rest of the profit goes to the middlemen.

Elias et al. (2007) indicated that the livestock marketing structure follows a four-tier system in which different actors are involved in buying and selling beef cattle in the market. The main actors of the first tier are local farmers and rural traders who transact at the farm level with very minimal volume, (i.e., 1–2 animals per transaction, irrespective of species involved). Some traders may specialise in either small or large animals. Small traders from different areas bring their livestock to the local market (second tier). Traders purchase a few large animals or a fairly large number of small animals to sell to the secondary markets. In the secondary market (third tier) both smaller and larger traders operate, and traders and meat sellers from terminal markets come to buy animals. In the terminal market (fourth tier), big traders and meat sellers transact a larger number of mainly slaughter-type animals.

According to EntrePinoyAtbp (2008), cattle marketing in the Philippines is characterised by the existence of many middlemen in the distribution network; this is to the disadvantage of both producers, who receive relatively low prices for their animals, and consumers, who pay a high price for meat products. In the same study, EntrePinoyAtbp (2008) showcased that the gross margin derived from selling a head of cattle is 60%–88%. Middlemen usually have bigger margins because cattle are bought from farmers at a much lower price.

Ahmed et al. (2010) conducted a study on factors related to small-scale cattle fattening and their systems of management. The data were collected through interviews with 215 respondents involved in small-scale cattle fattening from 24 districts in 52 upazilas. Most of the respondents (79.1%) fattened cattle for 3–6 months, while the rest fattened for a prolonged period. About 90.2% of respondents used their own capital for cattle fattening. About 79.5% did not have any training on cattle fattening. whereas about 20.5% had taken a short training on cattle fattening. Approximately 63.7% of respondents used cattle fattening tablets, 27% of respondents used urea molasses straw (UMS), and 51% followed conventional feeding methods.

Kadigi et al. (2013) studied the value chain of indigenous cattle and beef products in the Ilemela and Magu districts. They observed that there was weak vertical and horizontal coordination along the beef cattle value chain. Furthermore, the authors contended that the largest share of gross margin was earned by meat sellers. A comprehensive policy for the livestock sector was launched in 2005, thus its effective implementation and success remain to be seen. The government should encourage private investment in the livestock sector, but quality assurance of drugs, vaccines, feeds, and breeding materials through legal and regulatory frameworks is necessary for sustainable development of the livestock sector.

As shown above, many studies on cattle fattening and marketing systems have been conducted in different parts of the world, but only a few studies have been conducted in Bangladesh. Thus, the present study was undertaken to analyse the profitability of cattle fattening and the marketing channels of fattened cattle in the Bangladeshi context.

3. Materials and Methods

3.1 Data

The study was conducted in three districts, namely Kushtia, Joypurhut, and Dhaka, based on cattle fattening density and marketing. One upazila was selected from each district: Kushtia Sadar (Kushtia district), Pachbibi (Joypurhut district), and Dhamrai (Dhaka district) (Figure 1). For this study, both primary and secondary data were used. Primary data sources included cattle fattening farmers, beparies (middlemen), and meat sellers. Primary data were collected via interviews. Three separate sets of questions were constructed for this purpose. One set of questions was used for cattle fattening farmers, one for beparies, and one for meat sellers. The questionnaires were developed to capture all relevant data. The interviews were pre-tested before finalisation. The total sample size was 120 and comprised 90 cattle fattening farmers, 15 beparies, and 15 meat sellers. Primary data were collected from July to August 2018 via direct interviews during personal visits to the participants' houses. The objectives of the study were clearly explained to the respondents before data collection.

