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Pregnancy rate and associated factors in dairy cows of Bangladesh

MAN Al-Amin, SM Arman, M Afrose[1], MM Rahman, J Bhattacharjee and MMU Bhuiyan*
Department of Surgery and Obstetrics, Faculty of Veterinary Science, Bangladesh Agricultural University, Mymensingh-2202, Bangladesh

Abstract

The study was undertaken to identity the factors affecting the pregnancy rate in cows of commercial dairy farms in Bangladesh. Pre-tested questionnaires were used for collecting data from 662 mixed breed cows of 22 commercial dairy farms. The overall pregnancy rate was 53.6%. Pregnancy rate was the highest (62.5%) in local breed ($P<0.05$) followed by pure Friesian (55.5%), Local × Friesian (53.2%), Sahiwal × Friesian (54.5%) and Local × Jersey (50.0%) breed. The cows between 37 and 72 months old had higher pregnancy rate (58.9%) than cows aged 18 to 36 (44.4%) and 73 to 192 months (51.4%) ($P<0.05$). The cows served in parity 2 to 4 had higher pregnancy rate (57.3%) than those of parity zero (45.0%), 1 (50.0%) and 5 to 10 (46.0%) ($P<0.05$). Cows yielding 1-3 litres and 4-10 litres of daily milk showed higher pregnancy rate of 67.1 and 65.8%, respectively, followed by those yielding 11 to 34 litres (47.4%) ($P<0.05$). Pregnancy rate was higher (56.5%) in cows of BCS 3.5 to 4 than those with BCS 2.5 to 3 (48.8%) and BCS 4.5 (50.0%) ($P<0.05$). Cows served 181 to 270 days after calving had higher (62.7%) pregnancy rate than those served ≤90 days (48.4%), 91 to 180 days (53.7%) and 271 to 780 days (45.5%) ($P<0.05$). Cows receiving 2nd service had higher pregnancy rate (59.4%) than at 1st (53.3%), 3rd (53.8%) and 4th to 17th (46.4%) services ($P<0.05$). The cows served in the rainy season had higher pregnancy rate (65.0%) than those served in summer (40.0%) and winter (61.2%) ($P<0.05$). In conclusion, the present pregnancy rate in cows can be regarded as satisfactory. However, the factors affecting pregnancy rate negatively in commercial farms should be kept in mind for profitable dairying in Bangladesh. (*Bangl. vet*. 2018. Vol. 35, No. 1 & 2, 25 – 31)

Introduction

About 85% of Bangladesh people are engaged in crop and animal agriculture (Raha, 2000). It generates 13% of foreign exchange earnings and provides full-time employment to about 20% of the rural population. Due to increased population, the area of farmland is decreasing. Dairying is an important sector creating self-employment, which is one of the important tools for income generation in Bangladesh. Improving fertility is a common target for dairy herd owners. For maintaining profitable dairy business, optimum pregnancy rate is crucial (Louca and Legates, 1968; Esslemont and Ellis, 1974). In Bangladesh, low pregnancy rate, high

[1]Department of Anatomy and Histology, Faculty of Veterinary Science, Bangladesh Agricultural University, Mymensingh-2202, Bangladesh
*Corresponding author:- E-mail: mmubhuiyan@bau.edu.bd; mmubhuiyan@gmail.com

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number of services per pregnancy, prolonged calving to first service interval, extended period between calving and pregnancy, and poor heat detection have been identified as major constraints in reproduction (Alam and Ghosh, 1988; Shamsuddin *et al*., 2001). Moreover, breed, parity, body condition score (BCS), season of insemination and milk yield may influence the pregnancy rate in dairy cows. Several studies were conducted on pregnancy rate of cows in smallholdings in Bangladesh (Shikder, 2011; Khatun *et al*., 2014; Hossain *et al*., 2015). It is essential to evaluate the pregnancy rate of cows on commercial dairy farms and factors that may influence them. The present study was designed to measure the pregnancy rate and its associated factors in selected commercial dairy farms of Bangladesh.

Materials and Methods

Study area

The study was conducted at Karnafuli Upazila of Chittagong, Central Cattle Breeding and Dairy Farm (CCBDF) at Savar Upazila of Dhaka and Phulpur Upazila of Mymensingh district.

Data collection

Data were collected from 662 cows (280 of CCBDF; 354 of Karnafuli; 28 of Phulpur Upazilas) on breed, age, parity, milk yield, BCS, interval between calving to insemination, number of services given, season of insemination and pregnancy using pre-tested questionnaire. The questionnaire was filled in by interviewing the farmers or by examining farm registers.

Management of cows

Cows were managed by stall feeding with green grass, straw and concentrate with free access to drinking water. The cows were hand-milked twice daily keeping calves at foot. Routine deworming and vaccination were practised. Oestrus was detected by the farmers from clinical signs. The insemination was performed by skilled technicians using frozen semen of proven bulls. Pregnancy was diagnosed by rectal palpation 60 to 90 days after insemination.

