

Factors influencing the rates of pregnancy, calving and peri-parturient disorders in heifers at selected char areas of Bangladesh

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Abstract

The study was conducted to evaluate the factors affecting the rates of pregnancy, calving and peri-parturient disorders in heifers in selected char areas (*low lying flood and erosion-prone areas in or adjacent to major rivers*) of Lalmonirhat district of Bangladesh. A total of 101 artificial inseminated (AI) heifers were randomly selected for monitoring rates of pregnancy, calving and peri-parturient disorders with respect to breed of semen, source of semen, breed, age, body weight and body condition score (BCS) of heifers. The overall rates of pregnancy, calving and peri-parturient disorder were 51.5%, 45.5% and 32.6%, respectively. The differences were not significant with respect to the factors evaluated ($P>0.05$). (*Bangl. vet.* 2015. Vol. 32, No. 2, 65 – 72)

Introduction

Dairy cows play an important role in the livelihood of poor and marginal farmers in Char (*low lying flood and erosion-prone areas in or adjacent to major rivers*; Howes, 2006) area of Bangladesh. Dairy cattle farming and management in the mainland is convenient due to facilities such as feed, drugs and veterinary services as well as marketing. Cows in chars, however, lack these facilities, and suffer more from health and fertility problems. Most cattle of char areas are local zebu producing 0.5 to 1.5 litres of milk per day. For increasing milk yield, crossbreeding through AI using semen of exotic breeds is beneficial.

AI has been introduced since early 1960s for upgrading local cows (Ahmed and Islam, 1987). However, the achievement of AI in Bangladesh is still unsatisfactory. The success of any AI programme may be influenced by many factors (Siddiqui *et al.*, 2012; Mollah *et al.*, 2015). An inefficient AI programme not only causes reduced rates of pregnancy and calving but also causes economic loss. Limited investigations have been conducted on success of AI programmes in char areas of Bangladesh (Paul *et al.*, 2011). The present study was conducted to evaluate factors affecting the rates of pregnancy, calving and peri-parturient disorders in heifers received AI.

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Materials and Methods

Study area and period

This study was conducted from January 2012 to May 2013 at the Khogar char of Bhadoi and Bolder char of Mahiskhocha Union in Aditmari Upazila (Sub-district) of Lalmonirhat district of Bangladesh.

Animal selection and management

A total of 101 heifers (75 local zebus and 26 crossbred) were randomly selected. All heifers had been donated to the ultra-poor farmers by the Char Livelihood Programme (CLP) in Bangladesh. They were treated against round worms and liver fluke, and vaccinated against foot and mouth disease, anthrax and haemorrhagic septicaemia. All heifers were housed about 18 hours in their rearing sheds with natural ventilation. The animals were fed with concentrate, green grass (cut and carried) and straw with free access to drinking water. The animals grazed from early morning to noon and fed with 4-6 kg green grass mixed with 2-3 kg straw daily as evening meal. In addition, some farmers fed 150g mixed concentrate (rice polish, wheat bran, broken rice and oil cake) per animal twice daily.

Determination of age, body weight and body condition score (BCS) of heifers

Age of heifers was estimated by observing teeth. Body weight of heifers was estimated by using a measuring tape using the following formula:

$$\text{Body weight} = \{(L \times G^2)/300\}/2.2 \text{ kg}$$

Where L = Length from point of shoulder to point of pin bone in inches, G = chest girth in inches.

Body condition score (BCS) was assessed by visual and tactile appraisal. A scoring system from 1 to 5 with 0.5 fractions was used.

Oestrus detection, AI and pregnancy diagnosis

Oestrus was detected by the farmers on the basis of oestrus signs and AI was performed by a trained technician using frozen semen. The semen was derived from bulls of Central Cattle Breeding Station (CCBS), Savar, Dhaka (DLS) or bulls of Bangladesh Rural Advancement Committee (BRAC), Shambuganj, Mymensingh. Pregnancy was diagnosed 60-90 days after AI by rectal palpation.

Recording of AI, pregnancy, calving and peri-parturient disorders

Immediately after AI, farmers' name and address, date of AI, breed of heifer, source of semen, age, body weight and BCS of heifer were recorded. Results of pregnancy diagnosis, calving and disorders in and around parturition were recorded.