Secondary data sources included various publications from Bangladesh and abroad. Examples of secondary sources are Bangladesh Bureau of Statistics (BBS) reports, Planning Commission of Bangladesh reports, Department of Livestock Services (DLS) reports, and studies on cattle fattening and marketing.
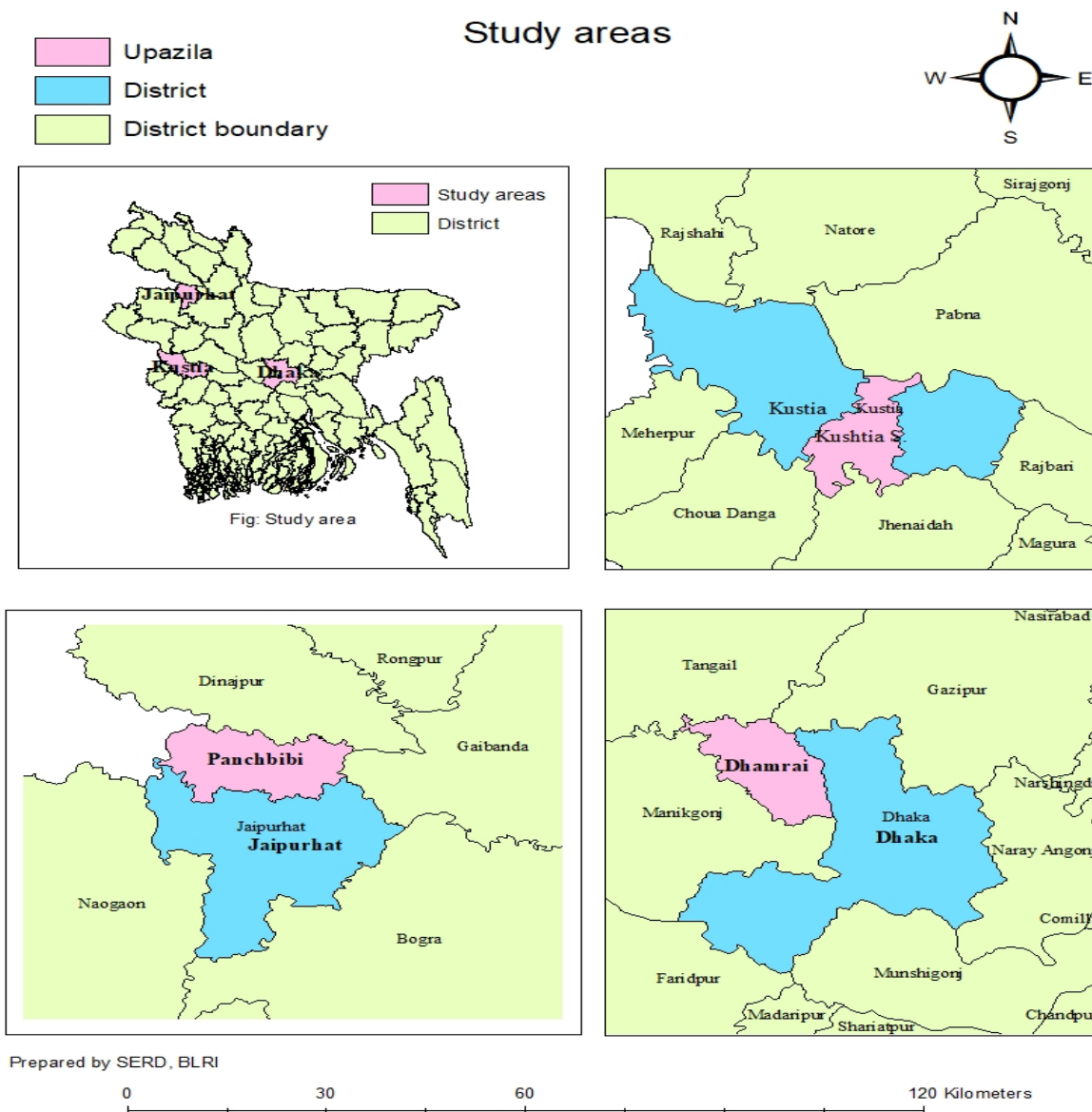
Figure 1 Study areas

3.2 Analytical techniques

3.2.1 Profitability analysis

Costs and returns analyses were done on a total cost basis. The following formula was used to assess the profitability of cattle-fattening farmers:

$$\prod i = \sum_{i=1}^{n} P_i Q_i - TC = \sum_{i=1}^{n} P_i Q_i - (VC + FC) \text{--------------------(i)}$$

Where $\prod i$ = Profit from i^{th} cattle fattening farmers (BDT[2] /cattle); Q_i = Quantity of the ith cattle fattening farmers (No. /year); P_i = Average price of ith fattened cattle (BDT /cattle); TC = Total cost (BDT /cattle); FC = Fixed cost (BDT /cattle); I = 1, 2, 3,... n. Per year profitability of cattle fattening from the viewpoint of individual farmers was measured in terms of gross return and gross margin.

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[2] BDT stands for Bangladeshi taka (currency of Bangladesh). As of December 7th, 2023; 1 US$ = 110.25 BDT.

3.2.2 Gross margin

To estimate the marketing margin earned by beparies and meat sellers, the following formula was used:

$$GM_i = PR_i - PP_i \text{---(ii)}$$

Where, GM_i = Gross margin (BDT /cattle) for i^{th} intermediaries; PR_i = Price received (BDT/cattle) by i^{th} intermediaries; PP_i = Price paid (BDT /cattle) by i^{th} intermediaries.

3.2.3 Net margin

To estimate the net margin earned by beparies and meat sellers, the following formula was used:

$$NM_i = GM_i - MC_i\text{---(iii)}$$

Where, NM_i = Net margin (BDT /cattle) for i^{th} intermediaries; MC_i = Marketing cost incurred (BDT/cattle) for i^{th} intermediaries.

3.2.4 Determinants of profit function

To determine the contributions of the most important variables in the cattle fattening process, the Cobb-Douglas production function was estimated. Nine variables were used to understand the production of cattle fattening. Before constructing the profit function, multicollinearity was checked among the explanatory variables. The general model was specified to adequately explain the production process of cattle fattening. To explore the input-output relationship of cattle fattening, the following linearised Cobb-Douglas production function model was used:

$$LnY = lna + b_1 lnX_1 + b_2 lnX_2 + b_3 lnX_3 + b_4 lnX_4 + b_5 lnX_5 + b_6 lnX_6 + b_7 lnX_7 + b_8 lnX_8 + Ui \ldots\ldots(iv)$$

Where Y = Gross return from cattle fattening (BDT/cattle); X_1 = Age; X_2 = Education; X_3 = Family size; X_4 = Farm size; X_5 = Purchase price of cattle (BDTT); X_6 = Treatment cost (BDT); X_7 = Feed cost (BDT); X_8 = Labour cost (BDT); b_1-b_8 = Coefficient of the relevant variables; ln = Natural logarithm; U_i = Disturbance term; a = Intercept.

