Economics of Cattle Fattening- A Case of Bangladesh

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Abstract

In Bangladesh, more than 90% of people are Muslim. During Eid-Ul-Azha (the Muslims' highest religious festival) aligned with the whole year, a huge number of cattle were slaughtered. Therefore, the demand for beef cattle is also very high. To trade off the increasing demand, fattening beef cattle is very popular. For this, the research was conducted to investigate cattle fattening profitability and its marketing system. Study areas were selected from three districts, namely, Dhamrai under Dhaka; Kustia Sadar under Kustia and Pachbibi under Joypurhat district considering the concentration of livestock farming and cattle fattening. The data were collected through a structured interview schedule from 90 farmers, 15 beparies and 15 meat sellers by three different sets of questionnaires. Data were collected during the period from July 2018 to August 2018. Descriptive statistics and multiple regression analysis were applied to determine the factors that affect profitability. From the analysis, about 53% of farmers practiced cattle fattening the whole year and 47% of farmers reared only before Eid-Ul-Azha. The average benefit-cost ratio was estimated at 1.25, which implies that beef cattle fattening is a profitable enterprise. The coefficients of the variable treatment cost, feed cost, and labor cost were significant at a 1% level indicating a positive association with profitability. The average net return of bepari was BDT 1,964 and the average net return of meat sellers was found BDT 1,944. The most dominant marketing channels were identified as (i) Farmer-Bepari-Meat seller-consumer, and (ii) Farmer-Bepari-Consumer. But the preferable channel was Farmer-Consumer. Because farmers were able to maximize profit through this channel, even marketing efficiency was found highest in this channel. The study recommends the provision of appropriate education and training and improving access and availability of market information to reduce the challenges of establishing sustainable cattle fattening practices in Bangladesh.

Keywords: Cattle fattening, Profitability, Marketing system and Marketing efficiency.

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, and a significant proportion of the urban poor, keep livestock and use them 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 basically a rural activity whereby more than 85 % of households keep 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 which ranks 12th in the world and 3rd in Asian countries (FAO, 2010) and the contribution of the livestock sector to national GDP is 1.85% (DLS, 2023). Although the growth of livestock production is the second highest among all other subs of agriculture in Bangladesh (BER, 2012), production and consumption of livestock products are still much lower in consumption 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 fulfill an important function in coping with shocks, accumulating wealth, and serving as a store of 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 the 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 diseases like tick-borne diseases, and foot and mouth diseases (FMD) (Duvel and Stephanus, 2000). Livestock is not only the source of food and income but also 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 poor. Large ruminants are cattle and buffalo and small ruminants are sheep and goats constitute the major portion of livestock. Sometimes it is argued that the real contribution of the livestock sector is generally 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). It can be conversely argued that the values of paddy straw and other crop residues, which are the main animal feeds, are also not included in crop sector GDP calculation. Ideally, these items should be included in the national input-output and social accounting matrices. So far that has not been done most probably because of a lack of accurate data. Available data on livestock have been considered both inadequate and poor in quality compared to crop statistics (Jabber and Green, 1983).

Fattening of animals is a highly profitable venture with a return of premium to the farmer. Bangladesh is a low-lying densely populated country with more than 160 million people and about 75% 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 hard to develop its agribusiness through potential cattle fattening practices. Cattle fattening mostly conducted through micro-credit activities, could form an appropriate tool for poverty alleviation and improvement in food security among the people (Maikasuwa et al*.,* 2012). Cattle of Bangladesh 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 by rural farmers is that they use locally available cattle feed resources during the Eid festival. In recent years, the women farmers of Bangladesh have been involved and sustained beef fattening programs in rural areas of the country. Cattle fattening practice was assessed considering the 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 fattening cattle in the study areas. In Bangladesh, a large number of studies have been conducted on growth trials on native male cattle based on different diets which showed different growth responses in the animals. During the holy Eid-Ul-Azha festival, Muslims always go for Kurbani (sacrificing slaughtered livestock). Animals including cows, goats, camels, and sheep are slaughtered each year to mark the festival. Bangladeshi Muslims celebrate the Eid-Ul-Azha every year. About 1.8 million cattle are sacrificed within two or three days of this occasion each year (Sujan et al*.,* 2011). So, the demand for cattle especially beef cattle increases several times higher during the holy Eid-Ul-Azha festival. The price of cattle has also increased currently. Keeping this occasion in mind, many poor people are involved in bull fattening just before 3 or 4 months of Eid-Ul-Azha, when they sell the animals at prices that results in high margin. Understanding these points is important for cattle-fattening farmers and market analysts, as the information generated from the research, provides insight into the designing and improvements of strategies to alleviate the shortage of the quality live animal (cattle) supply in the markets, therefore, the study is designed to assess beef cattle fattening system, marketing and marketing challenges and opportunities in the study areas.

