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Determination of Factors that Affect the Pregnancy Rate of Cows after Artificial Insemination at Monirampur Upazila of Jessore District of Bangladesh†

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ABSTRACT

This study was carried out to evaluate the influencing factors that affect the reproductive performance of cows at the Monirampur upazila in Jessore district of Bangladesh. A total of 224 cows were brought to the upazila livestock hospital for artificial insemination (AI). The cows were inseminated between 12 to 18 hours from the onset of estrus and data was obtained from the owner. Out of 224 cows, 133 became pregnant and 91 were non pregnant. In this study, the overall pregnancy rate was 59.29%. Among the age variability, the highest pregnancy rate (70.27%) was at the age of 4 years old. In case of breed variation, the highest pregnancy rate was observed in local breed (69.07%) compared with other crossbred cows. Hence the breed variations significantly influence the conception rate of cows. According to the parity, we found that the pregnancy rate was increasing with their parity but decreasing after 4th parity. The highest conception rate was observed in 3rd parity (67.74%) which was significantly higher than that of heifers (Parity-0). Here we also found that the types of bull semen used for AI had no significant effect for pregnancy rate. The skills of AI technician for AI to cows were significantly affecting the pregnancy rate. However, this study is not enough for rating and comment about the reproduction performance of cows. Therefore, further extensive study is needed for rating and recommendation for the cattle up gradation at that particular area.

(Key word: pregnancy rate, AI, holstein cross, sahiwal cross, red chittagonj cattle, parity)

INTRODUCTION

Pregnancy rate in cows reflect the reproductive performance of a dairy herd. Cow's artificial insemination is widely used throughout the world to improve the reproductive efficiency of cows. Accordingly, the Government of Bangladesh has been introduced AI since sixties. However, the achievements through AI in Bangladesh are still unsatisfactory. The success of any AI program may be influenced by many factors (Shamsuddin *et al*., 2001; Paul *et al*., 2011). An inefficient AI program is not only cause of reduced pregnancy rates and fertility but also causes huge economic loss to the farmers (Paul, 2010; Lopez-Gatius, 2013).

AI is one of the important tools for genetic improvement through male line. It has been becoming popular in Bangladesh with the increasing population and decreasing the grazing land properties. In Bangladesh the conception rate using same types of semen is 45.33% and 57.33% in cattle (Das *et al*., 2002). Shamsuddin *et al.* (2001) reported that the higher conception rate (54%) in cows after inseminated with chilled semen. The average conception rate of local non descriptive and crossbred with Friesian, Sahiwal breed were 42.5% and 45.2% to 53.1%, respectively. The low conception rate and other fertility indices after AI are affected by health status of the bull, semen collection, preservation, and transportation procedure and processing of semen during AI gun loading, proper heat detection and AI at correct time, insemination in friendly uterine environment and keeping the AI record. Capacity of AI technician and insemination technique is also plays a major role for poor fertility indices (Paul *et al*., 2011). Furthermore, the parity, breed of cows inseminated also found to affect the conception rate of AI. The

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decline in fertility can also be explained by management changes within the dairy industry and also negative genetic correlation between milk production and reproduction (Lucy, 2007). Than *et al.* (2001) reported that the higher conception rate with advancing parity from parity 2 up to parity 6 and then declined at parities 7 and 8.The major constraints of reduced efficiency of dairy cattle in Bangladesh are low conception rates , a large number of services per conception, prolonged calving to first service interval, poor heat detection (Alam and Ghosh, 1988; Shamsuddin *et al*., 2001). However, pregnancy rates of cows with AI may be affected by many factors and to our knowledge there is no published report about the reproductive performance of cows at the Monirampur upazila of Bangladesh. Therefore, considering the above mentioned factors the present study was conducted to determine the influencing factors and their effect on reproductive performance of cows.

MATERIALS AND METHODS

1. Location

The study was carried out at the Monirampur upazila from 20 September to 14 November'2015. Two hundred and twenty four cows were inseminated during the specified time period.

2. Time of AI

The cows were inseminated between 12 to 18 hours of onset of heat according to the obtained data (history) from the owner of the cows.