3.2.5 Producer's share of consumers' taka

Farmers' share was calculated by the following formula:

$$\text{Farmer's share to the consumer's taka} = \frac{\text{Price received by the farmer}}{\text{Price paid by the retailers}} \times 100\text{--------(v)}$$

3.2.6 Return over investment (ROI)

To estimate the return over investment for the bepari and meat seller, the following formula was used:

Return over investment (ROI) = (Net margin ÷ Total investment) × 100---------(vi)

Where Total investment = Purchase price + Marketing cost

3.2.7 Marketing system

The network analysis was performed using a graphical technique. First, market actors were identified. Then, the volume of trade through each actor was measured. Finally, a market chain was drawn.

3.2.8 Marketing efficiency

An ideal measure of marketing efficiency considers all the following: a) Total marketing costs (TMC); b) Net marketing margins (NMM); c) Prices received by the farmer (FP); d) Prices paid by the consumer (CP). As there is an exact relationship among four variables, namely a + b + c = d, any three of these

could be used to arrive at a measure for comparing marketing efficiency. Acharya (1999) suggested the following modified measure.

$$MME = \frac{FP}{MC+MM} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\text{(vii)}$$

Where MME is the modified measure of marketing efficiency, FP is the price received by the farmer, and MC and MM are marketing costs and marketing margins, respectively.

4. Results and Discussion

4.1 Farmers' socioeconomic characteristics

Respondents' socioeconomic attributes have a significant impact on farm production, marketing, and marketing decisions regarding where and when to sell products. According to Randela (2005), household demographic characteristics are essential when analysing economic data because such factors influence the households' economic behaviour. In the case of beef cattle fattening, socioeconomic characteristics include age, educational qualification, years of experience, duration of fattening by respondents, types of cows preferred for fattening, and number of animals fattened by the respondents at a time. In this study, slightly over one-third (39%) of the farmers were between 31–40 years old, 23% were 41–50, 20% were below 30, and 18% were over 50. Around 52% of farmers had agriculture as their main occupation, while 26% business and 12% service meaning that households' prime income source was agriculture. Many of the respondents mainly depended on livestock keeping, indicating that the livestock sector is the main economic activity in all the upazilas. This also means that, if livestock keeping is properly managed, this will contribute significantly to average household income and the regional economy as well. Regarding education, 43% of farmers had completed primary level education, 17% Secondary School Certificate (SSC), 26% illiterate, 6% Higher Secondary School Certificate (HSC) and 9% above degree level (Figure 2). The average family size was 4.92, which was slightly higher than the national average of 4.26 (HIES, 2022), and the average dependency ratio was 1.80. Average farm size was 1.22 acres, falling within the small farm category (Figure 3). A total of 61% of farmers used crossbred cattle for fattening, followed by 27% native cattle and 12% both types of cattle. The farmers viewed crossbred cattle as fast-growing and more profitable than native cattle (Annexure A1). In addition, meat sellers stated that the crossbred meat has a lower percentage of fat. Additionally, 79% of farmers bought cattle from a recognised nearby cattle market in the upazila,[3] while 14% own farms and the rest of both farms and markets for fattening of cattle. Furthermore, 53% of farmers engaged in cattle fattening the whole year, whereas 47% only did so before Eid-Ul-Azha, supporting that farmers use cattle fattening as an additional income-generating activity.

Regarding feed processing for cattle fattening, 41% of farmers confirmed that they had knowledge of silage, hay, and urea molasses straw (UMS) preparation and conservation, but the remaining 59% of farmers had no proper knowledge of feed processing. Thus, farmers require greater knowledge of cattle

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[3] Upazila is an administrative unit. An upazila is made up of a few villages or unions. It is the 3rd tier (from top to bottom) in the 4-tier (division-district-upazila-union) administrative system of Bangladesh.

fattening if they intend to join the fattening business. The study also found that among the farmers, only 22% had completed training on scientific management practices for cattle fattening from the Department of Livestock Services (DLS), and the average duration of these trainings was 4.25 days. However, most of the farmers did not undergo any training before starting a fattening farm. Maximum respondents have a connection with Upazila Veterinary Hospital[4] (UVH). Moreover, 94% of farmers stated that for the purpose of treatment of their livestock, they had taken treatment and other advisory services from the Upazila Veterinary Hospital. They reported normally going to the hospital with their sick cattle, but sometimes the veterinary doctors or other employees would make home visits. On average, per batch fattened cattle population was found 2.74, and the duration of fattening was 3.8 months. Ownership and responsibility of the cattle for fattening was measured according to three groups: male, female, and both. In 3% of the farms studied only males took care of the cattle without any female participation. In 9% of farms only females took care of the cattle without any help from males. In approximately 88% of farms, both male and female members of the household managed the cattle. On average, farmers spent 3.7 hours daily for cattle fattening purposes.