Though Bangladesh has been involved in and sustained beef fattening program in rural areas of the country; the information available in the literature on cattle fattening by small farmers in rural areas are few and sporadic (Hossain et al., 1996; Huq et al*.,* 1997 and Hashem et al*.,* 1999). To develop a sustainable beef cattle production system in Bangladesh which starts at the farmers' level for production and ends at consumers' level for consumption, it is necessary to find out the existing beef cattle production, marketing, and processing systems. Many studies have shown that beef cattle fattening has greater potential for improving the living standards of people through improved nutrition arising from meat consumption and incomes from the sale of cattle and beef cattle products. Despite the significance of the beef cattle sub-sector in the country, there are a number of constraints livestock

farmers are facing. Among the constraints that face livestock farmers are 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 the study was to identify the profitability and marketing system of cattle fattening. The specific objectives of the study were 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) finally, to identify the problems faced by the cattle fattening participants and market intermediaries.

The rest of the article is organized as follows: sect. 2, the review of the literature from the contemporary world. Section 3 presents a detailed description of the study areas and methodology. Section 4 presents the profitability of cattle fattening and its marketing channels and marketing margin aligned with marketing efficiency. In section 5, the conclusion and recommendations of the study are presented.

Review of literature

The previous studies in the field of cattle fattening, marketing systems, and marketing margins, carried out at home and abroad were reviewed in this chapter. No specific study on cattle fattening and marketing systems in the selected research areas has so far been conducted in Bangladesh. The studies which were found related were reviewed with paying attention. Nabi (1998) conducted a study on beef cattle marketing in Bangladesh. He showed that most of the time meat sellers slaughtered aged draft animals or aged milk cows. Slaughtering animals 47% were cow, 30% bullock, 10% bull, and 13% heifer calf and bull calf. Hossain and Chandra (2002) conducted a study on the beef cattle marketing system in Bangladesh and investigated the marketing margin and marketing costs of beef cattle with the help of primary data collected randomly from 71 intermediaries from different market levels. Farmer, Bepari-1, Bepari-2, Dalal, and Meat sellers involved in beef cattle marketing formed four different marketing channels in the study area. Around 15% of the total cattle sold in the study area were brought from abroad and the rest were produced locally and purchased through Dalal. Alemayehu, (2003) conducted a study on the marketing process in Ethiopia which generally follows a three-step system with primary, intermediate, and terminal markets through which marketable animal and animal products are passed 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 showed that a large number of farmers are involved in bull fattening just before 3 or 4 months of Eid-Ul-Azha (Muslim festival) when they sell the animals at profitable prices. Farmers used three-year-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 that in Vietnam most of the farmers do not have access to organized markets. Beef cattle

marketing is composed of 4 middlemen: trader, wholesaler, slaughterer, and retailer. Abeyrante (2007) studied that in Sri Lanka, the marketing system has evolved through the active participation of private meat sellers and agents. It was reported that the farmer gets less than 40% of the retail price of meat and the rest of the profit goes to the middlemen. Elias et al. (2007) conducted a study and showed 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 system. The main actors of the 1st tier are local farmers and rural traders who transact at the farm level with very minimal volume, 1-2 animals per transaction irrespective of species involved. Some traders may specialize in either small or large animals. Those small traders from different corners bring their livestock to the local market (2nd tire). Traders purchase a few large animals or a fairly large number of small animals for selling to the secondary markets. In the secondary market (3rd tier), both smaller and larger traders operate and traders and meat sellers from terminal markets come to buy animals. In the terminal market (4th tire), big traders and meat sellers transact a larger number of mainly slaughter-type animals. According to EntrePinoyAtbp (2008), cattle marketing in the Philippines is characterized by the existence of many middlemen in the distribution network which is to the disadvantage of producers who receive relatively low prices for their animals and consumers who pay a high price for meat products. Studies have shown that the gross margin derived from selling a head of cattle is 60-88%. They usually have bigger margins because cattle are bought from the farmers at a much lower price.

