Reproductive Performance of Crossbred and Indigenous (Desi) Dairy Cows under Rural Context at Sirajgonj District of Bangladesh

Ashit Kumar Paul[1†], Abdullah-Al-Maruf[2], Pankaj Kumar Jha[3] and M. Golam Shahi Alam[4]

[1]Department of Medicine and Surgery, Faculty of Animal Science and Veterinary Medicine, Patuahlali Science and Technology University, Barisal 8210, Bangladesh
[2]Department of Livestock Services, Ministry of Fisheries and Livestock, Bangladesh Government, Bangladesh
[3]Nepal Agricultural Research Council, National Animal Science Research Institute, Nepal
[4]Department of Surgery and Obstetrics, Faculty of Veterinary Medicine, Bangladesh Agricultural University, Mymensingh 2200, Bangladesh

ABSTRACT

This study was conducted among 120 different breed cows at selected areas of Sirajgonj district from March to July 2010 to compare the reproductive performance of crossbred and Desi cows at farmer's level. The results showed that the average daily milk yield of Desi, Shahiwal × Desi, Friesian × Desi and Jersey × Desi cows was 2.3 ± 0.2, 4.9 ± 0.9, 6.0 ± 1.0 and 5.7 ± 0.9 liters, respectively. The milk yield of crossbred cows (5.5 ± 0.6 liters/day) was significantly ($p<0.01$) higher than Desi cows (2.3 ± 0.2 liters/day). The average age at puberty of Shahiwal × Desi, Friesian × Desi and Jersey × Desi was significantly ($p<0.01$) lower than that of Desi breed. The crossbred cows had significantly ($p<0.01$) lower pubertal age (20.4 ± 1.2) than Desi (25.9 ± 1.1). The age at first calving in Desi cows was significantly ($p<0.01$) higher (37.6 ± 1.1 months) than crossbred cows (31.2 ± 1.3 months). The average gestation length of Desi, Shahiwal × Desi, Friesian × Desi and Jersey × Desi was 289.9 ± 1.4, 285.0 ± 0.0, 285.0 ± 4.2 and 282.1 ± 2.4 days, respectively. It is suggested that the overall reproductive performance of Friesian × Desi, Jersey × Desi and Shahiwal × Desi cows were better than that of Desi cow.

(Key words : reproductive performance, rural context, indigenous cow)

INTRODUCTION

The better performance with regard to the reproductive efficiency of the heifers and cows included age at first service and calving, parturition to the service, calving interval, gestation length, daily and total milk yield, age and body weight of cows influence the onset of estrus and the subsequent fertility after calving (Khan *et al*., 1998). The reproductive performances of the crossbred cows may differ from that of the indigenous ones living in different geographical areas where harsh environmental condition exists (Alam *et al*., 2001). Khan *et al*., (1998) reported that the cattle in Bangladesh are mostly of indigenous type (*Bos indicus*) with a few crossbreds, and some pure dairy zebus and European cross-breeds such as Shahiwal, Sindhi and Holstein-Friesian. Alam *et al*. (2008) reported that the productivity of cattle in char areas, which has attachment with main land, is low because of poor genetics, nutrition, herd health and management. There is paucity of information about reproductive performance of dairy cattle in the chars in Sirajgonj district which is totally separated from the main land and water vehicle is used only for communication. Comprehensive reports on productive potentials of Desi and crossbred cattle under various management conditions in Bangladesh are lacking (Alam and Ghosh, 1988; Nahar *et al*., 1989; Shamsuddin *et al*., 1988; Khan *et al*., 2001; Sarder, 2004; Rahman and Rahman, 2006). Prior to introduction of a crossbreeding programme for upgrading these cattle, it is essential to know the present reproductive performance of cattle. In island area, the climatic condition is fully different from main land (Paul *et al*., 2011). However there is no published data regarding the reproductive performance of cattle at rural and true island area of Bangladesh. Therefore, the study was undertaken to evaluate the reproductive performance of crossbred and Desi cows and to compare the reproductive performance of crossbred and Desi cows at farmer's

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† Correspondence : E-mail : akpaul2008@gmail.com

level in the rural context.

