*Article*

# Evaluation of reproductive health status in government and commercial dairy herds of Bangladesh

Mohammad Liaquat Osman Mojumder[*], Jalal Uddin Ahmed, Md. Musharraf Uddin Bhuiyan, Md. Jahid Hasan and Md. Showkat Ali

Department of Surgery and Obstetrics, Faculty of Veterinary Science, Bangladesh Agricultural University, Mymensingh-2202, Bangladesh

[*]Corresponding author: Mohammad Liaquat Osman Mojumder, Department of Surgery and Obstetrics, Faculty of Veterinary Science, Bangladesh Agricultural University, Mymensingh-2202, Bangladesh. E-mail: pavelbaudvm@gmail.com

**Abstract:** To evaluate the reproductive herd health status, the data were collected from Talbag Dairy Farm, Savar; Bangladesh Agricultural University Dairy Farm, Mymensingh and Central Cattle Breeding and Dairy Farm, Savar  for a period of two years. A total of 122 lactating cows were selected to collect data on productive and reproductive performance from the farms record book maintained by three farms. The mean value ± SD of breeding age, calving age, age at first conception, calving to first estrus, calving to first service, days open, calving interval, first service conception rate, number of service per conception, calf per year of Talbag Dairy Farm, BAU Dairy Farm, Central Cattle Breeding and Dairy Farm were 25.10 ± 2.68, 219.23 ± 12.23 and 27.40 ± 7.56 months; 34.30 ± 8.54, 55.88 ± 11.60 and 38.93 ± 8.58 months; 26.20 ± 4.05, 52.71 ± 12.55 and 29.83 ± 8.72 months; 165.00 ±73.82, 219.23 ± 121.83 and 190.50 ± 104.19 days; 165.00 ±73.82, 240.77 ± 128.59 and 190.50 ± 104.19 days; 201.00 ± 72.48, 250.38 ± 72.82 and 335.08 ± 118.61 days; 383.30 ± 57.87, 526.44 ± 196.80 and 523.17 ± 216.37 days; 73.50 ± 29.25, 64.75 ± 30.53 and 61.85 ± 31.87 %; 1.95 ± 0.44, 1.99 ± 0.72 and 2.30 ± 1.02; 383.30 ±57.87, 526.44 ± 196.80 and 523.17 ± 216.37 days, respectively. The overall calf mortality (%) in Talbag Dairy Farm, BAU Dairy Farm, Central Cattle Breeding and Dairy Farm were 4%, 0.70% and 4.06%, respectively. The calf mortality (%) at birth and birth to 30 days in Talbag Dairy Farm, BAU Dairy Farm, Central Cattle Breeding and Dairy Farm were 3%, 1% and 1.85%; 3.5%, 5% and 6.39%; respectively. It is concluded that commercial farms reasonably better due to optimum level of breeding age, first service conception rate, less calving interval and less service per conception.

**Keywords:** dairy herd; reproductive health status; breeding age; calf mortality

## 1. Introduction

In Bangladesh the total cattle population is about 24.4 million of which 11.49 million are female. Among the cattle population 3.53 million are milking cows and 2.61 million are dry cows. Most of the dairy farms in rural and periurban areas of Bangladesh are small scale and each farm consists of 5-20 lactating cows. There are some non-government and government dairy farm that consist of 50- 450 lactating cows (personal communication). Milk production in Bangladesh increased from 18.91 million metric tons in 2010-11 to 21.21 million metric tons in 2011-12 (FAO, 2012). In spite of our large number of cattle population, the production of calf and milk are insufficient. Generally crossbred dairy cows produce 600-800 liter milk per lactation of 210 to 240 days. The profit of dairy farm depends on the production of more calf and more milk from the dairy cows

