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Economics of Fertility Management of Small Holding Dairy Farms in Bangladesh

Research Article

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ABSTRACT

Considering different fertility traits 411 cows from 73 farms used for economic analyses. From these, 202 lactating cows were selected for evaluating the fertility status. Pre-tested data sheets were used to record the socioeconomic status of the farms including their assets, cost and return and productive and reproductive performance of the dairy cows. Targets were set considering the situations prevailing in Zebu and their crosses rearing countries. The best 20% of local farms were chosen during setting the targets. Delay at first calving caused a significant loss ($P<0.01$) of Tk. 11051 (135.04 USD)/farm/year. The farms would have had the opportunity to earn in average Tk. 22236 (171.73 USD) more/year if they could attain the targeted milk production. The opportunity from milk production had a significant effect on total farm earning. The milk production cost was Tk. 11.70 (0.14 USD)/litre .The average lactation length was 246.1 days in contrast to the target of 304 days. The farms were suffering from a significant ($P<0.05$) loss of Tk. 5651 (69.05 USD)/year due to shorter lactation length. The calf mortality was 30.33% resulting in a loss of Tk. 304 (3.71 USD)/farm/year. In 46 artificial inseminations (AI) the first service conception rate was 51%. The overall conception rate and services per conception was 50% and 2.0, respectively. The days open was found to be of 164.03 days. The main problems of the small holding dairy farms were delayed age at first calving, low milk production, high production cost, low milk to concentrate feed ratio and poor reproductive performance. Farmer's income would have increased by about Tk. 39493 (482.62 USD)/far year, if the control measures of different reproductive and productive indices could be substantially improved through veterinary herd health control programme.

KEY WORDS dairy farm, management, small holder.

INTRODUCTION

Dairy farms of Bangladesh are very small, often having only one lactating cow. However, some urban and peri-urban farms often contain 5 to 20 lactating cows. The development of dairy farms is quite slow in Bangladesh. The farms that start with lactating cows had better productive performance and provide with good economic return (Hasan, 1995). But with the advancement of time the farms became uneconomic because of serious drop in productivity and consequently many farms had to close down. Prolonged postpartum intervals to the initiation of ovarian activity and low conception rate are the major constraints limiting the dairy farming in Bangladesh (Alam and Ghosh, 1994;

Shamsuddin *et al*. 2001). The farmers invest a certain capital and that capital should bring some return to them, provided optimum management practices are followed. This means, when the management practices are compromised, the farms will bring less than their potential economic return.

Consequently, a major portion of the economic return will remain as the opportunity, which would have been achieved if the management practices could be improved substantially. The present study focused on the total economic opportunity of farms.

MATERIALS AND METHODS

Farms and animals

Contact dairy farmers (n=73) of Mimima Dairy Farm, Uttar Gosaipur, Suihary, Sadar, Dinajpur-5200, Bangladesh were selected for the study. The study was conducted during the period of January to December 2011. The contact small holding farms having at least two dairy cows were included. The farm economics was evaluated from 411 cows and the fertility was evaluated from 202 lactating cows. The cows were mostly local Zebus and their crosses with Friesian Shahiwal, Sindhi, Jersey and Haryana.

Economic opportunity survey (EOS)

The survey schedule was developed and contained 5 sections: i) Milk production from farm per day, ii) Expenses for health care and feed, iii) Inventory of herd culls and death, iv) Milk and calf production per cow and v) Summary of herd management.

Survey

Individual farmers were interviewed with regard to the information to be collected to fill in the EOS forms. Dentistry was adopted to determine the age of the animals.

Setting the targets

Achievable targets were set by considering the situations prevailing in Zebu and their cross rearing as in other developing countries as well as considering the best 20% of local farms.

The best farms were selected on the basis of amount of milk production.

Records of Data

The economic opportunities of the following indices were calculated by:

Age at first calving

(Herd average age at first calving-targeted age at first calving)×cost (taka) of feed/month×number of first lactation cow in herd).

