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First service influencing factors for pregnancy rate in dairy cows of Bangladesh

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ABSTRACT

The study was carried out to investigate the pregnancy rate of dairy cattle at first artificial insemination (AI). In this study, we considered breed, age parity, body condition, cow in milk or dry, feeding category and open period as a probable influencing factor for pregnancy. Depending on the relative quantitative contribution of these factors on fertility, some suggestions regarding fertility improvement of cow in the AI services were implied. The fertility data on a total of 450 cows were exploited in the experiment to investigate the effect of breed, age parity, body condition, cow in milk or dry, feeding category and open period. Statistical analysis of the results indicated that pregnancy rate was greatly affected by ($P<0.05$) age significantly ($P<0.01$) affected by feeding parity, body weight and milking. However, no other factors exerted significant effect on cow pregnancy rate. The results of the present study suggested that among factors, feeding sufficient amount of green grass, age, body weight to be manipulated in order to achieve desired pregnancy rate. Moreover, farmers alertness regarding the insemination of heifer (parity-0) must well be taken care of in order to realize desired pregnancy rate.

Key words: First artificial insemination, pregnancy rate, dairy cows, breed, parity.

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INTRODUCTION

Dairy farming is a class of agriculture for long-term production of milk. Agro-climatic condition of Bangladesh is favorable for dairying and might be an effective tool for income and employment generation in rural areas. The exotic and their cross are seen to be maintained in the government farms and by the people of the urban and semi urban areas (Alam, 1994). These animals have been produced through the long 30 years of AI program which carried out by the Department of Livestock Services (DLS) of Bangladesh. The number of crossbred cattle is increasing day by day with the demand of farmer as well as spread of AI. Improvement of reproductive traits particularly fertility of cattle through AI is one of the most important tools or elements of success story behind the genetic improvement (Dutta et al., 1982). Therefore measurement of reproductive

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performance in cattle is very important for better outcome.

One of the major constrain of profitable dairy farming is low conception rate (Alam 1994; Dutta et al. 1982; Miah et al. 2004). Economy of dairy farming largely depends on a good conception rate. The twelve-month calving interval is advantageous for maximal milk yield per cow per year with good economic return (Miah et al. 2004). Bangladesh is an agricultural country where livestock are playing a crucial role in the traditional subsistence of farming system.

AI is the most widely used breeding tool which is used for spreading superior germplasm of proven males (Miah et al. 2004; Sarder 2001). Government has spent lot of currency for AI coverage since its inception in this country. The efficiency of the technique and the fertility of cow achieved through this technique depend on several possible factors. Any deficiency on those factors reduces fertility resulting in heavy economic losses. However the analysis of influencing factors for first AI pregnancy rate is time claimed issue to find out the fact behind the success of dairying. Therefore, the present study was undertaken to analyze the effect of different factors for pregnancy rate at first AI.

MATERIALS AND METHODS

Selection of cows

We selected 450 cows from different part of Bangladesh. It was recorded by checking their record book and asking the farmer. Four types of breeds were selected for this study. These are local (L), Friesian (F) cross (L×F), Sahiwal (SL) cross (L×SL) and L×SL×F cross. Cows were different age and those were divided in < 2.5, 2.6 to 3.5, 3.6 to 5, 5.1 to 6.5, 6.6 to 8, >8.1 years. Cows were divided in Parity-0 (heifer), Parity-1, Parity-2, Parity-3, Parity-4, Parity-5, Parity-6, Parity-7 and Parity-10. Cows were different body condition score were considered for the study. Cows were different body weight were divided in <200, 201-250, 251 to 300, >301kg.

Feeding and managements system

Cows were in different feeding system. The cows were divided into poor feeding (1 Kg concentrate & no green grass, sufficient straw), moderate feeding (1-3kg concentrate and 4-5 kg green grass), and good feeding (balanced concentrate & green grass, good feeding (3-3.5kg concentrate & sufficient green grass).

Open period (days open)

Average interval from parturition to first insemination was defined as open period in this study. Open period were divided into less than 100, 101 to 200, more than 201 days.

Estrus detection and pregnancy diagnosis

Cows commonly show estrus approximately every 21 days (20 days for a heifer). The estrus was detected by observing the estrus sign and rectal palpation. Pregnancy was diagnosed by palpation of the uterine contents rectally. Pregnancy diagnosis after insemination can be conducted as early as 30 days in heifers and 35 days in cows, although much practice is necessary to be able to determine pregnancy at that stage.

BSC (Body condition score) was determined as described by Paul et al. (2011).

Statistical analysis

The raw data were decoded, entered and sorted accordingly using the MS Excel. The data were then transferred to analytical software SPSS (version 16.0) for doing logistic regression to measure the association and strength of association between the potential influencing factors.