with optimum fertility management. Calving interval, age at puberty, service per conception, gestation length and birth weight of fetus are most important parameters to measure the farm economy. A farm with 13-15 months calving interval, 24 months for age at puberty, 1.33 services per conception and 5 kg milk per day per cow could be economically profitable (Azizunnesa, 2002). Most of the farmers are illiterate and they are rearing their cattle with so called management system. It is also necessary to mention that more than 80% of the cattle population is being kept by the individual farmers in the rural areas under village management that is why the productivity is very low. On the other hand the demand for milk and milk products is rapidly increase in Bangladesh day by day. Usually the production performances of cross-bred cows are better than local cows. For why at present the demand of cross bred cows are many times higher due to higher production of milk ranges between 8-15 litre /day and it is also profitable business in our country. But some constrains decline the rate of production ultimately decline the profit of the dairy farms due to lack of technology. So it is important to measure the different productive and reproductive performances of both government and private dairy farm for overall productive and reproductive pictures of farms and accordingly putting some recommendation to improve the status. The reasons for poor productivity could be due to genetically low producing indigenous local cows, not using appropriate technologies to increase the productivity of the cows over the past years, inadequate feeding management, disease control programme and hot and humid environments (Jabber and Green, 1983; Shamsuddin, 1988; Alam and Ghosh, 1988; Shamsuddin *et al.*, 2001).

Lifetime productivity of cows largely depends on their individual reproductive performance. In most countries, the primary objective of a reproductive control program in a dairy herd is to have each cow calves and produce a live calf in every 12 months (Rahman *el al.,* 1995). The current level of reproductive performance in dairy herds is well below the optimum in most countries (Morton, 2003). Reproductive inefficiency in turn, however, affects dairy herd profitability by decreasing milk yield, the number of replacement heifers produced and by increasing culling rate. Healthy pregnant cows are seldom culled from a dairy operation. Maximizing both conception and service rate provides opportunities for management control of reproduction and profitability in dairy herd (Grohn and Rajwala, 2000; Santos, 2007). Therefore, the current study was undertaken to asses the productive and reproductive efficiency of lactating cows.

## 2. Materials and Methods
### 2.1. Study area
Three herds viz: Talbag Dairy Farm, Savar; Bangladesh Agricultural University Dairy Farm, Mymensingh; Central Cattle Breeding and Dairy Farm, Savar; were selected for the study. The BAU Dairy Farm, Mymensingh and Central Cattle Breeding and Dairy Farm, Savar are government farms; and Talbag Dairy Farm, Savar is commercial one.

### 2.2. The animals and their management
The breeds were selected from Talbag Dairy Farm, BAU Dairy Farm, Central Cattle Breeding and Dairy Farm were Friesian; Sahiwal, Holstein-Friesian, Jersey; Local× Friesian, Local × F × Friesian, respectively.

### 2.3. Management of Talbag Dairy Farm
The feeding management of Talbag Dairy Farm were sufficient roughages with appropriate amount of concentrate. The ingredients of concentrate were wheat bran, maize, rice polish etc. The forage ingredients are zamboo, napier, straw. The amount of concentrate was 10 kg/ day/ cow and the forage was 12 kg/ day/ cow. The artificial insemination was performed in this farm. The average insemination time after identifying heat was 12-18 hrs. Regular replacement of heifer was done. Routine deworming against liver fluke, round worms was in practiced and the cows were vaccinated routinely against foot and mouth diseases, anthrax, black quarter, haemorrhagic septicemia but vaccine available in those area were not control of diseases due to expired date of vaccine, impurities of vaccine. The cows were managed traditionally. All cows had free access to drinking water. All cows were milked twice a day by hand and keeping their calves during milking.

### 2.4. Management of BAU Dairy Farm
The feeding management of BAU Dairy Farm were maintained by supplying sufficient roughages with appropriate amount of concentrate. The ingredients of concentrate were wheat bran, rice polish, oil cake, salt, di calcium phosphate. The forage in the form of 20 kg green grass per cattle. The concentrate amounts for milking cow, dry cow, pregnant cows, and others were 2-3 kg, 1 kg, 2 kg and half kg, respectively. The artificial

insemination was performed in this farm. The average insemination time after identifying heat was 6-12 hrs. Routine deworming against liver fluke, round worms was in practiced and the cows were vaccinated routinely against foot and mouth diseases, anthrax, black quarter, haemorrhagic septicemia etc. The cows were managed traditionally or extensively, in extensively managed farms where most cows were under tethered grazing approximately for 4 hours daily.  All cows had free access to drinking water. All cows were milked twice a day by hand and keeping their calves during milking.