Ahmed et al. (2010) conducted a study on factors related to small-scale cattle fattening and investigated the systems of management in small-scale cattle fattening programs. The data were collected through an interview schedule from 215 respondents from 24 districts in 52 Upazilas who were involved in small-scale cattle fattening. Most of the respondents (79.1%) fattened cattle for 3-6 months and 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% of respondents had taken short training on cattle fattening. About 63.7% of respondents used cattle fattening tablets, 27% of respondents used urea molasses straw (UMS) and 51% followed conventional feeding. Kadigi et al. (2013) studied the value chain of indigenous cattle and beef products in Ilemela and Magu districts. It was 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 only in 2005 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. From the above discussion, it was revealed that many studies on cattle fattening and marketing systems were conducted in different parts of the world. However, only a few studies have been conducted in Bangladesh. In the country, this type of study is

very important. So, the present study was undertaken to analyze the profitability of cattle fattening, and the marketing channels of fattened cattle.

Materials and Methods

Data

The study was conducted in three districts namely Kushtia, Joypurhut, and Dhaka based on cattle fattening density and marketing. From each district, one Upazila was selected purposively and the selected Upazilas were Kushtia Sadar under Kushtia district, Pachbibi under Joypurhut district, and Dhamrai under Dhaka district. For this study, both primary and secondary data were used. The primary sources were the cattle fattening farmer, bepari (middleman), and meat seller. For collecting primary data from the relevant respondents, interview schedules were prepared. Three separate sets of questionnaires were constructed for this purpose. One set of interview schedules was used for the cattle fattening farmers, the second one for bepari, and the third one for the meat seller. The questionnaires were developed in such a manner that all relevant data could be obtained. The interview schedules were pre-tested before finalizing them. The total sample size was 120 which consisted of 90 cattle fattening farmers, 15 beparies and 15 meat sellers. Primary data were collected during the months of July to August 2018. Data were collected through direct interviews making personal visits to the houses of farmers, meat sellers, and beparies. The objectives of the study were clearly explained to the respondents before fetching information. The secondary sources were various publications from home and abroad. Some such secondary sources were BBS reports, reports of the Planning Commission of Bangladesh, DLS (Department of Livestock Services) reports, and kinds of literature concerning cattle fattening and marketing.

Analytical techniques

Profitability analysis

Costs and returns analyses were done on a total cost basis. The following equation was used to assess the profitability of the 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 /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.

Gross margin

For estimating the marketing margin earned by bepari and meat seller, the following formulas were used:

$$GM_i = P_{R_i} - P_{P_i}\text{---(ii)}$$

Where, M_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.

Net margin

For estimating the net margin earned by bepari and meat seller, the following formulas were 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.

Determinants of profit function

To determine the contributions of the most important variables in the cattle fattening process, the Cobb- Douglas production function was finally estimated. Judiciously we had taken nine (9) variables to explain the production of cattle fattening. Before constructing the profit function, we checked multicollinearity among the explanatory variables. The general model was specified comprehensively in such a way that it could explain the production process of cattle fattening adequately. To explore the input-output relationship of cattle fattening, the following linearized Cobb-Douglas production function model was used:

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

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 = Labor cost (BDT); b_1-b_8 = Coefficient of the relevant variables; ln = Natural logarithm; U_i = Disturbance term and a = Intercept.

Producer's share of consumer's taka (Bangladeshi currency)

Farmers' share was calculated by the following formula:

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

Return over investment (ROI)

For estimating the return over investment of bepari and meat seller, the following formula was used:

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

Where, Total investment = Purchase price + Marketing cost

Marketing system

Network analysis, mainly a graphical technique was performed for this identification. First, market actors were identified. Second, the volume of trade through each actor was measured. Third, a market chain was drawn.