Study approaches and statistical analysis

Pregnancy rate was measured in pure Friesian, Local, Local × Friesian, Sahiwal × Friesian and Local × Jersey cows with various aged groups (18 to 36, 37 to 72, 73 to 192 months); parities (0, 1, 2 to 4, 5 to 10); daily milk yield (1 to 3, 4 to 10, 11 to 34 litres); BCS (2.5 to 3, 3.5 to 4, 4.5); service intervals (≤90, 91 to 180, 181 to 270, 271-780 days); number of services (1st, 2nd, 3rd, 4th to 17th) and season (rainy, summer and winter). The data were processed using Microsoft Excel Worksheet and analysed by Duncan's Multiple Range Test using SPSS software version 20. The differences were considered significant when P was less than 0.05.

Results and Discussion

Out of 662 inseminated cows 355 were pregnant, giving a pregnancy rate of 53.6%. Similar pregnancy rates in cows were reported in smallholdings elsewhere in Bangladesh (Khatun *et al*., 2014; Hossain *et al*., 2015). Contrasting to the present finding, lower first service pregnancy rate (46.2%) was reported by Shamsuddin *et al.* (2001) and higher rate (57.3%) was reported in char area of Sirajgonj district of Bangladesh (Paul *et al*., 2011). The pregnancy rates among studies might vary due to different management, skill of AI technicians and environment.

The influences of breed, age, parity, milk yield, BCS, interval between calving and insemination, number of services and season of insemination in cows on pregnancy rate in commercial dairy farms are shown in Table 1. The pregnancy rate was significantly ($P<0.05$) higher in local breed (62.0%) than in pure Friesian, Local × Friesian, Sahiwal × Friesian and Local × Jersey breed. Similarly, higher pregnancy rate in indigenous cows than in other groups was reported elsewhere (Japri *et al.*, 1997; Paul *et al*., 2011). The higher pregnancy rate in local cows may be due to better adaptation to the local environment. In contrast, no difference was observed in pregnancy rate between local and crossbred cows in previous studies in Bangladesh (Shikder, 2011; Khatun *et al*., 2014; Hossain *et al*., 2015).

Cows inseminated at 37 to 72 months age had significantly ($P<0.05$) higher pregnancy rate (58.9%) than at 18 to 36 months and 73 to 192 months. Similarly, lower pregnancy rate in young cows was reported by Khatun *et al*. (2014). On the contrary, Shikder (2011) observed no difference in pregnancy rate among cows of different age groups. The fertility of cows increased slightly up to 3 to 4 years of age and declined after 4 years of age and markedly declined over 7 years of age (Spalding *et al.,* 1975). The reason for low pregnancy rate in young cows may be that these cows may have suffered more from negative energy balance. Older cows might have more chance to get sub-clinical uterine infection.

The cows in parity 2 to 4 had significantly ($P<0.05$) higher pregnancy rate (57.3%) than in parity zero, parity 1 and parity 5 to 10. Similarly, Khan *et al.* (2015) reported higher pregnancy rate in cows at 2nd and 3rd parity than in nulliparous cows. Differences in pregnancy rate with respect to parity were demonstrated by earlier studies (Khatun *et al*., 2014; Mollah *et al*., 2015). In contrast, no difference in pregnancy rate in cows were observed elsewhere (Shikder, 2011; Haque *et al.,* 2015). Pregnancy rates in cows in their first three parities were higher than in later parities (Fengxum, 1997). Further, Than Hla *et al.* (2001) reported an increased pregnancy rate with advancing parity from parity 2 up to 6, and then a decline in parities 7 and 8. The differences in pregnancy rates with respect to parities might be due to differences in breeds and environment.

The pregnancy rate in cows yielding 1-3 and 4-10 litres milk daily was significantly ($P<0.05$) higher (67.1 and 65.8%, respectively) than in cows yielding 11 to 34 litres (47.4%). In contrast, pregnancy rate was higher in cows yielding more milk (Mollah *et al.*, 2015). Shamsuddin *et al.* (2001) obtained higher pregnancy rates in low yielding

(≤1.0 litres) cows than in high yielding (>1 to 16 litres). However, Shikder (2011) and Haque *et al.* (2015) observed no difference in pregnancy rate among cows with different milk yields. The differences between studies might be due to breeds of cows, feeding and management practices.

The cows served at BCS 3.5 to 4, had significantly (P<0.05) higher pregnancy rate (56.5%) than cows at BCS 2.5 to 3 and 4.5. Haque *et al. (*2015) also observed the difference in pregnancy rate among cows of different BCS groups, similar to the observation of Shikder (2011). Providing an adequate balanced diet will help to gain good BCS resulting in satisfactory pregnancy rate. Higher pregnancy rates in cows with good BCS are documented by Shamsuddin *et al.* (2001) in Bangladesh. Nutrition can change gonadotropin secretion and cows with BCS <3 had reduced pituitary responsiveness to GnRH (Nolan *et al*., 1988).