## 2.5. Management of Central Cattle Breeding and Dairy Farm, Savar

The feeding management of Central Cattle Breeding and Dairy Farm was maintained by supplying sufficient roughages with appropriate amount of concentrate. The ingredients of concentrate were wheat bran, rice polish, oil cake, salt, di calcium phosphate, maize, khesari, soyabean. The amount of  concentrate was 5 kg/ day/ cow and the forage in the form of 15 kg green grass and 3 kg straw. The artificial insemination was performed in this farm. The average insemination time after identifying heat was 12-18 hrs. Routine deworming against liver fluke, round worms was in practiced and the cows were vaccinated routinely against foot and mouth diseases, anthrax, black quarter, haemorrhagic septicemia etc. The cows were managed traditionally or extensively, in extensively managed farms where most cows were under tethered grazing approximately for 5 hours daily. All cows had free access to drinking water. All cows were milked  twice a daily by hand and keeping their calves during milking.

## 2.6. Study population

Three herds viz, Talbag Dairy Farm, Savar; BAU Dairy Farm, Mymensingh Central Cattle Breeding and Dairy Farm, Savar; were included in this study. A total 122 lactating cows were selected, of which 10 from Talbag Dairy Farm; 52 from BAU Dairy Farm and 60 from Central Cattle Breeding and Dairy Farm.

## 2.7. Preparation of survey schedule

The survey schedule was prepared according to the objectives of the work. Before preparing the final schedule, a preliminary schedule was developed in accordance with objectives of the study. In the farms of the study area and the question in the schedule were rearranged and modified accordingly. A new set of questions were added in accordance with local managemental practice. The questionnaire was designed for colleting data and it contained: (i) Farm and owner identification, general information, breeds of different animal, milk production records etc, (ii) Feeding and their management, (iii) Breeding management, (iv) Hygienic management, (v) Farmers opinion-constraints and suggestion and (vi) Individual cow data: Breeding age, Calving age, Age at first conception, Calving to first estrous, Calving to first service, Days open, Calving interval, First service conception rate, Number of service per conception, Calf per year, Calf mortality etc.

## 2.8. Sampling of study unit

Out of 42, 157 and 1552 cattles in Talbag Dairy Farm, BAU Dairy Farm and Central Cattle Breeding and Dairy Farm randomly was selected 10, 52, 60 lactating cows, respectively.

## 2.9. Period of data collection

Two years (April 2010-March 2012) data were collected from three farms are Talbag Dairy Farm, Savar; BAU Dairy Farm, Mymensingh; Central Cattle Breeding and Dairy Farm, Savar.

## 2.10. Data collection

Reasonably reliable data and other necessary information were obtained. Direct interview technique was followed where the author asked questions to the respondents and recorded the answer in the questionnaire. If available, farm recodes were reviewed to obtain additional information and the animals were examined.

## 2.11. Data managements and strategy used for analysis

The raw data (extracted from questionnaire response) were decoded, entered and sorted accordingly using the MS Excel 2007 and MS Word. The data were then transported to analytical software Statistical Package for Social Sciences (SPSS) for doing descriptive analysis. Initially the data were sorted and cross cheeked duplication and/or missing value. The missing value for each variable were recoded (numeric) as to be not excluded in the analysis. Consistency check was done for quantitative variable using scatter plot and histogram;

and for categorical variable through cross tabulation. Descriptive analysis was expressed relative frequency and their percentages, mean, standard deviation (SD), Range (min-max) wherever applicable. For categorical variables the strength of association was measured using chi ($\lambda^2$) test. P value was expressed to denote the probability and uncertainty of measures association between specific outcome and respective variables.

## 3. Results and Discussion

Infertility problems are usually overlooked by the farmers and reproductive health management is not ensured. These lead to delayed first calving, long calving interval and poor conception rate. Imbalance feed management of dairy cows and calves are another burning issue, which seriously taxes the farm economy. The main constraints are unavailability of pasture land, inadequate veterinary services, excessive cost of concentrate and unawareness of farmers. The main objectives of this study was comparison between productive and reproductive efficiency of lactating cows and effect of management factors on production and reproduction in commercial and government farms.