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, i. e., a + b + c = d, any three of these could be used to arrive at a measure for comparing marketing efficiency. The following modified measure is suggested by Acharya (1999).

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

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.

Results and Discussion

Farmers' socioeconomic characteristics

Respondents' socioeconomic attributes have a significant connotation on farm production, marketing, and marketing decisions on where and when to sell the produce. According to Randela (2005), demographic characteristics of households are essential when analyzing economic data because such factors influence the households' economic behavior. In the case of beef cattle fattening, the socioeconomic characteristics included age, educational qualification, years of experience, duration of fattening by respondents, types of cows preferred for fattening, and number of animals fatten by the respondents at a time, etc. By analyzing socioeconomic variables, we found that around one-third (39%) of the farmers were in the age group between 31-40 years followed by 23% in the 41-50 years, 20% in the up to 30 years, and 18% were above 50 years. Around 52% of farmers had agriculture as their main occupation followed by 26% business and 12% service meaning that households' prime income source was agriculture. Many of the respondents interviewed mainly depend on livestock keeping. Therefore, it is a signal that the livestock sector is the main economic activity in all selected areas. This also means that, if livestock keeping is properly managed, contributes significantly to the households' income and the region's economy as well. In the case of education, 43% of farmers had primary level education followed by 17% SSC, 26% illiterate, 6% HSC and 9% above degree. The average family size was found 4.92 which was slightly higher than the national average of 4.26 (HIES, 2022), and the average dependency ratio was found 1.80. Farm size indicates the small farm category which was 1.22 acres. The study found that 61% of farmers had taken crossbred followed by 27% native and 12% both types of cattle for fattening. From farmers' view, crossbred was fast-growing and more profitable than the native (Annexure A1). In addition, fat composition is low in crossbred meat stated by the meat seller. As a source, 79% of farmers collected cattle from the recognized nearby cattle market in the Upazila followed by 14% own farms and the rest of both farms and markets for fattening of cattle. It was found that 53% of farmers did cattle fattening the whole year, in contrast, 47% of farmers only before Eid-Ul-Azha (the highest religious festival for the Muslim Community) which indicates that farmers find additional income-generating activities in cattle fattening.

In the case of feed processing for cattle fattening, 41% of farmers had given a positive statement 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 knowledge of cattle fattening if they are willing to start the fattening business. The study also found that among the cattle fattened farmers only 22% had taken training on scientific management practices on cattle fattening from the Department of Livestock Services (DLS) and the average duration was

4.25 days. But most of the farmers did not have any training before starting the fattening farm. Maximum respondents have a connection with Upazila Veterinary Hospital (UVH). Moreover, 94% of farmers opined that for the purpose of treatment of their livestock, they had taken treatment and other advisory services from the Upazila Veterinary Hospital. Normally they go to the hospital with their sick cattle and sometimes the veterinary doctors and other employees visit their house. On average, per batch fattened cattle population was found 2.74, and the duration of fattening was 3.8 months. Ownership and taking care of the cattle for fattening is divided into three groups- male, female, and both. In the study areas, there were 3% of farms where only males took care of the cattle without any female participation. On the other hand, there were 9% of farms where only females took care of the cattle without any help from males. Around 88% of farmers both male and female members of the household had taken care of the cattle. On average, farmers spend 3.7 hours daily for cattle fattening purposes.