RESULTS AND DISCUSSION

A total of 450 cows were exploited in the experiment to investigate the effect of breed, age parity, body condition, cow in milk or dry, feeding category and open period. The overall first AI pregnancy rate was 34.0%. A descriptive analysis expressed as binary logistic regressions were done to measure the association and strength of association of different factors. Pregnancy rate in different parameters and class are shown in table 1.

Table 1
Pregnancy rate in different parameters.

Parameter	Class	Pregnancy rate %
Breed	Local	34.8
	L×F	34.9
	SL×F×F	6.6
Age (year)	< 2.5	20
	2.6 to 3.5	21.2
	3.6 to 5	34.0
	5.1 to 6.5	34.1
	6.6 to 8	40.3
	>8.1	36.0
Parity	0	19.0
	1	35.6
	2	30.1
	3	39.1
	4	37.5
	5	62.5
	6	75.0
	7	41.7
	10	25.2
BSC	<2	0
	2.1 to 3	34.1
	3.1 to 4	34.5
	4.1 to5	25
Body weight (kg)	< 200	34.7
	201 to 250	33.3
	251 to 300	36.6
	>301	31.3
Milking	Milking	39.3
	Dry	22.5
Feeding	Good	45.5
	Moderate	34.1
	Poor	20.5
Open Period	<100	52.5
	101 to 200	35.0
	>201	25.0

Effect of breed

In the experiment the pregnancy rate of local, L×F, SL×L×F is 34.8%, 34.9%, 6.6% respectively, shown in the table 2. In the experiment the pregnancy rate of local, L×F, SL×L×F is 34.8%, 34.9%, 6.6% respectively (Table 1). The effect of breed on pregnancy rate in the present study was found non-significant (P>0.05). The findings of the present study was in agreement with the findings of Ghosh (1995); Alam (1991); Gwazdauskas et al., (1981) and in partial agreement with the reports of Reo et al. (1992) and Cuong et al. (1993). In practice, it is difficult to find out the effect of cow genotype on their fertility regarding other factors including environmental and management conditions those might have much more influence on fertility. Cuong et al. (1993) observed higher conception rate in Holstein × Vietnamese crossbreds in the rainy season. Measures of female fertility were significantly higher in 3/4-Holstein cows than in half-bred and 7/8-Holstein cows. In Bangladesh, Ghosh (1995) recorded no significant difference in first service conception rate for different genotypes of cow (50.00, 43.75, 50.00, 43.75 and 43.75% for F× L, SL×L, F×SL×L, Jersey × L and SL×L cows, respectively) in the small dairy enterprises at the village level of Gazipur district. Ghosh (1990) found overall conception rates of several genotypes to be more or less similar in the rural areas of Bangladesh. However, the conception rates varied within the same breed at different location. Alam (1991) also observed more or less similar conception rates for different genotypes, although it varied within the same breed at different areas and different seasons. It is indicated that a significant variation in the conception rate with regard to the initiation of service after calving; the conception rate was higher in cows inseminated 74 days after calving than those inseminated before 74 days postpartum (Coung et al., 1993).

Effect of age

In the experiment the pregnancy rate of cows aged 0 to 2.5 years, 2.6 to 3.5 years, 3.6 to 5 years, 5.1 to 6.5 years, 6 to 8 years, 8.1 years to more is 20%, 21.2%, 34.0%, 34.1%, 40.3%, 36.0%, respectively (Table 2). The effect of age on pregnancy rate in the present study was found significant (P<0.05) whereas the effect of age on cow fertility was non-significant (P>0.05). The age related findings of this study were in partial agreement with the report of Spalding et al. (1975). They reported a slight increase in the fertility of cow up to 3 to 4 years of age and a decline after 4 years of age. They also found a marked decline in fertility in cows over 7 years of age. De Kruif (1978) observed pregnancy rate following the first insemination to be lower for over 7 years of age.

Table 2
Analysis of logistic regression.

Predictor	Correlation coefficients	SE of correlation coefficients	Z	P value	Odds Ratio	95% CI	
						Lower	Upper
Age	0.25	0.11	2.29	0.022*	1.29	1.04	1.61
Parity	-0.51	0.15	-3.28	0.001**	0.60	0.44	0.81
BCS	-0.32	0.22	-1.48	0.139	0.72	0.47	1.11
BW	0.00	0.00	2.79	0.005**	1.01	1.00	1.01
Breed	-0.45	0.35	-1.29	0.199	0.63	0.32	1.27
Milking	0.88	0.27	3.28	0.001**	2.43	1.43	4.13
Feeding	0.77	0.27	2.81	0.005**	2.17	1.26	3.71

Log-Likelihood = -268.127, Test that all slopes are zero: G = 40.678, DF = 8, P-Value = 0.000**, ** Means 0.01 level of significance, * Means 0.05 level of significance, NS= Not significance.