The breeding age (month) was highest ($43.40 \pm 12.23$) in BAU Dairy Farm and lowest ($25.10 \pm 2.68$) in Talbag Dairy Farm (Table 1). The calving age (months) was highest ($55.88 \pm 11.60$) in BAU Dairy Farm and lowest ($34.30 \pm 8.54$) in Talbag Dairy Farm (Table 2). The age at first conception (month) was highest ($52.71 \pm 12.55$) in BAU Dairy Farm and lowest ($26.20 \pm 4.05$) in Talbag Dairy Farm (Table 3). The calving to first estrus (days) was highest ($219.23 \pm 121.83$) in BAU Dairy Farm and lowest ($165.00 \pm 73.82$) in Talbag Dairy Farm (Table 4). The calving to first service (days) was highest ($240.77 \pm 128.59$) in BAU Dairy Farm and lowest ($165.00 \pm 73.82$) in Talbag Dairy Farm (Table 5). The days open (days) was highest ($335.08 \pm 118.61$) in Savar Dairy Farm and lowest ($201.00 \pm 72.48$) in Talbag Dairy Farm (Table 6). The calving interval (days) was highest ($526.44 \pm 196.80$) in BAU Dairy Farm and lowest ($383.30 \pm 57.87$) in Talbag Dairy Farm (Table 7).

**Table 1. Breeding age (month) in different farms.**

| Variable | Name of the farms | No. of cows | Mean ± standard deviation | Minimum | Maximum |
|---|---|---|---|---|---|
| Breeding age (month) | Talbag Dairy Farm | 10 | $25.10 \pm 2.68^c$ | 23 | 32 |
| | BAU Dairy Farm | 52 | $43.40 \pm 12.23^a$ | 25 | 77 |
| | Savar Dairy Farm | 60 | $27.40 \pm 7.56^b$ | 14 | 49 |

a,b,c values with superscripts within column differ significantly from each other (p>0.01)

**Table 2. Calving age (month) in different farms.**

| Variable | Name of the farms | No. of cows | Mean ± standard deviation | Minimum | Maximum |
|---|---|---|---|---|---|
| Calving age (month) | Talbag Dairy Farm | 10 | $34.30 \pm 8.54^c$ | 14 | 45 |
| | BAU Dairy Farm | 52 | $55.88 \pm 11.60^a$ | 37 | 86 |
| | Savar Dairy Farm | 60 | $38.93 \pm 8.58^b$ | 19 | 61 |

a,b,c values with superscripts within column differ significantly from each other (p>0.01)

**Table 3. Age at first conception in different farms.**

| Variable | Name of the farms | No. of cows | Mean ± standard deviation | Minimum | Maximum |
|---|---|---|---|---|---|
| Age at first conception (month) | Talbag dairy farm | 10 | $26.20 \pm 4.05^c$ | 23 | 35 |
| | BAU dairy farm | 52 | $52.71 \pm 12.55^a$ | 36 | 91 |
| | Savar dairy farm | 60 | $29.83 \pm 8.72^b$ | 13 | 51 |

a,b,c values with superscripts within column differ significantly from each other (p>0.01)

**Table 4. Calving to first estrus (days) in different farms.**

| Variable | Name of the farms | No. of cows | Mean ± standard deviation | Minimum | Maximum |
|---|---|---|---|---|---|
| Calving to first estrus (days) | Talbag Dairy Farm | 10 | $165.00 \pm 73.82^c$ | 120 | 300 |
| | BAU Dairy Farm | 52 | $219.23 \pm 121.83^a$ | 30 | 540 |
| | Savar Dairy Farm | 60 | $190.50 \pm 104.19^b$ | 30 | 540 |

a,b,c values with superscripts within column differ significantly from each other (p>0.01)

**Table 5. Calving to first service (days) in different farms.**

| Variable | Name of the farms | No. of cows | Mean± standard deviation | Minimum | Maximum |
|---|---|---|---|---|---|
| Calving to first service (days) | Talbag Dairy Farm | 10 | $165.00 \pm 73.82^c$ | 120 | 300 |
| | BAU Dairy Farm | 52 | $240.77 \pm 128.59^a$ | 30 | 540 |
| | Savar Dairy Farm | 60 | $190.50 \pm 104.19^b$ | 30 | 540 |

a,b,c values with superscripts within column differ significantly from each other (p>0.01)