MATERIALS AND METHODS

1. Animal Selection and Management

The areas where available cross breed near to the artificial insemination (AI) center and point, were selected. A total number of 120 dairy cows were selected during milking period, same lactation period, age within 3~4 years, body weight within 150~200 kg, 2nd or 3rd parity. The animals were vaccinated against foot and mouth disease, black quarter, haemorrhagic septicemia, anthrax and deworming were also given at three months interval. Animals were grazing from early morning up to noon (midday) and fed 4~5 kg green grasses mixed with 2~3 kg straw daily as evening meal. Few farmers were able to supply 150 g mixed concentrate (rice police, wheat bran, broken rice and oil cake) per animal. The Desi cows are most common than that of crossbred cows. Crossbred cows, more common are Shahiwal × Desi and Friesian × Desi, and less frequent Jersey × Desi. So, on the availability of the breeds were selected Local (60), Shahiwal × Desi (20), Friesian × Desi (20) and Jersey × Desi (20) were used.

2. Data Collection

The data were collected directly from farmers of Sirajgonj district using a questionnaire. It was designed in a simple manner to get accurate information from the dairy cow owners. The questionnaire consists of name of the owner, address of the owner, breed of cows, management system, age at puberty (month), age at first calving (month), length of calving interval (month), post-partum anoestrus period (days), length of gestation period (days), length of lactation (days), milk yield (liter/day), service per conception (number). However, it is indicated that all of the farmers were the beneficiary of Chars livelihood program (CLP). Therefore they maintained the daily record of their cattle performances. We collected the information from their record book.

3. Statistical Analysis

The collected data were compiled, tabulated and analyzed the variance by ANOVA in accordance with the objective of the study. The data were subjected to statistical analysis by using SPSS® (11.5 version) soft ware (Anon, 1996).

RESULTS AND DISCUSSION

1. Age at Puberty

Age at puberty of the indigenous cows was comparatively higher than crossbred cows (Table 1). The differences between crossbred and indigenous cows were significant ($p<0.01$). The age at puberty of Desi, Shahiwal × Desi and Holstein × Desi and Jersey × Desi was 25.9 ± 1.1, 18.0 ± 00, 21.6 ± 2.4 and 20.4 ± 1.6 months, respectively. These findings were agreed with Morrow (1986) who found the age at puberty ranging from 1.4 months to over 2 years. In case of indigenous cows the age at puberty was not similar with other experiments because Rahman et al. (1998) conducted an experiment and found age at puberty to be 35 ± 5.2 months. Sahiwal × Desi had the lowest

Table 1. Productive and reproductive performance of the cows

Parameters	Crossbred(n=60) (Mean ± SE)	Desi(n=60) (Mean ± SE)	F value	Level of significance
Age at puberty(month)	20.4 ± 1.2	25.9 ± 1.1	11.8	**
Age at first calving(month)	31.2 ± 1.3	37.6 ± 1.1	14.4	**
Calving interval(month)	14.2 ± 0.5	15.4 ± 0.7	1.6	NS
Service per conception(number)	1.4 ± 0.1	1.3 ± 0.1	0.1	NS
Gestation length(days)	284.0 ± 1.2	290.0 ± 1.4	8.5	NS
Milk yield(liter/day)	5.5 ± 0.6	2.3 ± 0.2	33.5	**
Lactation length(days)	246.0 ± 6.7	235.4 ± 6.9	1.2	NS
Post-partum anoestrus period(days)	92.4 ± 5.8	102.0 ± 8.8	0.7	NS

** Means in a row differ($p<0.01$), NS; Non-significant.

age at puberty (18.0 ± 0.00 months). In contrast Rahman *et al.* (1998) found that the age at puberty of Friesian × Desi cows was 19 ± 2.3 months. The pubertal age of Jersey × Desi and Friesian × Desi did not coincide with the findings of Rahman *et al.* (1987) who observed the values to be 31 months 27 days and 34 months 27 days, respectively. This variation occurs due to numerous genetic (sex and breed) and environmental (nutritional status, social interactions, temperature and photoperiod) factors. Sarder (2006) reported that the mean age at puberty was significant lowest (25.3 ± 8.1 months) in Friesian sire of cows and highest (32.0 ± 5.3 months) in S × SL sire of cows. Haque *et al.* (1999) noted that the age at puberty of Shahiwal × Pabna (35.10 months), F × Pabna (25.5 months) and Pabna × Pabna (39.2 months) cows did not differed significantly (*p*> 0.05).