Similar results were reported by Bhuiyan et al. (1995), where they found a decrease in fertility in cows older than 7 years of age. However, partial dissimilarities were found in the present study with the findings of Shamsuddin (1995). Based on the several reports it is clear that the optimum fertility of cow is approaching from 6 and 7 years of age and then declined with the advancement of age.

Effects of parity

In the experiment the pregnancy rate of Parity-0, Parity-1, Parity-2, Parity-3, Parity-4,Parity-5,Parity-6,Parity-7,Parity- 10, is 19.0%, 35.6%, 30.1%, 39.1%, 37.5% 62.5%, 75.0%, 47.7%, 25.2%, respectively (Table 1). The effect of parity on pregnancy rate in the present study was found significant (P<0.01). Bhuiyan et al. (1994) observed that parturition to first oestrus interval (PFOI), parturition to conception interval (PCI), first service to conception interval (FSCI) and service per conception (S/C) were shorter in higher parities groups than in first parity. The third parity cows required shorter PFO (105.57±7.12 days) than did the first (127.80±10.62 days) and second parity ones (117.43±5.58 days). Similarly in this study, PCI was shorter in fifth parity cows (110.16±28.65 days) and longest in first parity cows (150.16±14.66 days). The second parity cows required fewest S/C (1.47±.20 days) and highest number of services (2.07±.24 days) in first parity cows. However, the parity of cows did not influence the reproductive parameters significantly (p>0.05).

Effects of BCS

Effect of BCS on reproductive performance of dairy cows is shown in table 1. The cows having BCS 3.10-4.00 (very good condition) had shown better performance than that of others. Lyakov et al. (1977) defined low, intermediate and high categories of BCS for values lower than 2.5, from 2.5 to 3.5, or higher than 3.5, respectively. Saacke et al. (1991) reported that the heavier cows perform than their lighter counterparts. Gonzalez (1981) stated that the conception rate was highest (62.58) when insemination was done at 12 to 18 hours after the onset of estrus. Dutta et al. (Dutta et al., 1982) and Bach (Bach, 1983) reported that the CR is high when insemination is done at middle or late estrus. The relationship between body condition score and production was strong, but, even after adjusting for yield, an unfavorable relationship still exists between body condition score and fertility (Pryce et al., 2001). Body condition score could be used as a management and selection tool to improve reproductive performance.

Effect of cow in milk or dry

Effect of body milking on pregnancy rate of dairy cows is shown in table 1. The effect of 'milking or not' condition on fertility is significant (P>0.01) shown in the table 2. The effect of 'milking or not' condition on fertility is significant (P>0.01) shown in the table 2. Though no comprehensive work on the effect of this factor on cow fertility was done

so far, Spalding et al. (1975) and Fonseca et al. (1983) suggested that milk production is an energy demanding process, resulting in relative nutritional deficiency and thereby extends the onset of post-partum estrus i.e., reduced fertility. However, Fonseca et al. (1983) observed that Jersey cows producing high amount of milk but maintained on positive energy balance ovulated earlier than their low producing. The lower pregnancy rates in lactating cows that received inadequate amounts of nutrition during the post-partum period (Miah et al., 2004; Ghosh, 1990; Bhuiyan et al., 1995). However, it became difficult to ascertain about the effect of cows in milk or not, condition on fertility particularly with a small data set as used in the present study.

Effects of body weight

Effect of body weight (BW) on pregnancy rate of dairy cows is shown in table 1. The heavy body weight cows had shown better performance. The effect of age on pregnancy rate in the present study was found significant ($P<0.01$) shown in the table 2.

Effects of feeding

Effect of feeding on reproductive performance of dairy cows is shown in table 1. The cows were provided sufficient feed had shown better performance. The effect of feeding condition on fertility is significant ($P>0.01$). Ghosh et al. (1993); Jalil et al. (1995) indicated that improved feeding has a positive effect on reproductive performance.

Effect of open period

Effect of open period on the reproductive and reproductive performance of dairy cows is shown in table 1. The result is, increase in the length of open period the decrease in fertility. The non-significant effect of open period in the present study might be due to smaller number of observations (Alam, 1994; Miah et al., 2004).

CONCLUSION

The study indicate that there is strong effect of breed, age parity, body condition, cow in milk or dry, feeding category and open period for pregnancy rate in cows. The problems associated with fertility failure in cows have been recognized today as burning issue in cattle breeding program of Bangladesh. Extreme pregnancy rate is therefore very much essential for the sustainability of a qualitative dairy farm.

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