3. Grouping of different influencing factors

Age

According to the age of cows, the animals were grouped into A (1-3), B (4), C (5), D (6-7) and E (>8) years.

Breed

In this study, local (native), Red Chittagong Cattle (RCC) and crossbred (Sahiwal and Holstein Friesian) were used for analysis.

Parity

The animals were grouped according to their number of birth as parity-0 (heifer), Parity-1 (gave one birth), Parity-2 (gave two birth), Parity-3 (gave three birth), Parity-4 (gave four birth),

4. Semen Selection

Three types of semen were used for AI in the current study, which were collected from bulls of three genotypes.

a) 50% Sahiwal
b) 62.5% Sahiwal
c) 75%Holstein Friesian

5. Skill of AI Technician

Two AI technician had been used this study and categorized according to their skill and years of experience as technician -1 (five years' experienced) and technician -2 (eight years' experienced).

6. Confirmation of Pregnancy

Pregnancy was confirmed by rectal palpation as described by Arthur (2001). All the animals under this study were subjected to pregnancy diagnosis per rectum after 60-90days post AI by visiting owner's house and some at the hospital where animals were brought by the owners. The results of the pregnancy diagnosis were recorded to find out the pregnancy rate. Briefly, the pregnancy was confirmed by observing the asymmetry of the horn, palpation of the fetus and slipping of the fetal membrane.

7. Recording and Analysis of Data

All the findings of this study were recorded on data sheet and the data were entered in Microsoft Excel sheet for coding. The pregnancy rate was expressed as percentage (%). The analysis of variance will be analyzed by using SPSS® statistical software. Differences were considered significant at the level of $P< 0.01$ and $P< 0.05$

8. Estimation of pregnancy rate

Pregnancy rates were estimated from the proportion of pregnancies confirmed by the rectal palpation of the genital tract at day 60 and day 90 of post insemination among the total number of cows /heifer inseminated artificially with frozen semen in a specified period of time.

$$\text{Pregnancy rate} = \frac{\text{No. of heifers/cows pregnant}}{\text{No. of heifers/cows inseminated}} \times 100$$

RESULTS AND DISCUSSION

In the present study, total of 224 cows were inseminated with frozen semen brought to the AI center, Upazila Veterinary Hospital, Monirampur, Jessore. The overall pregnancy rate was 59.29%. This finding partially agreed with Paul *et al*. (2011) who got 57.3% at the island areas of Bangladesh and Khan *et al*. (2015) who also got similar rate 59.3%.

Effect of age on pregnancy rate

According to the age variability of cows/heifers, we found that the pregnancy rate at group A, B, C, D and E were 48.50, 70.27, 67.50, 60.52 and 50.00%, respectively (Table1). This findings were little higher than that of the findings reported by Paul et al. (2011) and Khan et al. (2008). The highest pregnancy rate was found at age 4 and 5 years old which might due to the recovery of cows from the stress of first calving. However, these findings were agreed with Khan *et al.* (2015). Khan *et al*. (2015) reported that the conception rate at 2.5-3, 3.5-5, 6, 7-8 and .9 years old were 57.9, 77.8, 65.6, 46.7 and 31.3%, respectively.

Effect of breed on pregnancy rate

In the case of breed variation, the pregnancy rate has been mentioned in the Table 2. We demonstrated that the pregnancy rate in local, RCC and Crossbred cows were 69.7, 60.00 and 48.75%, respectively (Table 2). The crossbred cows had been showed significantly lower pregnancy rate than that of our native breeds local and RCC. It might be interpreted that the crossbred cattle feel stress in our climate. Hence breed influences the pregnancy rate. Khan *et al.* (2015) found the conception rate of local, Friesian, and Sahiwal were 63.8, 57.1 and 52.6%, respectively. In case of RCC, our findings are agreed with Mufti *et al.* (2010).