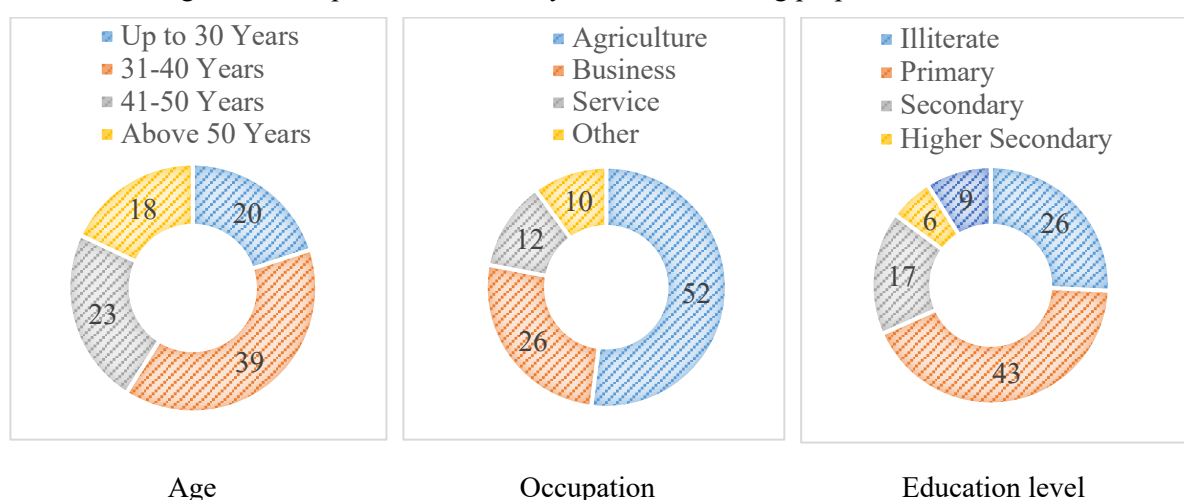| Age | Occupation | Education level |

Figure 2 Socioeconomic features of the meat seller

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[4] Upazila Veterinary Hospital (UVH) is a government veterinary hospital for provides veterinary services to farmers who seek consultancy for their livestock and pets at the upazila level.
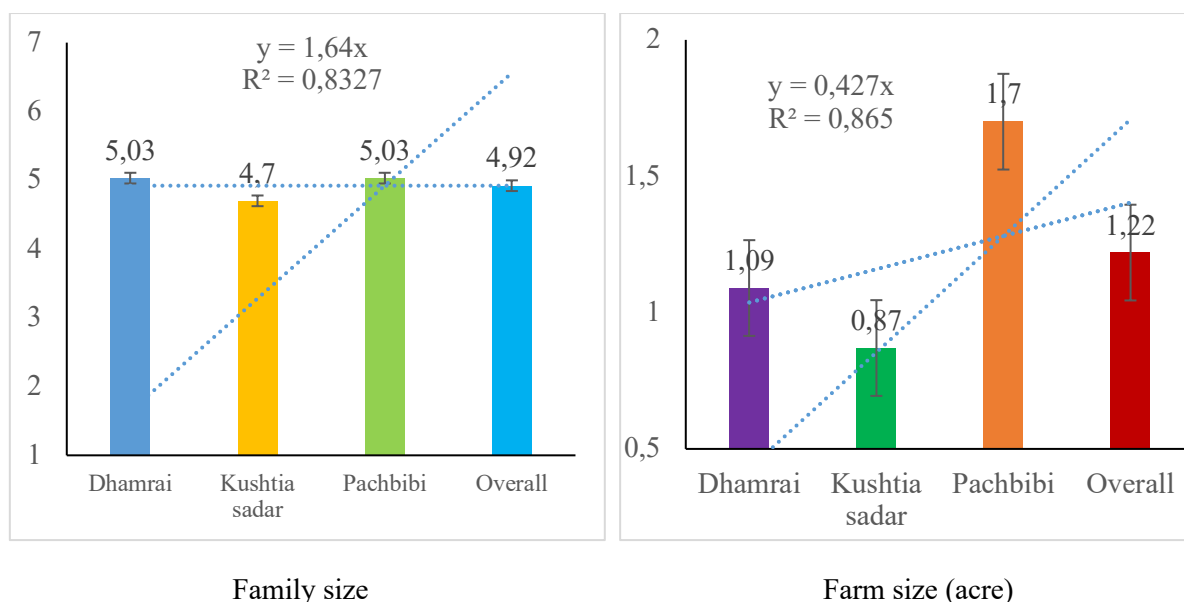
$y = 1{,}64x$
$R^2 = 0{,}8327$

$y = 0{,}427x$
$R^2 = 0{,}865$

Family size

Farm size (acre)

Figure 3 Family size and farm size of the meat seller

4.2 Costs and returns of cattle fattening for farmers

The cost of cattle fattening comprises two main components, variable costs and fixed costs. The variable cost of fattening encompasses various input costs such as the initial price of cattle (i.e., purchase price), feed, healthcare services, equipment, electricity, interest on operating capital, and so on. On the other hand, fixed costs cover depreciation on fixed capital and labour costs. Human labour cost is an important factor in cattle fattening. Both family and hired labour were used in cattle fattening among study participants. Family labour is often considered to be a fixed input. In this case, family labour included the owner themselves and other male and female working members of the family. Operating expenses, determined by the summation of variable costs, was about BDT 61,546 (89.44%), and fixed costs amounted to BDT 7,267 (10.66%). The purchase price of cattle was the highest cost item at about 65.51%, followed by feed cost at 21%. The average cost of cattle purchases was about BDT 45,079, and the feed for cattle fattening amounted to BDT 14,602. Drugs/vaccines are another important input used for cattle fattening. Antibiotics are typically viewed as a tool for improving animals' health. In this study, the total cost of drugs and vaccines (including veterinary consultation fees) per beef cow for an average of 3.5 months was BDT 389. The labour used for the cattle fattening program included both family labour and hired labour. Since farmers fattened an average of 2.74 cows per batch, the average cost of labour per head of cattle was estimated as BDT 7,208 for 3.5 months. The average total cost was estimated as BDT 68,813/cattle. The net margin earned by the farmer was BDT 17,358 per cattle. The cost-benefit ratio of the cattle fattening enterprise was 1.25; this means for every BDT invested in cattle fattening, BDT 0.25 was realised as net profit, implying that beef cattle fattening is a profitable enterprise (Tables 1 & 2).