**Table 6. Days open (days) in different farms.**

| Variable | Name of the farms | No. of cows | Mean ± standard deviation | Minimum | Maximum |
|---|---|---|---|---|---|
| Days open (days) | Talbag Dairy Farm | 10 | $201.00 \pm 72.48^c$ | 120 | 570 |
| | BAU Dairy Farm | 52 | $250.38 \pm 72.82^b$ | 30 | 750 |
| | Savar Dairy Farm | 60 | $335.08 \pm 118.61^a$ | 90 | 1140 |

a,b,c values with superscripts within column differ significantly from each other (p>0.01)

**Table 7. Calving interval (days) in different farms**

| Variable | Name of the farms | No. of cows | Mean ± standard deviation | Minimum | Maximum |
|---|---|---|---|---|---|
| Calving interval (days) | Talbag Dairy Farm | 10 | $383.30 \pm 57.87^c$ | 365 | 548 |
| | BAU Dairy Farm | 52 | $526.44 \pm 196.80^a$ | 365 | 1095 |
| | Savar Dairy Farm | 60 | $523.17 \pm 216.37^b$ | 365 | 1095 |

a,b,c values with superscripts within column differ significantly from each other (p>0.01)

**Table 8. First service conception rate (%) in different farms.**

| Variable | Name of the farms | No. of cows | Mean ± standard deviation | Minimum | Maximum |
|---|---|---|---|---|---|
| First service conception rate (%) | Talbag Dairy Farm | 10 | $73.50 \pm 29.25^a$ | 25 | 100 |
| | BAU Dairy Farm | 52 | $64.75 \pm 30.53^b$ | 17 | 100 |
| | Savar Dairy Farm | 60 | $61.85 \pm 31.87^c$ | 14.28 | 100 |

a,b,c values with superscripts within column differ significantly from each other  (p>0.01)

**Table 9. Service per conception  in different farms.**

| Variable | Name of the farms | No. of cows | Mean ± standard deviation | Minimum | Maximum |
|---|---|---|---|---|---|
| Service per conception (ratio) | Talbag Dairy Farm | 10 | $1.95 \pm 0.44^c$ | 1.5 | 3 |
| | BAU Dairy Farm | 52 | $1.99 \pm 0.72^b$ | 1 | 3.5 |
| | Savar Dairy Farm | 60 | $2.30 \pm 1.02^a$ | 1 | 6 |

a,b,c values with superscripts within column differ significantly from each other  (p>0.01)

**Table 10. Calf per year in different farms.**

| Variable | Name of the farms | No. of cows | Mean ± standard deviation | Minimum | Maximum |
|---|---|---|---|---|---|
| Calf per year | Talbag Dairy Farm | 10 | 383.30 ± 57.87 [c] | 365 | 548 |
| | BAU Dairy Farm | 52 | 526.44 ±196.80 [a] | 365 | 1095 |
| | Savar Dairy Farm | 60 | 523.17 ± 216.37 [b] | 365 | 1095 |

a,b,c values with superscripts within column differ nonsignificantly from each other (p<0.05)

**Table 11. Calf mortality (%) in different farms.**

| Variable | Time | Name of the farms | Born | Died | Years | Percentage per year |
|---|---|---|---|---|---|---|
| Calf mortality | Total | Talbag Dairy Farm | 40 | 8 | 05 | 4.00 |
| | | BAU Dairy Farm | 778 | 103 | 19 | 0.70 |
| | | Savar Dairy Farm | 1189 | 193 | 04 | 4.06 |
| | At birth | Talbag Dairy Farm | 40 | 6 | 05 | 3.00 |
| | | BAU Dairy Farm | 101 | 1 | 01 | 1.00 |
| | | Savar Dairy Farm | 1189 | 88 | 04 | 1.85 |
| | Birth to 30 days | Talbag Dairy Farm | 40 | 7 | 05 | 3.5 |
| | | BAU Dairy Farm | 100 | 5 | 01 | 5.00 |
| | | Savar Dairy Farm | 725 | 139 | 03 | 6.39 |