Calving interval

[{(Herd calving interval/targeted calving interval) × number of calves born last year} - number of calves born last

year] × value (taka) of new born calf.

Average lactation length

{(Average amount of milk production/day×value of milk/litre)×average lactation length×(Targeted lactation length/herd average lactation length)×0.85*)} - {(Average milk production/day×value of milk/litre) × average lactation length)}.

* To correct the low milk production during the lean period, the lactation period is multiplied by 0.85.

Milk production/cow/day

(Local target of the herd-herd average) × number of lactating cows × 365 days × price (taka) of milk.

Milk production cost/ liter

[Feeding cost + % of mature cows value for (0+15/2) % interest + loss due to death of mature cow + veterinary cost + medicine cost + housing cost (depreciation+repair+(0+15/2) % interest on the average value of the house for the year)] / Average milk production/cow/day.

Calve mortality

Total number of calf borne alive or dead × (farms % calf mortality-tolerated mortality of calves) × value of calf= amount in taka.

Feed cost as a percent of income

{(Daily feed costs/ total lactating cow)/(total milk production/cow/day)} × unit price (taka) of milk..

Milk price

The farmers were paid milk price based on the percentage of fat in milk.

The price of milk was Taka 22 and 13/litre for 4 and 1.75% fat in milk, respectively. The service per conception, first service conception rate and conception rate were calculated by the following methods:

Service per conception= number of services made in the pregnant cows / total number of pregnant cows × 100

First service conception rate= number of cows conceived at first artificial insemination artificial / number of cows inseminated for the first time × 100

Conception rate= number of pregnant cows / total number of inseminations × 100

Days open was calculated by deducting the date of last calving from the date of conception. This was recorded as days.

Statistical analysis

The collected information was recorded in the Microsoft Excel 2000, which was customized to set five sections of the EOS form in four pages. A macro was designed to transfer the data from the four sheets to one spreadsheet. Data were analyzed by using MINITAB Statistical package. The descriptive statistics were done for calculating mean, median, standard deviation, minimum and maximum of the variables studied. Data were log transformed to near normality. Regression analysis was done to establish relationship between opportunity of the farms and average age at first calving, calving interval and average lactation length. ANOVA was used to analyze the relationship of milk unit price with different location group, and total economic opportunity with opportunity from milk production.

RESULTS AND DISCUSSION

The reproductive and productive performances of the dairy cows are shown in Table 1. The average age of calving was 43.78 ± 5.79 months in contrast to the local target of 30 months. Singh *et al.* (1997) found age at first calving was 43.77 ± 2.30 months. Such a delay at first calving incurred excess cost of feeds and the farms were losing in average Tk. 11051/year. The delayed age at first calving could be related to poor calf management, calf hood malnutrition and parasitic infestation that retard the growth and development in early life (Rawson, 1986; Alam *et al.* 2001). The calving interval was 14.87 ± 1.49 months (n=114) against a target of 15 months. The shorter calving interval creates scope to the farms earning in average Tk. 203.9/year. The calving interval of zebra cattle and their crosses are longer than the European cattle (Alam and Ghosh, 1994; Swadogo *et al.* 1998). The average lactation length was 246±69.0 in contrast to the target of 305 days. Ashraf *et al.* (2000) found average lactation length of 262.33 ± 10.03 days in Local × Friesian cows. The farms were losing in average Tk. 5651/year/farm due to shorter lactation length (58.9 days<target; Tk. 13-22/litre milk depending on the fat %).

