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RESEARCH PAPER

Problems, Productivity and Profitability of a Small-scale Commercial Dairy Farm in Rangamati Hill Tract

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ABSTRACT

The present study was designed to perceive the general information, management system, cost-return and problems of rearing dairy cattle by a sole proprietorship small-scale dairy operation, LRL Khan Dairy Farm Ltd. of Rangamati Hill Tract. With this view, the experiential data were collected with the help of a structured pre-tested questionnaire prepared for the study through face to face interviewing and personal visit to a commercial small scale dairy farm. The Housing, feeding, breeding and other management system were investigated and cost-return of the farm was analyzed. The study revealed that the farm used an open-sided brick floor shed for housing the cattle. The main livestock feed was raw grass, untreated rice straw and concentrated feed. The average dry period, calving interval and services per conception of the cows were 97.3 days, 418 days and 2.97 respectively. The average milk production was 10 litre/cow/day. The highest cost of production was on feed cost which accounts for more than 63%. The gross return of the farm stood at BDT 1,053,000. The highest share of return (74.89%) was obtained from milk production followed by change in inventory (24.06%). The return on investment of the farm was about 34%. The main problems faced by the dairy owner were non-availability of veterinarians and AI services in the locality, shortage of medicine and vaccines in veterinary hospital and ineffectiveness of artificial insemination from the veterinary hospitals. In conclusion, it can be said that small-scale dairy would be a profitable business operation if the problem faced by the farmer can be mitigated.

Key words: Small scale dairy farms, Management, Cost-return analysis

Introduction

Livestock play a vital role in agricultural economy of Bangladesh through production management, employment of huge people, poverty reduction and animal protein supply. The contribution of livestock to the country's gross domestic products (GDP) is about 1.66 % and GDP growth rate of livestock is about 3.32% to the agricultural GDP is around 11.76 % (Selim, 2017). This sector also provides full time employment of about 20% of the rural population (GOB, 1997). Cattle are considerably the most important livestock which provides milk, meat, hide and skin in addition to providing of non-human farm energy needed for ploughing, crushing, and transportation. The cattle population in Bangladesh is about 23.9Million of which 90% is indigenous zebu cattle (Selim, 2017). In the rural area, cattle are kept mainly for draught purpose. Only a limited number of farmers have cow for milk production which are mainly non-descriptive type with average milk production of 1.5 kg/day (DLS, 2011).

The worth of milk and milk products as part of the human diet is well documented. Milk is a highly nutritious natural food of particular benefit for growing infants and lactating mothers as it contains valuable minerals, vitamins, protein and fat. With the rapid increase in population, the spread of education and growing nutrition awareness among consumers, the domestic demand for milk has been rising faster than the domestic production of milk. The annual milk production of Bangladesh is 6.09 MMT/year (2013-14) but the requirement is about 14.02 MMT/year (considering per Capita milk requirement of 250 ml/day) i.e. 7.93 MMT is

deficit (DLS 2013). To bridge the gap, Government imports more than 100,000 tonnes of powdered milk and dairy products by spending over Tk 2,000 crore a year, according to data by Bangladesh Bureau of Statistics and Bangladesh Bank (Al Amin, 2019). Hence several government, NGOs and private sector take initiatives to reduce this dependency of imported milk that have made progress in converting dairy sector into a more value-driven and market-oriented sector. They have given the priority on the development of dairying at farmers' level to increase the supply of milk from small dairy farms. The small/marginal farmers and land less agricultural laborers play a very important role in milk production of the country. More than 60% of the families involved in dairying in Bangladesh (Shamsuddoha and Edwards, 2000). At present, there are many registered small-dairy farms in the country. These farms may have 5 to 200 cows of which 20% are local (average 1.5 liters milk/head/d) and 80% crossbred (5.5 liters milk/head/d) type (Banglapedia, 2015). Even though these farms are generally well managed, but mostly rely on purchased feed (both roughage and concentrate). They used to be profitable with benefit cost ratio of 1:1.03 and provided employment opportunity of about 650 man-days annually (Banglapedia, 2015). However, reports of closing down of many of these farms are known. For example, in Bogura, out of 201 registered small-scale organized farms, 147 have already been closed due to problems of milk marketing and higher maintenance costs.