2. Age at First Calving

Age at first calving of crossbred and indigenous cows were 31.2 ± 1.3 and 37.6 ± 1.3 months, respectively (Table 1) and it was significantly (*p*<0.01) difference. This result was supported by Hafez (1987) who found age at first calving ranging from 24 to 36 months. However, in case of Desi cows the result was not similar because Majid *et al.* (1993) found 49.5 months and 1,269.3 ± 42.0 days, respectively. In present study, the average age of first calving between Friesian × Desi and Shahiwal × Desi was 32.6 ± 2.3 and 28.0 ± 0.0 months, respectively. This was not similar with Asaduzzaman and Miah (2004) who found that the age at first calving of Friesian × Desi and

Shahiwal × Desi was 36.3 ± 3.1 and 37.3 ± 3.0 months, respectively. In this experiment, the average age at first calving was higher for indigenous dairy cows (37.6 ± 1.3 months) and lower for the Shahiwal × Desi (28.0 ± 0 month), and the average age at first calving between crossbred and Desi cows differed significantly (*p*<0.01). It was also observed that the intensive management practices reduced the age at first calving (Sarder *et al.*, 2001). Shamsuddin *et al.* (2006) investigated opportunities for interventions to increase dairy farmer's income in four areas of Bangladesh, including the district of Mymensingh, Khulna-Satkhira, Sirajgonj-Pabna and Chittagong. Ageat first calving was 37 months in Sirajgonj-Pabnad is trict while it was 40, 35 and 33 months for Mymensingh, Khulna-Satkhira and Chittagong, respectively.

3. Calving Interval

The calving interval of Desi, Shahiwal × Desi, Friesian × Desi and Jersey × Desi was 15.4 ± 0.7, 15.0 ± 3.0, 14.2 ± 0.5 and 14.1 ± 0.6 months, respectively (Table 2). These results coincides the findings of Asaduzzaman and Miah (2004) who observed that the calving interval of Desi, Shahiwal × Desi and Holstein × Desi were 422.4 ± 49.5, 417.0 ± 34.4 and 393.8 ± 33.6 days, respectively. However, these results contradict the findings of Mondal *et al.* (2005) observed that average calving interval was 501.41 ± 86.4, 444.9 ± 94.9, 451.0 ± 89.3, 414.1 ± 51.4 and 469.3 ± 123.7 days for Jersey cross, Shahiwal cross, Sindhi cross, Holstein cross and Red-Chittagong cows, respectively in Bangladesh Agricultural University Dairy Farm. Cal-

Table 2. Breed wise productive and reproductive performance of the cows

Parameters	Desi (n=60) (Mean ± SE)	Sahiwal × Desi (n=20) (Mean ± SE)	Friesian×Desi (n=20) (Mean ± SE)	Jersey × Desi (n=20) (Mean ± SE)	*F* value	Level of significance
Age at puberty(months)	25.9[a] ± 1.1	18.0[b] ± 0.0	21.6[b] ± 2.4	20.3[b] ± 1.6	4.02	**
Age at first calving(months)	37.6[a] ± 1.1	28.0[b] ± 0.0	32.6 ± 2.3	31.1[b] ± 1.7	5.02	**
Calving interval(months)	15.4 ± 0.7	15.3 ± 3.0	14.2 ± 0.5	14.1 ± 0.6	0.55	NS
Service per conception(n)	1.3 ± 0.1	1.5 ± 0.5	1.6 ± 0.2	1.2 ± 0.1	0.49	NS
Gestation length(days)	289.9[a] ± 1.4	285.0 ± 0.0	285.0 ± 4.2	282.1[b] ± 2.4	2.97	**
Milk yield(liter/day)	2.3[a] ± 0.2	4.9[b] ± 0.9	6.0[b] ± 1.0	5.7[b] ± 0.9	11.11	**
Lactation length(days)	235.4 ± 7.0	234.0 ± 24.0	270.0 ± 0.0	274.0 ± 3.7	0.98	NS
Post-partum anoestrous period(days)	102.0 ± 8.8	95.0 ± 25.0	90.0 ± 13.4	92.9 ± 7.2	0.24	NS

** Means in a row differ(*p*<0.05), NS; Non-significant, Sig.; Significance, [a,b] ; no significance variation among them.

ving interval was highest for Local cows (15.4 ± 0.1 months) and lowest for Jersey × Desi (14.1 ± 0.6 months). It was also observed that there was no significant difference (p>0.05) between the calving interval of different crossbred and indigenous dairy cows. Hossain *et al*. (2005) stated that the average length of calving interval of crossbred and indigenous cows stood at 419 and 428 days, respectively. Statistically non-significant variations existed between the lengths of calving interval crossbred and Desi cows.