The shorter lactation length could be due to calf mortality on the farms, improper herd management and imbalanced nutrition. The presence of calf is essential to stimulate milk let down in Zebu and their crossbreeds. The mortality of calves caused drying off the lactating cows. The percentage of lactating cows out of total breedable cows and all cattle were 52 and 27, respectively. The percentage of replacement heifer was 25.30% out of all cattle. The percentage of replacement heifers could be regarded as poor. In economically profitable dairy herd, 31-35% replacement heifers should be maintained for better production (Kirk, 1986). The replacement heifers require proper health care, reproduction management to be able to catch puberty at an early age. The average milk production per cow/day was 4.71 ± 2.08 litre. The production ranged between 1 and 10 litres. On the basis of performance, the first quarter cows produced in average 3 litre milk and the last 3rd quarter produced 6 litres per day. The farm could earn on average Tk. 22236 more/year from milk. The opportunity from milk production of farms had significant effect (P<0.01) on total economic opportunity. The feeding cost in relation to the income from milk is shown in Table 2. The milk production/cow/day averaged 4.71 litres. The result of average daily milk production/cow was close to the findings of Rahman *et al.* (1987). They observed that the average daily milk production in Local × Friesian cows was 4.65 litres. The production cost per litre of milk was Tk. 11.70. The income from milk per cow per day was Tk. 79.30. The result was close to findings of Sayeed *et al.* (1994) and was 10.41 Taka per litre for crossbred cows. The milk unit price in different farms varied due to fat percentage of milk. So, the farmers who fed cows with balanced diets got high percentage of milk fat as well as highest milk price. Analysis of variance indicated that the fat percentage in different location of farms had significant effect (P<0.01) on milk unit price. The milk to concentrated ratio was 0.82:1 in contrast to the universal target of 1.5:1. Poor conservation of concentrate to milk adversely affects the production performance.

Table 1 Reproductive and productive performances of the farms

Reproductive and productive indices	No. of farms	No. of cows	Measures of indices
Average age at first calving (months)	36	54	43.78±5.79
Calving interval (months)	69	114	14.87±1.49
Average lactation length (days)	42	55	246.1±69.0
Average milk production /day/cow (litre)	73	147	4.71±2.08

Table 2 Relationship between feed cost and income from milk

Observation	Quantity (kg/L) (mean)	Unit price (taka) (mean)	Total (taka)
Forage fed/cow/day	7.97	1.25	9.95
Concentrated fed /cow/day	3.89	9.17	35.62
Average milk /cow/day	4.71	16.83	79.30

Furthermore, nutrition plane has positive effect on follicular growth (Murphy *et al*. 1991). Excessive intake concentrate feed might be risky with regard to the reproductive performance (Nolan *et al*. 1998). On other hand, low concentrate intake also hampered the ovarian cyclicity postpartum. The feed cost Taka 10.14/cow/day was more in relation to income from milk, which decreased the net income of farms per year. Fertility results of the cows are shown in Table 3. Forty-one cows were inseminated and twenty-one cows were conceived (51%). Overall, 23 cows conceived (50%) and the services per conception were 2.0. The cows remained open for 164 days.

Table 3 Fertility performance of cows (46 services in 41 cows were studied)

Fertility parameter	No. of services	No. of conceived	Value of parameter
Conception rate at first service (%)	41	21	51
Overall conception rate (%)	46	23	50
Service per conception	46	23	2.0

The fertility status of the dairy farms evaluated as services per conception, conception rate and days open were poor. The services per conception were close to the findings of Pandey (1989) and Shamsuddin (1995). The conception rate at first service was similar to the findings of Menendez and Dempfle (1998) and was 43.9% for all females and 63.1% for heifers. Heat detection error or improper timing of insemination may hamper the conceptions, which in turn, increase the calving to conception interval (Shamsuddin *et al*. 2001). The negative energy balance affects negatively the interval between calving and resumption of ovarian activity postpartum. It could have delayed resumption of LH secretion pattern, resulting in a longer postpartum interval. Silent heat and unavailability of the skilled artificial insemination technician could also be constraints in improving the fertility status.

CONCLUSION

Poor fertility performance of cows, delayed age at first calving, less number of lactating cows out of all breedable cows and all cattle and high production cost due to poor milk to concentrate ratio are the main constraints of the small holder dairy farmers. Farmers are losing in average Tk. 39.493 / year because of poor fertility and milk production in the studied area.

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