Therefore it is of growing need for studying the economic analysis and the types of problems faced by small scale dairy farm. The objectives this study were thus to conduct an economic analysis of a newly established dairy farm for one complete year of production and identifies the problems of dairy farm raising and suggestions to improvement.

Materials and methods

Data collection:

The data was collected by the researchers directly from the farm during the period of May 2017 to August 2017 using a structured pre-tested questionnaire according to objectives. Before actual interview, the farm owner was given a short briefing regarding the nature and objectives of the present study. The survey schedule was prepared based on the following key items: general information of the farm, cattle population, sources of fund, housing system, feeds and feeding system, breeding system, overall management system, costs and returns of raising dairy cows, problems in dairying etc.

Analytical Technique:

The collected data regarding costs and returns of raising dairy cows were tabulated and analyzed using Microsoft Excel to arrive a significant conclusion regarding profits.

Estimation of cost:

Cost of milk production means all the expenses acquired in production of milk. It is valuable to all those in milk production enterprise and essential information for consumers as well. USDA was probably the first to study the cost of milk production. The cost of milk production can be determined in three ways: survey methods, direct observation methods and formula method. In this study the authors go to the dairy farm and collected the information pertaining to cost of milk production from the records maintained at the dairy farm and calculated the fixed, variable and total cost of milk production using some simple formula.

Estimation of fixed cost:

The herd expenses, cost of land purchase, house building expenses and equipment expenses were taking into account during calculating the fixed cost.

1) Herd expenses: (a) Depreciation (b) Interest.

a) Depreciation= $\frac{\text{Purchase value of animal} - \text{Estimated value after productive life}}{\text{Number of year of productive life}}$

Assumed productive life is 7 years and after 7 years the value is BDT 80000/cow

b) Interest on purchase value @ 10%

2) Land expenses: the price of the land was collected from the farm record and assumed that life of this land is 100 yrs and the Interest on building cost @ 10%

3) The cost of building the house was 1000000 BDT, collected from the farm record book and assumed that the life of this shed is 50 yrs.

a) Depreciation = $\frac{\text{Building cost}}{\text{life of the shed in year}}$

b) Interest on building cost @ 10%

4) Equipment expenses: the cost of equipment purchase were collected from the farm record and the depreciation and interest were calculated

a) Depreciation= $\frac{\text{Cost of equipment} - \text{Sales value of junk materials}}{\text{Life of the equipments in year}}$

Assumed that the life of these equipment's is 10 year.

b) Interest on equipment cost @ 10%

Estimation of variable cost

The variable cost included the cost of fodder and concentrated feed, feed additives, labor cost, treatment cost and miscellaneous cost (electric bill, artificial insemination, transport).

Estimation of return:

The return from dairy farming was calculated in terms of gross return, gross margin and net return. Gross return was calculated considering sale proceeds from milk, cow dung, net change in inventory (appreciation in the values of calves and heifers in the herd during the year). Gross margin was calculated by deducting variable cost from gross return, whereas net return is the difference between gross return and total cost of production.

Return on investment:

Return on investment (ROI), is the ratio of a profit or loss made in a fiscal year expressed in terms of an investment and shown as a percentage of increase or decrease in the value of the investment during the year in question.

The basic formula for ROI is:

ROI = Net Profit / Total Investment * 100.

Benefit cost ratio:
Benefit-cost ratio is an indicator used in cost-benefit analysis that attempts to summarize the overall value for money of a project. It is the ratio of the benefits of a project relative to its costs, being expressed in discounted present values.
The formula used to calculate BCR = total present value of benefits/total benefits of cost

Statistical analysis:

The data regarding productive and reproductive performance were analyzed by using MS Excel 2010.