Effect of parity on pregnancy rate

On the basis of the number of parity, we found that the pregnancy rate in heifers, parity 1, 2, 3 and 4 were 48.72, 56.45, 62.03, 67.74 and 61.54%, respectively (Table 3). The pregnancy rate in heifers was significantly higher than that of others parities. The highest conception rate was observed in third parity (67.74%) compared with other parities. Moreover, the pregnancy rate in heifer was higher than that of the observations of Khan *et al.* (2015) and Mollah *et al.* (2015). At first parity the pregnancy rate was 56.45% and after that the pregnancy rate increased up to third parity, from the fourth parity the pregnancy rate declined Jiménez *et al*. (2011). The pregnancy rate is decreased after 3rd and 4th parity because of

Table 1. Pregnancy rate at different age group of cows

Age groups (Years)	No. of cows AI	No. of cows pregnant	Pregnancy rate (%)
A (1-3)	101	49	48.50^{a}
B (4)	37	26	70.27^{b}
C (5)	40	27	67.50^{b}
D (6-7)	38	23	60.52^{b}
E (>8)	08	04	50.00^{a}

$^{a, b}$ within a column represent significant differences ($p< 0.05$).

Table 2. Pregnancy rate in different breed variability of cows

Breed of cows	No. of cows AI	No. of cows pregnant	Pregnancy rate (%)
Local	139	96	69.07^{b}
RCC	05	03	60.00^{b}
Crossbred	80	39	48.75^{a}

$^{a, b}$ within a column represent significant differences ($p< 0.05$).

the nutritional stress to maintain the reproductive physiology as well as the subnormal BCS (Paul *et al.,* 2015).

Effect of bull semen on pregnancy rate

Three distinct types of bull semen were used for artificial insemination. The pregnancy rate of 50%SL, 62.5% SL and 75% HF were 56.33, 62.96 and 58.33%, respectively (Table 4). There is no significant effect of bull semen for cow pregnancy rate. This study was agreed with Paul *et al.* (2011) who used different bull semen for the calculation of first service pregnancy rate and found no significant effect for pregnancy rate.

Effect of skill and experience of AI technician on pregnancy rate

Pregnancy rate also depends on the effective artificial insemination by the AI technician. In this study, two technicians performed artificial insemination. The pregnancy rate of AI technician 1 and 2 were 51.24 and 60.20%, respectively (Table 5). The cows those were inseminated by AI technician-2 become pregnant which was significantly higher than that of AI technician-1. This finding is agreement with the report of Shamsuddin *et al.* (2001) and Paul *et al.* (2011).

CONCLUSIONS

From the present study, it may be concluded that the overall pregnancy rate is 59.29% at the study area during that time period. The pregnancy rate is significant increased in both parity 2 and parity 3 than that of nulliparous (heifers) and others parity, but cows with age group more than 8 have significantly decreased pregnancy rate than other age group. The experience of AI technician is also an important considering factor for successful AI program. Further study is warranted with large number of cattle population with proper AI recording system and veterinary herd fertility program and also should consider management and environmental variation.

CONFLICT OF INTEREST

None to declare

Table 3. Pregnancy rate in different parity of cows

Parity	No. of cows AI	No. of cows pregnant	Pregnancy rate (%)
0	39	19	48.72[a]
1	62	35	56.45[b]
2	79	49	62.03[b]
3	31	21	67.74[b]
4	13	08	61.54[b]

[a, b] within a column represent significant differences ($p< 0.05$).

Table 4. Pregnancy rate of using different bull semen

Bull semen	No. of cows AI	No. of cows pregnant	Pregnancy rate (%)
SL 50%	71	40	56.33
SL 62.5%	81	51	62.96
HF 75%	72	42	58.33

Table 5. conception rate depending on AI technician

AI Technician	No. of cows AI	No. of cows pregnant	Pregnancy rate (%)
AI technician-1	121	67	51.24[a]
AI technician-2	103	62	60.20[b]

[a, b] within a column represent significant differences ($p< 0.05$).

AUTHOR'S CONTRIBUTION

AK Paul designed the experiment, supervised the study, analyzed the data and revised the final draft of manuscript. DMN Hossain directly involved to do the experiment, collection of data and reviewed the literature. M Talukder and MK Begum entered the all data in excel sheet, coding for analysis as well as written the draft of this manuscript.

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