Cost and returns of cattle fattening by the farmers

The cost of cattle fattening constitutes two main components, variable costs and fixed costs. The variable cost of fattening comprises various input costs such as the initial price of cattle which means the purchase price of cattle, feeds, health care service, equipment, electricity, interest on operating capital, etc. On the other hand, fixed costs covered depreciation on fixed capital and labor costs. Human labor cost is an important factor in cattle fattening. Both family and hired labor were used in cattle fattening. Family labor is often considered to be a fixed input. Family labor included the owner himself/herself, and other male and female working members of the family. It revealed that operating expenses accounted by the summation of variable cost was about BDT 61546 (89.44%) and fixed cost BDT 7267 (10.66%). The purchase value of cattle was the highest cost item at about 65.51% followed by feed cost at 21%. The average cost of cattle purchasing was about BDT 45,079 and the feed for cattle fattening was BDT 14,602. Drugs/vaccines are another important input used for cattle fattening. Antibiotics are typically viewed as a tool for improving the health status of cattle. The study revealed that the total cost of drugs and vaccines including veterinary consultation fees per beef cattle for an average of 3.5 months was BDT 389. The labor used for the cattle fattening program included both family labor and hired labor. Since farmers fattened an average of 2.74 cows per batch, the average cost of labor per head of cattle was estimated as BDT 7,208 for 3.5 months. The average total cost was estimated at BDT 68,813/cattle. The net margin earned by the farmer was BDT 17,358 per cattle. The benefit-cost ratio of the cattle fattening enterprise was 1.25. That means for every one BDT invested in cattle fattening BDT 0.25 was realized as net profit which implies that beef cattle fattening is a profitable enterprise (Table 1 & 2).

Table 1. Cattle fattening cost (BDT/cattle)

Cost items	Dhamrai	Kushtia Sadar	Pachbibi	Average	(%)
Variable cost					

The initial price of cattle	45256	53667	36315	45079	65.51
Treatment	466	423	277	389	0.57
Feed	16267	16438	11102	14602	21.22
Equipment	117	169	130	139	0.20
Electricity	169	177	102	149	0.22
Interest on operating capital	1254	1427	882	1188	1.73
A. Total variable cost	**63529**	**72301**	**48808**	**61546**	**89.44**
Fixed cost					
Labor	6816	8954	5853	7208	10.57
Housing	59	71	47	59	0.09
B. Total fixed cost	**6875**	**9025**	**5900**	**7267**	**10.66**
C. Total cost (A+B)	**70404**	**81326**	**54708**	**68813**	**100.00**

Source: Authors' calculation, 2018.

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

Return items	Dhamrai	Kushtia Sadar	Pachbibi	Average	(%)
Cattle sale	87972	94850	73524	85449	99.16
Cow dung	580	607	605	598	0.69
Feed sacks	123	142	108	124	0.14
D. Total return	88675	95599	74237	86171	100.00
E. Gross margin (D-A)	25146	23298	25429	24625	
F. Net return (D-C)	18271	14273	19529	17358	
G. BCR (D/C)	1.26	1.18	1.36	1.25	

Source: Authors' calculation, 2018.

Factors affecting profitability

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

Table 3. Coefficient of explanatory variables

Explanatory variable	Coefficients	Std. Error	Sig. Level
Constant	56515.377***	14678.74	0.00
Age (X_1)	-160.639	199.86	0.42
Education (X_2)	1880.481	1968.10	0.34
Family size (X_3)	-43.075	1351.79	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
Labor 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 *$p<0.1$ significant level, respectively.

Marketing costs, margins, and channels of fattened cattle

Marketing cost of beparie

The bepari performed the functions of assembling, transporting, and selling fattened beef cattle to the meat sellers or consumers in the market. The costs involved in performing these functions are mainly market tolls, dalal's commission, personal expenses, transportation costs and tips and donations. The marketing cost per fattened beef cattle for bepari in Dhamrai, Kushtia Sadar and Pachbibi Upazila and the average amount is shown in Table 4. It showed that the market toll was the highest cost amounting to BDT 283 per cattle i. e. 31% of the total marketing cost. The market toll charged by the 'Ijaradar' varied over the rural markets of Dhamarai, Kushtia Sadar and Pachbibi Upazila. The transportation cost was incurred at the time of carrying from one market to another. It was found as the second highest cost which was calculated at BDT 233 per cattle, i. e. 25% of the total marketing cost. The amount for personal costs such as food, 'paan' and 'biri' etc. spent during the cattle purchase and sale. The average personal expense was BDT 75, i. e. 8.14 % of the total marketing cost which is BDT 925. Another cost component was the dalal's commission which is BDT 54 (7.2 %) at Dhamrai Upazila, BDT 60 (5.76 %) at Kushtia Sadar Upazila, BDT 140 (14.19 %) in Pachbibi Upazila and on average BDT 85 (9.15 %). After buying cattle, the bepari kept the animals at their disposal for a week to several weeks before selling them to others. During this time the bepari used labor to feed and maintain cattle. The average labor cost was calculated at BDT 133 per cattle, i. e. 14.33 % of the total marketing cost. Before selling the cattle, bepari feed the cattle. The feed cost was estimated at BDT 98 (9.42 %) in Kushtia Sadar Upazila which is the highest among the three Upazilas. When the bepari brought cattle from different local markets, the police took some amount of money from them. The amount paid for them is considered as tips to them. Some amounts of money are also paid by bepari as tips and donations for different social, religious, or political institutions. The costs were complex to calculate because there were no regular and fixed rates. The total cost incurred for this purpose was estimated at BDT 42 (4.54 %) per animal. Loss due to stolen, death, snatching, and accident of cattle were some of the cost items. However, this type of problem did not occur during the study period. So, it was not included in the cost item.