Statistical analysis of data

The data were entered in Microsoft Excel Worksheet and presented as percentages. The rates of pregnancy, calving and peri-parturient disorders were compared with respect to breed of bull (Sahiwal or Friesian), sources of semen (DLS vs. BRAC), breed (Local zebu vs. cross), age (24-29 vs. 30-35 vs. 36-42 months), body weight (120-160 vs. 161-200 vs. 201-245 kg) and BCS (2.0 vs. 2.5-3.0 vs. 3.0-3.5) of heifers. The data were analysed by Chi-square test using SPSS software version 17. The variation was considered significant when the P value was less than 0.05.

Results and Discussion

The overall rates of pregnancy, calving and reproductive disorders in heifers of char areas were 51.5% (52/101 heifers), 45.5% (46/101 heifers) and 32.6% (15/46 parturient heifers), respectively. Similar pregnancy rate was reported by Al-Hasan (2003) in Friesian herds in Saudi Arabia and by Khatun *et al.* (2014) in Kurigram district of Bangladesh. Contrasting with the present finding, lower pregnancy rate (46.2) was reported in cattle of plain land by Shamsuddin *et al.* (2001) and of char areas (43.8%) of Bangladesh by Islam (2015). Moreover, higher pregnancy rate (57.3%) was reported in cattle of char areas of Sirajgonj district by Paul *et al.* (2011). The variation in pregnancy rates between studies might be due to variations in management of cows, skill of AI technicians and agro-ecological conditions of study areas.

Effects of breed of bulls on rates of pregnancy, calving and peri-parturient disorders

Effects of breed of bull on rates of pregnancy, calving and peri-parturient disorders are presented in Table 1. The pregnancy rate was higher (54.1%) when Sahiwal bull's semen was used for AI than with Friesian bulls (47.5%). The calving rate was higher (49.9%) when Sahiwal bull semen was used for AI than with Friesian bulls (35.2%). The peri-parturient disorder rate was higher (50.0%) when Friesian bull semen was used than with Sahiwal bulls (23.5%). However, these differences were not significant ($P>0.05$). Similarly, higher pregnancy rate was observed in cows receiving Sahiwal semen than that of Friesian in Sirajgonj district (Paul *et al.*, 2011). Contrasting with the present finding, the pregnancy rate in cows receiving Friesian semen was higher than that of Sahiwal bull semen in Gaibandha district (Mollah *et al.*, 2015). Additionally, higher pregnancy rate was found in cows using Friesian semen than Sahiwal (Shamsuddin *et al.*, 2001). The differences between studies might be due to variations in management of cows, skill of AI technicians, quality of semen and agro-ecological conditions of study areas. In the present study, higher rate of peri-parturient disorders in heifers receiving semen from Friesian than from Sahiwal bull may be explained by the greater size of foetus of Friesian cross compared with Sahiwal. Only bulls whose calves have acceptable birth weight should be considered for AI in heifers, since birth weight is the most significant factor affecting parturition.

Table 1. Effects of breed of bull on rates of pregnancy, calving and peri-parturient disorders

Breed of bulls	No. of inseminated heifers	No. of pregnant heifers	Pregnancy rate (%)	No. of calves born	Calving rate (%)	No. of heifers with peri-parturient disorder	Peri-parturient disorder rate (%)
Sahiwal	61	33	54.1	30	49.9	8	23.5
Friesian	40	19	47.5	14	35.2	7	50.0

The rates of pregnancy, calving and peri-parturient disorders within same column did not differ significantly from each other ($P>0.05$).

Effects of source of semen on rates of pregnancy, calving and peri-parturient disorders

Effects of source of semen on rates of pregnancy, calving and peri-parturient disorders are presented in Table 2. The pregnancy rate was higher (58.5%) when BRAC-derived semen was used compared to semen from DLS (46.7%). The calving rate was higher (48.9%) when BRAC semen was used compared to DLS (41.7%). The peri-parturient disorder rate was higher (35.0%) when BRAC semen was used compared to DLS (32.0%). However, these differences were not significant ($P>0.05$). The present finding is consistent with other investigators where cows inseminated with frozen semen derived from BRAC showed higher (61.6%) pregnancy rate than that of semen derived from DLS (55.0%) (Shikder, 2011). The reason for lower pregnancy rate in heifers inseminated with DLS derived semen may be that the quality of semen of DLS might be inferior. The reason for higher peri-parturient disorders in heifers receiving semen from BRAC may be that the selection procedure of bulls might be better in DLS.