Table 1. Cattle fattening cost (BDT/cattle)

Cost items	Dhamrai	Kushtia Sadar	Pachbibi	Average	(%)

Variable cost					
The initial price of cattle	45,256	53,667	36,315	45,079	65.51
Treatment	466	423	277	389	0.57
Feed	16,267	16,438	11,102	14,602	21.22
Equipment	117	169	130	139	0.20
Electricity	169	177	102	149	0.22
Interest on operating capital	1,254	1,427	882	1,188	1.73
A. Total variable cost	**63,529**	**72,301**	**48,808**	**61,546**	**89.44**
Fixed cost					
Labour	6,816	8,954	5,853	7,208	10.57
Housing	59	71	47	59	0.09
B. Total fixed cost	**6,875**	**9,025**	**5,900**	**7,267**	**10.66**
C. Total cost (A+B)	**70,404**	**81,326**	**54,708**	**68,813**	**100.00**

Source: Authors' calculation, 2018.

Table 2. Returns on fattened cattle (BDT/cattle)

Return items	Dhamrai	Kushtia Sadar	Pachbibi	Average	(%)
Cattle sale	87,972	94,850	73,524	85,449	99.16
Cow dung	580	607	605	598	0.69
Feed sacks	123	142	108	124	0.14
D. Total return	88,675	95,599	74,237	86,171	100.00
E. Gross margin (D-A)	25,146	23,298	25,429	24,625	
F. Net return (D-C)	18,271	14,273	19,529	17,358	
G. BCR (D/C)	1.26	1.18	1.36	1.25	

Source: Authors' calculation, 2018.

4.3 Factors affecting profitability

To identify the potential factors that substantially influence farmers' profit, multivariate regression analysis was utilised. It was predicted that treatment cost, labour cost, initial investment, feed cost, education, and farm size might have a positive influence on farmers' revenue from cattle fattening. However, significant factors affecting the revenue of cattle fattening were feed cost, labour cost, treatment cost, and farm size with various levels of significance (Table 3).

Table 3. Coefficient of explanatory variables

Explanatory variable	Coefficients	Std. Error	Sig. Level
Constant	56,515.377***	14,678.74	0.00
Age (X_1)	-160.639	199.86	0.42
Education (X_2)	1,880.481	1,968.10	0.34
Family size (X_3)	-43.075	1,351.79	0.97

Farm size (X_4)	114.452**	18.25	0.04
Purchase price of cattle (X_5)	0.068	0.13	0.62
Treatment cost (X_6)	23.134**	10.25	0.02
Feed cost (X_7)	1.332***	0.45	0.00
Labour cost (X_8)	1.876**	0.94	0.05
R^2		0.56	
F value		3.53*** (0.00)	

Source: Author's estimation. ***$p < 0.01$, **$p < 0.05$ and *$p < 0.1$ significance level.

4.4 Marketing costs, margins, and channels of fattened cattle

4.4.1 Marketing costs for beparies[5]

Beparies perform the functions of assembling, transporting, and selling fattened beef cattle to meat sellers or consumers in the market. The costs involved in performing these functions are mainly market tolls[6], dalal's[7] commission, personal expenses, transportation costs, and tips and donations. The marketing cost per head of fattened beef cattle for beparies in the Dhamrai, Kushtia Sadar, and Pachbibi Upazilas and the average amount are listed in Table 4. The total marketing cost was BDT 925. The market toll was the highest cost at BDT 283 per cattle, representing 31% of the total marketing cost. The market toll charged by the 'Ijaradar[8]' varied between the rural markets of Dhamarai, Kushtia Sadar, and Pachbibi. Transportation costs are incurred when carrying goods from one market to another. Transportation was found to be the second highest cost at BDT 233 per head of cattle, or 25% of the total marketing cost. Personal costs include items such as food, 'paan[9]' and 'biri[10]', and so on bought during the cattle purchase and sale. Average personal expenses amounted to BDT 75, or 8.14% of the total marketing cost. The dalal's commission was BDT 54 (7.2%) in Dhamrai Upazila, BDT 60 (5.76%) in Kushtia Sadar Upazila, BDT 140 (14.19%) in Pachbibi Upazila; the average dalal's commission was BDT 85 (9.15%). After buying cattle, the beparies kept the animals at their disposal for a week to several weeks before selling them. During this time, the bepari required labourers to feed and maintain cattle. The average labour cost was calculated at BDT 133 per head of cattle (14.33% of the total marketing cost), while the feed cost was estimated at BDT 98 (9.42%) in Kushtia Sadar, which is the highest among the three upazilas. When the beparies brought cattle from different local markets, the police took money from them as 'tips'. Bepari also gave tips and donations to different social, religious, or political institutions. These costs were complex to calculate because there are no regular and fixed rates, but the

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[5] A *bepari* is a market actor or middleman who takes ownership of goods by purchasing them from farmers.