Haider (2007) stated that the average length of calving interval of indigenous and crossbred dairy cows was 421.3 ± 8.5 and 406.8 ± 5.0 days, respectively. Halim (1992) worked on local and crossbred dairy cows and reported that average calving interval were 445 and 425 days, respectively. These results of Mondal (1998) who find that the mean calving interval of Jersey cross, Sahiwal cross, Sindhi cross, Holstein cross and Red Chittagong cows were 501.4 ± 86.4, 444.9 ± 94.9, 431.0 ± 98.5, 414.1 ± 51.4 and 469.3 ± 123.8 days, respectively. Nahar *et al*. (1989) also observed that the mean calving interval of Sindhi, Sahiwal, Jersey and Holstein cross bred cows under farm conditions were 451.7, 485.8, 436.3 and 749.4 days, respectively. Variation in calving interval of different genotype might be due to genetic, environmental, feeding and management effect. Jainuddin and Hafez (2001) stated that 12-13 months calving interval in a dairy herd. At least 90% of cows should show estrus by Day 60 post partum and conceived by 85 days post partum. Haider (2007) suggested an optimum calving interval from 360 to 390 days. An average interval of 70 days from calving to first breeding and a high fertility rate are important to maximize efficiency in dairy herds resulting more milk and calve at reduced cost.

The first service conception rate (%) was highest (73.50 ± 29.25) in Talbag Dairy Farm and lowest (61.85 ± 31.87) in Savar Dairy Farm (Table 8). The service per conception (ratio) was highest (2.30 ± 1.02) in Savar Dairy Farm and lowest (1.95 ± 0.44) in Talbag Dairy Farm (Table 9). The results of present study to the findings of Sultana (1995) who showed that average service per conception of Local, Local × Jersey and Local × Friesian were 1.8, 0.2, 1.9 ± 0.2 and 1.7 ± 0.2, respectively. Jabbar and Ali (1988) observed that average service per conception of crossbred, Local (milk) and Local (draft) were 1.2 ± 0.5, 1.3 ± 0.3 and 1.7 ± 0.6, respectively in Bangladesh. Mondal (1998) stated that service per conception were 1.6 ± 0.6, 1.6 ± 0.6, 1.6 ± 0.7, 1.6 ± 0.6 and 1.7 ± 0.6 for Jersey cross, Sahiwal cross, Sindhi cross, Holstein cross and Red Chittagong cows, respectively in BAU, Dairy Farm. Ghosh (1995) reported that the number of service per conception were 1.6 ± 0.2, 1.7 ± 0.2, 1.7 ± 0.2, 1.8 ± 0.2 for Friesian × Local, Sahiwal × Local, Jersey × Local and Sindhi × Local, respectively. Variation in service per conception of different types of dairy cow might be due to semen quality, insemination technique, and time of insemination, skillness of inseminator, reproductive disease and feeding practices.

In case of calf per year, the mean value ± SD were highest (526.44 ± 196.80 days) in BAU Dairy Farm with a minimum value of 365 days and maximum value of 1095 days (Table 10). The overall calf mortality in Talbag Dairy Farm, BAU Dairy Farm, Central Cattle Breeding and Dairy Farm were 4%, 0.70%, 4.06% per year, respectively (Table 11). The overall calf mortality was highest (4.06% per year) in Central Cattle Breeding and Dairy Farm and lowest (0.70% per year) in BAU Dairy Farm (Table 11). The calf mortality at birth Talbag

Dairy Farm, BAU Dairy Farm, Central Cattle Breeding and Dairy Farm were 3%, 1%, 1.85% per year, respectively (Table 11). The calf mortality at birth was highest (3% per year) in Talbag Dairy Farm and lowest (1% per year) in BAU Dairy Farm (Table 11).The calf mortality from birth to 30 days in Talbag Dairy Farm, BAU Dairy Farm, Central Cattle Breeding and Dairy Farm were 3.5%, 5%, 6.39% per year, respectively (Table 11). The calf mortality from birth to 30 days was highest (6.39% per year) in Central Cattle Breeding and Dairy Farm and lowest (3.5% per year) in Talbag Dairy Farm (Table 11).

## 4. Conclusions

There is reasonably optimum level of breeding age, age at first conception, calving to first estrus, calving to first service, calving interval, first service conception rate, number of service per conception, calf per year were in commercial farm. Moreover, the calf mortality was comparatively lower in BAU Dairy Farm.

## Conflict of interest

None to declare.

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