Table 2. Effects of source of semen on rates of pregnancy, calving and peri-parturient disorders

Sources of semen	No. of inseminated heifers	No. of pregnant heifers	Pregnancy rate (%)	No. of calves born	Calving rate (%)	No. of heifers with peri-parturient disorder	Peri-parturient disorder rate (%)
DLS	60	28	46.7	25	41.7	8	32.0
BRAC	41	24	58.5	20	48.9	7	35.0

The rates of pregnancy, calving and peri-parturient disorder within same column did not differ significantly ($P>0.05$); DLS = Department of Livestock Services, BRAC = Bangladesh Rural Advancement Committee

Effects of breeds of heifers on rates of pregnancy, calving and peri-parturient disorders

Effects of breed of heifer on rates of pregnancy, calving and peri-parturient disorders are presented in Table 3. The pregnancy rate was higher (52.0%) in local heifers than in crossbred heifers (50.0%). The calving rate was higher (46.7%) in local heifers than

in crossbred heifers (42.3%). The peri-parturient disorder rate was higher (36.4%) in crossbred heifers than in local heifers (31.5%). However, these differences were not significant ($P>0.05$). Similarly, higher pregnancy rate was reported in local cows than in crossbred cows in char area of Sirajgonj district (Paul *et al.*, 2011). Moreover, Khatun *et al.* (2014) obtained higher pregnancy rate in local cows than in Friesian and Sahiwal cross cows in Kurigram district. Contrasting with the present finding, Sarder *et al.* (2001) found better pregnancy rates in crossbred cows than in local counterparts in Rajshahi district. The reason for variations in pregnancy rates between studies might be variations in management of cows, skill of AI technicians, quality of semen and agro-ecological conditions of study areas.

Table 3. Effects of breeds of heifers on rates of pregnancy, calving and peri-parturient disorders

Breed of heifers	No. of inseminated heifers	No. of pregnant heifers	Pregnancy rate (%)	No. of calves born	Calving rate (%)	No. of heifers with peri-parturient disorder	Peri-parturient disorder rate (%)
Local	75	39	52.0	35	46.7	11	31.5
Cross	26	13	50.0	11	42.3	4	36.4

The rates of pregnancy, calving and peri-parturient disorder within same column did not differ significantly ($P>0.05$).

Effects of age of heifers on rates of pregnancy, calving and peri-parturient disorders

Effects of age of heifers on rates of pregnancy, calving and peri-parturient disorders are presented in Table 4. The pregnancy rate was the highest (66.7%) in 36-42 month-old heifers and the lowest (40.0%) at 24-29 months. The calving rate was the highest (57.0%) in 36-42 month-old heifers and the lowest (36.7%) at 24-29 months. The peri-parturient disorder rate was the highest (36.4%) in 24-29 month-old heifers and the lowest (26.3%) at 36-42 months old counterparts. However, the differences were not significant ($P>0.05$). Similarly, no significant difference was obtained in pregnancy rate with respect to age of cows in Sirajgonj district (Paul *et al.*, 2011). Contrasting with the present finding, variation in pregnancy rate was reported with respect to age of cows in Gaibandha district (Mollah *et al.*, 2015). Analysing data from Botswana, Buck *et al.* (1976) found that fertility rate increased from 69% in 2.5-year-old cows to a maximum of 82% in 6- to 7-year-old cows and then declined. In Bolivia, Plasse *et al.* (1975) recorded an increase in pregnancy rate from 50% in 3-year-old purebred Criollo and Criollo \times zebu cows to 75% in 7-year-olds. Moreover, similar higher rate of peri-parturient disorders in younger heifers has been documented (Ahmed *et al.*, 2005; Majed *et al.*, 2009). This may be due to smaller pelvis in younger heifers.