[6] Market tools refer to a payment made by the sellers to the local market authority for doing business.

[7] *Dalal* is a commission agent who works between buyer and seller a seeks a percentage.

[8] *Ijaradar* is a leaseholder (private entity) who collects revenue from the local market and pays a fixed sum to the government.

[9] *Paan* means battle leaf which is very popular in Bangladesh.

[10] A *biri* (also spelled beedi or bidi) is a thin cigarette filled with tobacco flake.

total cost was estimated at BDT 42 (4.54%) per animal. Losses due to theft, death, snatching, and accidents also incurred costs. However, this type of problem did not occur during the study period and was therefore not included as a cost item.

Table 4. Marketing costs for beparies (BDT/animal)

Cost items	Dhamrai	Kushtia Sadar	Pachbibi	Average
Market toll	250 (33.33)	250 (24.03)	350 (35.49)	283 (30.62)
Dalal's commission	54 (7.2)	60 (5.76)	140 (14.19)	85 (9.15)
Personal expenses	42 (5.6)	104 (10)	80 (8.11)	75 (8.14)
Transportation	178 (23.73)	316 (30.38)	206 (20.89)	233 (25.22)
Feed	70 (9.33)	98 (9.42)	54 (5.47)	74 (7.99)
Labour	116 (15.46)	148 (14.23)	134 (13.59)	133 (14.33)
Tips or police harassment	40 (5.33)	64 (6.15)	22 (2.23)	42 (4.54)
Total cost	750	1040	986	925.33

Source: Authors' calculation, 2018. Figures in parentheses indicate percentages.

4.4.2 Marketing costs for meat sellers

The meat seller purchases fattened beef cattle either from the farmers or from the beparies at different local cattle markets. Meat sellers incur costs for various items, including transportation costs, handling costs, market tolls, shop rentals, feed costs, and slaughtering instruments. The marketing costs of the meat sellers in Dhamrai, Kushtia Sadar, Pachbibi were BDT 1,403, BDT 1,018, and BDT 1,191, respectively. The highest cost incurred was for transportation for all the upazilas. The transportation costs for carrying purchased beef cattle from one place to another was on average BDT 730 per animal (61%). The second highest marketing cost for meat sellers was feed. The average feed cost was estimated at BDT 252 (20.93%). The next highest cost item was market tolls at an average of BDT 93 per animal, or 7.72% of the total marketing costs. Additionally, each meat seller required a shop to sell the beef, with rent coming to an average of BDT 60, or 4.98% of the total marketing costs. Some meat sellers hired help in slaughtering cattle from 'Munshi', while others slaughtered their cattle by themselves taking the help of their hired labourers. If needed, meat sellers sometimes employ labourers on a temporary basis for meat processing, selling, and other functions. The average slaughtering costs in this study amounted to BDT 44 (4%). Meat processing functions include separating hides from the body, separating bowels and intestines from the belly, separating and cutting the head and legs, and cutting meat into pieces. To complete these activities, meat sellers used knives, machetes, choppers, and so on. The average cost for slaughtering instruments was calculated at BDT 25 which was 2.08% of the total marketing costs (Table 5).

Table 5. Marketing costs of slaughtered cattle for meat sellers (BDT/animal)

Cost items	Dhamrai	Kushtia Sadar	Pachbibi	Average
Transportation	880 (62.72)	560 (55.01)	750 (62.97)	730 (60.63)

Slaughtering charge	50 (3.56)	42 (4.13)	39 (3.27)	44 (3.65)
Market tolls	150 (10.69)	30 (2.94)	100 (8.39)	93 (7.72)
Shop rent	50 (3.56)	100 (9.82)	30 (2.51)	60 (4.98)
Slaughtering instrument	25 (1.78)	30 (2.94)	20 (1.67)	25 (2.08)
Feed	248 (17.67)	256 (25.14)	252 (21.15)	252 (20.93
Total cost	1,403	1,018	1,191	1,204

Source: Authors' calculation, 2018. Figures in parentheses indicate percentages.

4.4.3 Bepari marketing margin

The marketing return (net margin) of beparies in the Dhamrai, Kushtia Sadar and Pachbibi Upazilas was calculated as BDT 1,706, BDT 2,286, and BDT 1,900, respectively. The average net margin was BDT 1,964. Beef cattle farmers' gross share of consumers' taka was identified as 97%, 97%, and 96% in Dhamrai, Kushtia Sadar and Pachbibi, respectively. The return over investment was highest in Pachbibi at 2.53%, while in Dhamrai and Kushtia Sadar it was 1.93% and 2.41%, respectively. The average return over investment was 2.28%, and the average beef cattle farmers' gross share of consumers' (meat sellers) taka was 97% (Table 6). This return over investment indicates that the market structure operates on competitive norms.