Table 4. Marketing cost of bepari (BDT/cattle)

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 cost	178 (23.73)	316 (30.38)	206 (20.89)	233 (25.22)
Feed cost	70 (9.33)	98 (9.42)	54 (5.47)	74 (7.99)
Labor cost	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.

Marketing cost of meat seller

The meat seller purchases fattened beef cattle either from the farmers or from the bepari at different local cattle-selling markets. The meat seller incurred costs on various items. Different cost items of meat seller included transportation costs, handling costs, market toll, shop rent, feed costs, and slaughtering instruments. The marketing cost of the meat seller in Dhamrai, Kushtia Sadar, Pachbibi Upazila was calculated at BDT 1403, BDT 1018, and BDT 1191, respectively. It revealed that the highest cost was incurred transportation cost for all the locations. The transportation cost for carrying purchased beef cattle from one place to another constituted about BDT 730 per cattle (61%) on average. The second highest marketing cost of meat sellers was the feed cost. The average feed cost was estimated at BDT 252 (20.93 %). The next highest cost item was market toll. This component was estimated at an average of BDT 93 per cattle, which constituted 7.72 % of the total marketing cost. Each meat seller required a shop for selling beef meat. The rent for using the shop was BDT 60 on average, which is 4.98 % of the total marketing cost. The meat sellers received help in slaughtering cattle by 'Munshi' on payment of some amount of money. Some meat seller slaughtered their cattle by themselves taking the help of their hired laborers. If needed sometimes meat sellers employ some laborers on a temporary basis for meat processing, selling, and some other related functions. The slaughtering cost (on average) was calculated at BDT 44 (4%). Meat processing functions included separating hides from the body, separating bowels, and intestines from the belly, separating and cutting head and legs, and cutting meat into pieces. To complete these activities meat sellers used knives, machetes, choppers, etc. The average cost for slaughtering instruments was calculated at BDT 25 which was 2.08 % of the total marketing cost (Table 5).

Table 5. Marketing cost of slaughtered cattle by the meat seller (BDT /cattle)

Cost items	Dhamrai	Kushtia Sadar	Pachbibi	Average
Transportation cost	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 cost	248 (17.67)	256 (25.14)	252 (21.15)	252 (20.93
Total cost	1403	1018	1191	1204

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

Marketing margin of bepari

The marketing return (net margin) of bepari at Dhamrai, Kushtia Sadar and Pachbibi Upazila was calculated at BDT 1706, BDT 2286, and BDT 1900, respectively. The average net margin was calculated at BDT 1964. Beef cattle farmers' gross share of consumers' taka was identified as 97%, 97%, and 96% in Dhamrai, Kushtia Sadar and Pachbibi Upazila, respectively. The return over investment was highest in Pachbibi Upazila which was 2.53 % and in Dhamrai and Kushtia Sadar Upazila 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 operated on competitive norms.