Results and discussion

General information of the farms
The present study was conducted in a commercial small scale dairy farm, LRL Khan Dairy Farm Ltd., Bangalhalla Rayastholy Upozila of Rangamati Hill Tract, Bangladesh owned by Tushar Barua. The farm was established at 2012 on 3 acres of land (purchased by the farm owner). However they started their dairy operation at 23 September of 2016 by purchasing 10 Friesian Crossbred dairy cows. At present there are 15 cattle in that farm of which 10 are lactating dairy cow and 5 calves (4 heifers and 1 bull calf). The owners invested 50 lack BDT by his own and borrowed 1 crores BDT from "Equity Entrepreneur Fund of Bangladesh". The average milk production of the farm is 100 liter daily which are mainly supplied to the local sweet store. The average lactation period of the cows was 283 days.

Housing, feeding and breeding systems
The farm using open-sided, tin shed roof and brick floor for housing the cattle. They practiced stall-feeding system for feeding the cows. All calves were fed milk by suckling. The main livestock feed was raw grass, untreated rice straw and concentrated feed. The farm cultivated para grass in the farm premises and collect grass locally. The farm does not maintain any scientific ration for the dairy cow. Each dairy cow was supplied with 12-14 kg of raw grass, 3-4 kg of dried straw and 7 kg of concentrate feed (4 kg in the morning and 3 kg in the evening) on a daily basis. The concentrate feed was a combination of wheat bran, rice bran, crushed chick pea, crushed magiepea, mustard oil cake, pea, salt, molasses, soybean meal and crushed maize. The farm owner selects artificial insemination for breeding the cow using Friesian semen.

Other management system
It was observed that the farm milked their cows manually using traditional equipment. Before milking they clean the udder of the cows with normal water. The source of water was deep tube well placed in the farm premises. The farm labors cleaned the cattle house four times daily with the help of water and with bleaching powder once in a week. The farm maintains register to record the preventive or treatment status and keep their cattle isolated while sick. They deworming to their dairy cow in every three month and inject the cow with Food and Mouth Disease vaccine in every 3-4 months. They also use vitamin DCP Plus and Renavit DB Plus Powder as a vitamin and mineral supplement.

Productive and reproductive parameters of crossbred and indigenous cows

The average dry period of the cows was 97.3 days (Table 1). This result was in agreement with Ali et al. (2000) who found that average dry period for crossbred cows were 97.2. Naharet al. (1992) found that the average dry period for F1 graded Sindhi and Sahiwal as 146 and 127 days, respectively.
The average length of calving interval of the cows stood at 418 days (Table 1). Ali et al. (2000) stated that average length of calving interval of crossbred were 653 which contradict to this study.
The average services per conception were 2.97 which was in agreement with Ali et al. (2000) who reported that the service per conception of crossbred cows were 3.33 in Gaibandha district.
The average milk production of the cows was 10 liter/day. Hossain et al. (2005) reported that the highest milk production of crossbred cows was 10.4 liter/day. The average lactation period was 283 days which was in consistent with Hossain et al. (2005). Another study made by Halim (1992) who found the length of lactation period for crossbred and indigenous cows were 259 and 228 days, respectively.

Cost of maintaining dairy cow
The annual cost of maintaining the dairy cow is given in Table 2. It can be noticed form the table that the highest cost of production was feed cost which accounts for more than 63%. Kabir and Talukdar (1999) and Alam et al. (1994) also reported that the feed cost was the highest cost of maintaining dairy cow (about 50%) which corroborated the result obtained in this study. The analysis of cost components showed that the highest cost (35.40 %) was incurred for concentrate followed by fodder cost (28.32 %), equipment cost (15.49 %), herd expenses (15.36 %), miscellaneous cost (1.94 %), land and building expenses (1.42 %) and treatment cost (0.65 %). The labor cost is insignificant in this study, because the farm's owner himself take care of the cows. Kabir and Talukdar (1999) reported that the cost of maintaining was higher in crossbred cows comparing to local cows.