Table 6. Beparies' returns (BDT/animal)

Area	Average purchase price (*)	Average sales price	Gross margin	Marketing cost	Net margin	ROI (%)
Dhamrai	87,672 (97)	90,127	2,455	750	1,705	1.93
Kushtia Sadar	93,984 (97)	97,309	3,326	1,040	2,286	2.41
Pachbibi	74,103 (96)	76,989	2,886	986	1,900	2.53
Average	85,253 (97)	88,142	2,889	925	1,964	2.28

Source: Authors' calculation, 2018. *This is the price producers received. The figures in parentheses are the producer's gross share of consumers' taka.

4.4.4 Marketing margin for meat sellers

The average live weight and dressing weight were 354 kg and 201 kg, respectively. Both of these figures were highest in Kushtia Sadar, which produced an average live weight of 371 kg and an average dressing weight of 221 kg. The average dressing percentage was BDT 57. The price of meat was highest in Dhamrai (BDT 485/kg) and lowest in Pachbibi (BDT 420/kg). After adding the value of leather BDT 485, BDT 450, and BDT 420 with dressed meat value, respectively in Dhamrai, Kushtia Sadar, and Pachbibi Upazila the meat seller got their final return. Returns were highest in Kushtia Sadar Upazila (BDT 99,998) and lowest in Pachbibi Upazila (BDT 80,546). The average total return was BDT 91,470 (Table 7a), whereas net returns were BDT 1,897, BDT 1,584, and BDT 2,351 for Dhamrai, Kustia Sadar, and Pachbibi, respectively. The average net return was BDT 1,944. The beparies' gross share of consumers' taka was 96% in Dhamrai Upazila, 97% in Kushtia Sadar Upazila, and 96% in Pachbibi

Upazila, thus averaging 97%. The average return over investment was 2.17% and was highest in Pachbibi (3.01%) and lowest in Kushtia Sadar (1.61%; Table 7b). The average beef cattle farmers' gross share of consumers' (final consumers) taka was 93.2% (Table 7c).

Table 7a. Meat seller returns

Items	Unit	Dhamrai	Kushtia Sadar	Pachbibi	Average
Live weight	Kg. /Cattle	343	371	346	354
Dressing weight	Kg. /Cattle	192	221	191	201
Dressing percentage	%	56	60	55	57
Price of meat	BDT/Kg.	485	450	420	452
Sales value of meat	BDT/Cattle	93,247	99,418	80,226	90,960
Price of leather	BDT/Cattle	630	580	320	510
Total return	BDT	93,877	99,998	80,546	91,470

Source: Authors' calculation, 2018.

Table 7b. Meat seller returns (BDT/animal)

Area	Purchase price	Sales price	Gross margin	Marketing cost	Net margin	ROI (%)
Dhamrai	90,568 (96)	93,877	3,300	1,403	1,897	2.06
Kushtia Sadar	97,396 (97)	99,998	2,602	1,018	1,584	1.61
Pachbibi	77,003 (96)	80,546	3,542	1,191	2,351	3.01
Average	88,322 (97)	91,470	3,148	1,204	1,944	2.17

Source: Authors' calculation, 2018. The figures in parentheses are the beparies' gross share of consumers' taka.

Table 7c. Farmers' share (BDT/cattle)

Areas	Price received by farmers	Price paid by consumers	Net margin	Farmers' share of consumers' taka
Dhamrai	87,672	93,877	6,205	93.39
Kushtia Sadar	93,984	99,998	6,014	93.98
Pachbibi	74,103	80,546	6,443	92.00
Average	85,253	91,470	6,217	93.20

Source: Authors' calculation, 2018.

4.4.5 Marketing channels and market actors

The cattle marketer's (actor's) ability to generate more income from marketing activities depends largely on the effective utilisation of improved marketing practices. The process of fattened beef cattle marketing starts at the producer's level and continues through several channels until the beef reaches final consumers. In the process of beef cattle marketing studied here, a few important operations were performed at different stages by several market actors (beparies and meat sellers) who linked the farmers of fattened beef cattle with consumers. The market actors in the beef cattle marketing channels were farmers, beparies, meat sellers, and consumers. The study identified four prevalent beef cattle marketing

channels: (I) Farmer → Bepari → Meat seller → Consumer; (II) Farmer → Meat seller → Consumer; (III) Farmer → Bepari → Consumer; (IV) Farmer → Consumer. Channel I is the most common, and Channel I and Channel III dominate the market due to the presence of many middlemen in the markets. However, Channel IV is preferable because livestock farmers can sell their cattle directly to consumers and maximise profit, and Channel IV normally occurs during the time of Eid-Ul-Azha. Among farmers, beparies, and meat sellers there was an entity acting as a catalyst called the 'dalal' (broker), who helped to negotiate sales by taking a commission from transacting parties and who did not take ownership of the possession (cattle).

4.4.6 Marketing efficiency of beef cattle under different marketing channels

To assess marketing efficiency, Acharya's method was applied as it is the most satisfactory method for the evaluation of marketing efficiency. The information presented in Table 8a regarding the costs and margins incurred by various market functionaries in Dhamrai Upazila, Kushtia Sadar Upazila, and Pachbibi Upazila markets are used to measure marketing efficiency under different marketing channels. Using Acharya's method, it was found to be highest in Channel III (28.76), followed by Channel I (13.94) and then Channel II (11.93; Table 8b). The findings demonstrate that market efficiency decreases as the marketing costs and/or margins of intermediaries in the marketing channel increase and vice-versa. These findings correlate with Addisu et al. (2012), who studied the beef and feed value chain in the Adama district, Ethiopia, and found that beef marketing in the Adama district consisted of three channels. The study also revealed that the marketing margin of a particular marketing agent was an indicator of the efficiency of the channel; this means that the lower the marketing margins, the higher the efficiency. Only Channel IV had no value added, meaning that marketing efficiency was 100%. However, this channel was activated only during Eid-Ul-Azha. According to Scarborough and Kydd (1992), the value of marketing efficiency ranges from 0% to infinity. As such, if the market efficiency is 100%, the market is perfectly efficient. If the marketing efficiency is higher than 100%, this indicates excess profit. Conversely, if marketing efficiency is less than 100%, this signifies inefficiency.