Effects of body weight of heifers on rates of pregnancy, calving and peri-parturient disorders

Effects of body weight of heifers on rates of pregnancy, calving and peri-parturient disorders are presented in Table 5. The pregnancy rate was the highest (53.8%) in

heifers of 201-245 kg body weight and the lowest (46.6%) in heifers of 120-160 kg. The calving rate was the highest (50.0%) in heifers of 201-245 kg body weight and the lowest (36.7%) in heifers of 120-160 kg. The rate of peri-parturient disorder was higher (45.4%) in heifers of 120-160 kg body weight and lower (23.1%) in heifers of 201-245 kg. However, the differences were not significant ($P>0.05$). The pregnancy rate was higher in cows above 200 kg body weight than in lighter cows (Shikder, 2011). Moreover, there is a report that body weight of cows significantly affects the pregnancy rate in Kurigram district (Khatun *et al.*, 2014). On the contrary, no significant effect of body weight of cows on pregnancy rate was found in Sirajgonj district (Paul *et al.*, 2011). Higher rate of peri-parturient disorders was reported in cows with lower body weight than in heavier cows in Savar Dairy Farm, Dhaka (Majed *et al.*, 2009).

Table 4. Effects of age of heifers on rates of pregnancy, calving and peri-parturient disorders

Age of cows (months)	No. of inseminated heifers	No. of pregnant heifers	Pregnancy rate (%)	No. of calves born	Calving rate (%)	No. of Heifers with peri-parturient disorder	Peri-parturient disorder rate (%)
24-29	30	12	40.0	11	36.7	4	36.4
30-35	38	18	47.0	16	42.5	6	31.5
36-42	33	22	66.7	19	57.0	5	26.3

The rates of pregnancy, calving and peri-parturient disorder within same column did not differ significantly ($P>0.05$)

Table 5. Effects of body weight of heifers on rates of pregnancy, calving and peri-parturient disorders

Body weight of cows (kg)	No. of inseminated heifers	No. of pregnant heifers	Pregnancy rate (%)	No. of calves born	Calving rate (%)	No. of heifers with peri-parturient disorder	Peri-parturient disorder rate (%)
120-160	30	14	46.6	11	36.7	5	45.4
161-200	45	24	53.3	22	48.4	7	31.8
201-245	26	14	53.8	13	50.0	3	23.1

The rates of pregnancy, calving and peri-parturient disorder within same column did not differ significantly ($P>0.05$)

Effects of BCS on rates of pregnancy, calving and peri-parturient disorders

Effects of BCS of heifers on rates of pregnancy, calving and peri-parturient disorders are presented in Table 6. The pregnancy rate was the highest (53.8%) in heifers with 3.0-3.5 BCS and the lowest (48.5%) in heifers with 2.0 BCS. The calving rate was the highest (50.0%) in heifers with 3.0-3.5 BCS and the lowest (42.9%) in heifers with 2.0

BCS. The peri-parturient disorder rate was the highest (40.0%) in heifers with 2.0 BCS and the lowest (23.1%) in heifers with 3.0-3.5 BCS. However, the differences were not significant among heifers with different BCS ($P>0.05$). Higher pregnancy rate in cows with good BCS has been documented elsewhere in Bangladesh (Shamsuddin *et al.*, 2001). An increased rate of peri-parturient disorders with decreased BCS of heifers has also been reported (Majed *et al.* 2009).

Table 6. Effects of body condition score on rates of pregnancy, calving and peri-parturient disorders

BCS	No. of inseminated heifers	No. of pregnant heifers	Pregnancy rate (%)	No. of calves born	Calving rate (%)	No. of heifers with peri-parturient disorder	Peri-parturient disorder rate (%)
2.0	35	17	48.5	15	42.9	6	40.0
2.5	40	21	52.5	18	45.0	6	33.3
3.0-3.5	26	14	53.8	13	50.0	3	23.1

The rates of pregnancy, calving and peri-parturient disorder within same column did not differ significantly ($P>0.05$)

Conclusions

The overall rates of pregnancy, calving and peri-parturient disorders were 51.5%, 45.5% and 32.6%, respectively at selected char areas of Bangladesh. The rates did not differ significantly with age, body weight, body condition score, or source of semen.

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