The pregnancy rate in cows inseminated 181 to 270 days after calving was significantly (P<0.05) higher (62.7%) than at ≤90, 91-180 and 271 - 780 days. Mollah *et al. (*2015) also observed the difference in pregnancy rate in cows inseminated at different intervals after calving. On the contrary, Haque *et al. (*2015) observed no differences. This may be because, 181 days after calving, most had minimum or no suckling. Negative effect of suckling on pregnancy rate has been documented by Shamsuddin *et al.* (2001), who obtained higher pregnancy rate in cows suckling once or twice daily than in cows suckling several times. Moreover, the pregnancy rate was higher in cows with restricted suckling than in those with continuous suckling (Tegegne *et al.,* 1991). The reason may be that suckling inhibits the tonic GnRH and LH secretion (Stevenson *et al*., 1997).

Cows receiving 2nd service had significantly (P<0.05) higher pregnancy rate (59.4%) than at 1st, 3rd and 4th-17th service. Similarly, the pregnancy rate differed significantly among cows of different service groups (Shikder, 2011; Mollah *et al.,* 2015). The 1st service pregnancy rate was 53.3%, which was similar to Balachandran (1975) who recorded an average pregnancy rate of 53.0% at 1st insemination. On the contrary, Shamsuddin *et al.* (2001) reported 46.4% pregnancy rate. The variation in pregnancy rate might be due to different management of cows, semen quality and skill of AI technicians.

The cows served in the rainy season had a significantly (P<0.05) higher pregnancy rate (65.0%) than those served during summer and winter. Similarly, Alam and Ghosh (1988) reported differences in pregnancy rate in different seasons. The differences in pregnancy rate among seasons may be explained by changes in nutrition, environmental temperature and photo period. The pregnancy rate of cows markedly reduced when a higher temperature prevailed for two days before insemination to 4 to 6 days after insemination (Gwazdauskas *et al.,* 1975). Higher temperature and humidity may also affect the pregnancy rate in cows (Zakari *et al*., 1981). Small ovarian follicles are susceptible to heat stress (Badinga *et al.,* 1993; Wolfenson *et al*., 1995) and it takes 40 to 50 days for small antral follicles to develop into large dominant follicles (Lussier *et al.,* 1987). The author suggests that the rainy season

(July-October) may be the best season for good fertility of cows and heifers in Bangladesh when sufficient green grasses are available.

Table 1: Effects of breed, age, parity, milk yield, BCS, interval between calving and insemination, number of services and season of insemination on pregnancy rate of cows

Factors	No. of cows inseminated	No. conceived	Pregnancy rate (%)
1. Breed			
Pure Friesian	9	5	55.5^{b}
Local	29	18	62.0^{a}
Local × Friesian	597	318	53.2^{bc}
Sahiwal × Friesian	11	6	54.5^{b}
Local × Jersey	16	8	50.0^{c}
2. Age (months)			
18-36	99	44	44.4^{c}
37-72	285	168	58.9^{a}
73-192	278	143	51.4^{b}
3. Parity			
0	51	23	45.0^{c}
1	140	70	50.0^{b}
2-4	392	225	57.3^{a}
5-10	79	37	46.0^{c}
4. Milk yield (litres/day)			
1-3	70	47	67.1^{a}
4-10	120	79	65.8^{a}
11-34	278	132	47.4^{b}
5. BCS			
2.5-3	225	110	48.8^{b}
3.5-4	405	229	56.5^{a}
4.5	32	16	50.0^{b}
6. Interval calving to insemination (days)			
≤90	95	46	48.4^{c}
91-180	175	94	53.7^{b}
181-270	212	133	62.7^{a}
271-780	112	51	45.5^{c}
7. No. of services			
1st	236	126	53.3^{b}
2nd	180	107	59.4^{a}
3rd	104	56	53.8^{b}
4th-17th	142	66	46.4^{c}
8. Season			
Rainy (July-October)	143	93	65.0^{a}
Summer (March-June)	182	73	40.0^{c}
Winter (November-February)	235	144	61.2^{b}

^{a,b,c} Values within the same column with respect to same factor with different superscripts differed significantly ($P<0.05$).

Conclusions

The overall pregnancy rate in dairy cows of commercial farms was 53.6% and the highest pregnancy rate was obtained at 2nd service. The highest pregnancy rate was in local non-descriptive cows. Other parameters such as age (37 to 72 months), parity (2 to 4), milk yield (up to 3 litres daily), BCS (3.5 to 4), interval between calving to insemination (181 to 270 days) and the rainy season had good influences on pregnancy rates. It is suggested that good management practices help in achieving the satisfactory pregnancy rate in commercial dairy farms in Bangladesh.

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