Table 6. Return of bepari (BDT/cattle)

Area	Average purchase price (*)	Average sales price	Gross margin	Marketing cost	Net margin	ROI (%)
Dhamrai	87672 (97)	90127	2455	750	1705	1.93
Kushtia Sadar	93984 (97)	97309	3326	1040	2286	2.41
Pachbibi	74103 (96)	76989	2886	986	1900	2.53
Average	85253 (97)	88142	2889	925	1964	2.28

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

Marketing margin of meat seller

The average live weight and dressing weight were 354 kg. and 201 kg., respectively. And, both were the highest in Kushtia Sadar Upazila which had an average live weight of 371 kg and an average dressing weight 221 kg. The average dressing percentage was calculated at BDT 57. The price of meat was the highest BDT 485/kg in Dhamrai Upazila and lowest in Pachbibi Upazila which was 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. The return was the highest in Kushtia Sadar Upazila which was BDT 99,998 and the lowest in Pachbibi Upazila which was BDT 80546. The average total return was calculated at BDT 91,470 (Table 7a). Moreover, the net return was calculated at BDT 1897, BDT 1584, and BDT 2351, respectively for Dhamrai, Kustia Sadar, and Pachbibi. The average net return was calculated at BDT 1,944. Findings also revealed that beparis' gross share of consumers' taka was 96% in Dhamrai Upazila, 97% in Kushtia Sadar Upaizla, 96% in Pachbibi Upazila and on average it was 97 %. The average return over investment was 2.17 %. The return over investment was highest in Pachbibi Upazila which was 3.01

% and lowest in Kushtia Sadar Upazila which was 1.61 % (Table 7b). The average beef cattle farmers' gross share of consumers' (final consumers) taka was 93.2% (Table 7c).

Table 7a. Return of meat seller

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	93247	99418	80226	90960
Price of leather	BDT/Cattle	630	580	320	510
Total return	BDT	93877	99998	80546	91470

Source: Authors' calculation, 2018.

Table 7b. Return of meat seller (BDT/cattle)

Area	Purchase price	Sales price	Gross margin	Marketing cost	Net margin	ROI (%)
Dhamrai	90568 (96)	93877	3300	1403	1897	2.06
Kushtia Sadar	97396 (97)	99998	2602	1018	1584	1.61
Pachbibi	77003 (96)	80546	3542	1191	2351	3.01
Average	88322 (97)	91470	3148	1204	1944	2.17

Source: Authors' calculation, 2018. The figures in parentheses are the bepari's gross share of the consumer's Taka.

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

Areas	Price received by farmers	Price paid by consumers	Net margin	Farmers' share of consumers' Taka
Dhamrai	87672	93877	6205	93.39
Kushtia Sadar	93984	99998	6014	93.98
Pachbibi	74103	80546	6443	92.00
Average	85253	91470	6217	93.20

Source: Authors' calculation, 2018.

Marketing channels and market actors

The ability of the cattle marketer (actors) to generate more income from its marketing activities depends largely on the effective utilization of improved marketing practices. The process of fattened beef cattle marketing started at the producer's level and continued moving through channels until the beef reached the final consumers. In the process of beef cattle marketing, 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 the ultimate consumers. The market actors in the beef cattle marketing channels were farmers, beparies, meat sellers, and consumers. The study identified that there were four (4) prevalent beef cattle marketing channels. These were as follows: (I) Farmer→

Bepari→ Meat seller→ Consumer; (II) Farmer→ Meat seller→ Consumer; (III) Farmer→ Bepari→ Consumer; (IV) Farmer→ consumer. Channel I is more common. 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 sell their cattle directly to consumers and maximize profit and it (channel IV) normally occurs during the time of Eid-Ul-Azha. Among farmers, bepari, and meat sellers there was an entity acting as a catalyst called 'Dalal' (broker) who helped in negotiating sales by taking a commission from transacting parties and who did not take ownership of the possession (cattle).