Financial performance of dairying
Table 3 shows the financial performance of the experimental farm. The table shows that the gross return of the farm stood at Taka 1,053,000. The highest share of return (74.89%) was obtained from milk production followed by change in inventory (24.06%). However the shares of milk was found to be slightly higher (77.58%) and change in inventory was slightly lower (17.82%) in the study of Kabir and Talukdar (1999). Inventory change was the difference between*last period's ending inventory* and the*current period's ending inventory*. Gross return of the farm was accounted of 2,078,500 taka and the net return was 531,920 taka. The return on investment of the farm was about 34%.

Table 1: Productive and reproductive performances of dairy cows

Parameters	Performance*
Dry period (days)	97.3±10.5
Calving interval (days)	418.16±16.3
Service per conception	3.33±0.67
Average milk production (L/d)	10.1±0.59
Lactation period (days)	283±12.7

*Each value indicates the mean performance of 10 cows

Table 2: Cost of raring the dairy cow in the experimental farm*

Items	Depreciation cost	Interest	Total	% of total cost
Fixed cost (taka)				
Herd expenses	87500	150000	237500	15.36
Land expenses	20000	2000	22000	1.42
Building expenses	20000	2000	22000	1.42
Equipment cost	217800	21780	239580	15.49
Total fixed cost	345300	175780	521080	33.69
Variable Cost (taka)				
Fodder cost			438000	28.32
Cost of concentrates			547500	35.40
Treatment cost			10,000	0.65
Miscellaneous cost			30,000	1.94
Total variable cost			1025500	66.71
Total cost (Taka)			1546580	-
Number of animals (cow equivalent)			12	-
Total cost/cow			128881.7	-
Cost of milk (Taka/kg)			54.65	-

*The total cost of raising animals was calculated per unit of animal. For this purpose the number of animal in cow-equivalent was calculated by using the conversion factors 1 calf = 0.40 cows.

Table 3: Return from rearing dairy cow in the dairy farm

Particulars		% of gross return
First year milk production of the farm (L)	28300	
Value of milk (Taka)	1,556,500	74.89
Value of Cow dung (Taka)	12000	0.58
Value of empty gunny bag (taka)	10000	0.48
Change in inventory (taka)	500000	24.06
Gross return (taka)	2,078,500	
Gross margin (GM, taka)	1,053,000	
Net return (NR, Taka)	531,920	
Return on Investment (%)	34.4	
Benefit-cost ratio	1.22	Greater than 1= Good

Problems faced by the experimental farm

Different problems were identified through discussion with the key personnel following the pre-tested structured questionnaire. The problems faced by the dairy owner are enlisted below:

- Lack of information regarding new technology and methods of rearing
- Lack of disease and parasites control
- Shortage of quality breed
- Scarcity of quality feed
- Non-availability of veterinarians in the locality.
- In emergency cases, no doorstep service provided by DLS.
- Insufficiency of AI services in the locality
- Service from ULO/VS/Specialist doctor is very expensive
- Shortage of medicine and vaccines in veterinary hospitals
- Ineffectiveness of artificial insemination from the veterinary hospitals
- Lack of understanding by the owners on severity of problem in livestock (necessity of treatment)
- Marketing problems

Conclusion

In conclusion, it can be said that small scale dairy farm can be successful to meet up the rising demand of milk if the problem faced by the dairy farmer can be solved. To

overcome the scarcity of food government and non-government organizations should play a vital role in spreading the technology of high yielding varieties fodder cultivation in rural areas. Private sectors should be given importance to establish small-scale cattle feed industry providing financial support by the government and these feed industries will sell the feed to the registered dairy farms in a fixed price recommended by government time to time. Good quality semen should be preserved centrally and distribute to the AI centers for further use as and when required basis. Veterinary care and services to the small farm owners should be strengthened. Regular short training programme on different management of dairying should be arranged for the farm owners and short term institutional loan or credit should be given to actual farm owners and to be checked regularly. The price of milk should be fixed at a reasonable level and milk-marketing system should be improved through the intervention by the government.

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