Table 8a. Marketing costs and profits for intermediaries

Market intermediaries	Cost/Profit items	Marketing channels		
		I	II	III
Bepari	Purchase price	85,181		85,181
	Transportation cost	233		233
	Other costs	692		692
	Total marketing cost	925		925
	Selling price	88,142		88,142
	Net margin	2,036		2,036
Meat seller	Purchase price	88,322	84,398	
	Transportation cost	730	1,177	

	Other costs	474	474	
	Total marketing cost	1,204	1,651	
	Selling price	91,470	91,470	
	Net margin	1,944	5,422	
Consumer	Consumer price	91,470	91,470	88,142

Source: Authors' calculation, 2018.

Table 8b. Measurement of marketing efficiency under different marketing channels

Sl. No.	Particulars	Channel I	Channel II	Channel III
1	Retailers' sales or consumers' purchase price	91,470	91,470	88,142
2	Total marketing cost	2,129	1,651	925
3	Total net margins of intermediaries	3,980	5,422	2,036
4	Net price received by the producer	85,181	84,398	85,181
5	Value added (1–4)	6,290	7,073	2,961
6	Index (MME) = [4/(2+3)]	14	12	29

Source: Authors' calculation.

5. Conclusion

Beef is a very expensive dietary item, and many educated but unemployed youths are finding self-employment with a high cash inflow from livestock enterprises, especially cattle-fattening farms. This enterprise augments both the availability and affordability of meat by increasing the supply of beef cattle in domestic markets. This study determined that 53% of farmers engaged in cattle fattening throughout the year, while 47% only did so before Eid-Ul-Azha. The total cost for cattle fattening farmers was estimated at BDT 68,813, the total variable cost was 89.44%, and the fixed cost was 10.66%. Net margins for farmers were BDT 17,358. The average BCR was estimated at 1.25, which implies that beef cattle fattening is a profitable enterprise. The most common marketing functions were performed by the bepari and meat seller. The study reveals that 93% bepari collected cattle from local villages and 67% of them sold those cattle in the nearest Haat.[11] About 86.66% of the bepari performed their business with their own capital, while 6.67% borrowed from neighbours and 6.67% from Mahajan.[12] Beparies' average gross margin and net margin were BDT 2,889 and BDT 1,963, respectively. The return over investment was 2.28% for beparies, and farmers' gross share of consumers' taka was 96.72%. The average gross margin and net returns of meat sellers were BDT 3,148 and BDT 1,944, respectively. The return over investment was 2.17% for beparies, and the farmers' gross share of the consumers' taka was 96.56%. Marketing efficiency was highest in Channel III (28.76), followed by Channel I (13.94) and then Channel II (11.93). Recommendations are

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[11] *Haat* is a place (local market) where sellers and buyers gather and sell and buy products based on their preferences.

[12] *Mohajan* is a rural-level private agent who lends money to other people with high interest and where collateral is sometimes absent.

improvement of market infrastructure, enforcement of existing laws and regulations, and market information dissemination.

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Annex A

Table A1. Farmers' socioeconomic profile

Particulars	Dhamrai	Kushtia Sadar	Pachbibi	Average
Age				
Up to 30 Years	5 (17)	7 (23)	6 (20)	18 (20)
31–40 Years	10 (33)	10 (33)	15 (50)	35 (39)
41–50 Years	8 (27)	8 (27)	5 (17)	21 (23)
Above 50 Years	7 (23)	5 (17)	4 (13)	16 (18)
Occupation of farmers				
Agriculture	16 (53)	10 (33)	21 (70)	47 (52)
Business	9 (30)	9 (30)	5 (17)	23 (26)
Service	3 (10)	6 (20)	2 (7)	11 (12)
Other	2 (7)	5 (17)	2 (7)	9 (10)
Education level				
Illiterate	10 (33)	8 (27)	5 (17)	23 (26)
Primary	13 (43)	13 (43)	13 (43)	39 (43)
Secondary	5 (17)	2 (7)	8 (27)	15 (17)
Higher Secondary	1 (3)	2 (7)	2 (7)	5 (6)
Degree & up	1 (3)	5 (17)	2 (7)	8 (9)
Family size	5.03	4.7	5.03	4.92
Active members	2.87	2.8	2.53	2.73
Dependency ratio	1.75	1.68	1.99	1.80
Farm size (acre)	1.09	0.87	1.7	1.22

Source: Authors' calculation, 2018. The values in the parentheses indicate the percentages.

Table A2. Types of cattle fattened by the farmers

Cattle type	Number of observations (n)	(%)
Native	24	27
Crossbred	55	61
Both	11	12

Source: Authors' calculation, 2018.

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