Marketing efficiency of beef cattle under different marketing channels

For assessing marketing efficiency, Acharya's method was applied, by far 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 at Dhamrai Upazila, Kushtia Sadar Upazila, and Pachbibi Upazila markets are required to depict the measurement of marketing efficiency under different marketing channels. When calculated using Acharya's method it was found to be the highest in channel III (28.76) followed by channel I (13.94) and then channel II (11.93) (Table 8b). The findings show 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 revealed further that, the marketing margin of a particular marketing agent was an indicator of the efficiency of the channel i. e. the lower the marketing margins the higher the efficiency. Only in the case of Channel IV, it found that there was no value added in that channel; so, marketing efficiency was 100 % in Channel IV. But this channel is activated only in Eid-Ul-Azha. According to Scarborough and Kydd (1992), the value of marketing efficiency ranges from 0% to infinity. This means that if the market efficiency is 100%, it implies that the market is perfectly efficient. If it happens that the marketing efficiency is higher than 100% it indicates excess profit. Conversely, if marketing efficiency is less than 100% it signifies inefficiency.

Table 8a. Marketing costs and profit of intermediaries

Market intermediaries	Cost/ Profit items	Marketing channels		
		I	II	III
Bepari	Purchasing price	85181		85181
	Transportation cost	233		233
	Other costs	692		692
	Total marketing cost	925		925
	Selling price	88142		88142
	Net margin	2036		2036
Meat seller	Purchase price	88322	84398	

	Transportation cost	730	1177	
	Other costs	474	474	
	Total marketing cost	1204	1651	
	Selling price	91470	91470	
	Net margin	1944	5422	
Consumer	Consumer price	91470	91470	88142

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 Consumer's purchase price	91470	91470	88142
2	Total marketing cost	2129	1651	925
3	Total net margins of intermediaries	3980	5422	2036
4	Net price received by the producer	85181	84398	85181
5	Value added (1-4)	6290	7073	2961
6	Index (MME) = [4/(2+3)]	14	12	29

Source: Authors' calculation.

Conclusion

Since beef is a very expensive dietary item nowadays. Many educated unemployed youths are coming forward and finding themselves self-employment with a good cash inflow from livestock enterprises, especially cattle-fattening farms. It augments availability along with affordability by increasing the supply of beef cattle in the domestic markets. The study found that 53% of farmers did cattle fattening around the year and 47% of farmers only before Eid-Ul-Azha. Around 41% of farmers had given a positive statement that they had knowledge of cattle feed processing but the remaining 59% of farmers had no proper knowledge about it. Findings also showed that only 22% of farmers had taken training on scientific cattle fattening management practices which means farmers are in need of hands-on training regarding smart livestock management practices. The total cost for cattle fattening farmers was estimated at BDT 68813, where the total variable cost was 89.44% and the fixed cost was 10.66%. The net margin earned by the farmer was BDT 17358. The benefit-cost ratio was found highest in Pachbibi Upazila which was 1.36 and lowest in Kushtia Sadar Upazila which was 1.18. The average benefit-cost ratio was estimated at 1.25, which implies that beef cattle fattening is a profitable enterprise. The most common marketing functions performed by the bepari and meat seller. The functions were beef cattle keeping, transportation, grading, financing, risk bearing, and market information. The beef cattle were carried from the farmer's possession to the bepari possession mainly by trucks, boats, and on foot. The study reveals that 93% bepari collected cattle from local villages and 67% of them sold those cattle in the nearest Haat. About 86.66% of the bepari carried on their business with their own capital, 6.67% from borrowing neighbors and 6.67% from Mahajan. In the

study areas, bepari and meat sellers themselves bored the risks because there was no risk-bearing institution that could cover the risk. Meat sellers and bepari collected market information by observing the current market situation from the traders of their own markets and of another market. The bepari performed the functions of assembling the transportation of beef cattle and selling them to meat sellers or consumers. The average gross margin and net margin of bepari were BDT 2889 and BDT 1963, respectively. The return over investment was 2.28 % for bepari and the farmer's gross share of the consumer's Taka was 96.72 %. The average gross margin and net returns of meat sellers were BDT 3148 and BDT 1944, respectively. The return over investment was 2.17 % for bepari and the farmer's gross share of the consumer's Taka was 96.56 %. Marketing efficiency was found to be highest in channel III (28.76) followed by channel I (13.94) and then channel II (11.93). The recommendations are improvement of market infrastructure, enforcement of existing laws and regulations, and market information dissemination.

Acknowledgment

Annexures 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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