4. Service per Conception

Service per conception for Desi and crossbred was 1.3 ± 0.1 and 1.4 ± 0.1 times, respectively (Table 2). Statistical analysis showed that there were no significant differences (p>0.05) in the service per conception of different genetic groups of cows. These results are nearly in agreement with Rahman *et al*. (1998) who reported that service per conception was 1.3 and 1.7 times for crossbred, respectively. In Table 1 service per conception for Desi, Shahiwal × Desi, Friesian × Desi and Jersey × Desi is 1.3 ± 0.1, 1.5 ± 0.5, 1.6 ± 0.2 and 1.2 ± 0.1 times, respectively. But in case of Friesian × Desi this is contradict with Asaduzzaman and Miah (2004) who reported that service per conception for Desi, Shahiwal × Desi was 1.5 ± 0.6 and 1.7 ± 0.7 times, respectively. Alam *et al*. (2008) reported that the service per conception of Desi, Desi × Frie- sian and Desi × Shahiwal were 1.3 ± 0.5, 1.60 ± 0.6 and 1.6 ± 0.5 time, respectively. Hossain *et al*. (2005) stated that the average services per conception of crossbred and indigenous cows were 3.1 and 1.9 times, respectively, of which were sig- nificantly different (p<0.01).

5. Gestation Length

The average gestation length of Desi and crossbred cows was 290 ± 1.4 and 284 ± 1.2 days, respectively (Table 1). This result partially supports the observation of Rahman *et al*., (1998) who reported that the average gestation length for indigenous and crossbred were 287.8 ± 8.0 and 285.4 ± 6.1 days, respectively. They also reported that there was no significant difference (p> 0.05) between the gestation length of two types of milking cows and gestation length at different calving interval were also analyzed and found that different calving interval had no significant effect on gestation length. In Table 1, the gestation length for Shahiwal × Desi, Friesian × Desi was 285.0 ± 0.0 and 285.0 ± 4.8 days, respectively. These results are partially in agreed with Asaduzzaman and Miah (2004) who observed that the gesta-

tion length for Shahiwal × Desi and Friesian × Desi were 281.1 ± 4.6 and 282.7 ± 8.4 days, respectively. Mondol *et al*. (2005) reported that the average lactation length of different types of dairy cows of Bangladesh Agricultural University Dairy Farm. It was found that average gestation length for 275 ± 4.1 days of Jersey cross, for 276 ± 4.2 days of Shahiwal cross, for 275 ± 4.4 days of Sindhi cross, for 275 ± 3.9 days of Holstein cross and for 277 ± 3.3 days of Red-Chittagong. Slightly higher and lower values were for Red-Chittagong and Sindhi cross cows, respectively. It is also evident that there was no significant difference within the gestation length of different dairy cows. Sarder (2006) reported that the mean gestation length was lowest (277 ± 4.5 days) in sire of Local (Desi) × Friesian × Friesian crossbred and highest (280.0 ± 5.1 days) in these of (Shahiwal × Friesian). The genotypes sire had significant influence on the gestation length.

6. Milk Yield

The average milk yield of Desi, Shahiwal × Desi, Friesian × Desi and Jersey × Local was 2.26 ± 0.2, 4.9 ± 0.9, 6.0 ± 1.1 and 5.7 ± 0.9 (liters/day), respectively. It was observed that crossbreeding had a significant effect (p<0.01) on milk yield. Among different cows, highest milk production was recorded in case of Friesian × Desi cross (6.0 ± 1.0 liters/day) and lowest milk yield was recorded in case of Desi cows (2.3 ± 0.2 liters/ day). These results are in agreement with findings of Islam *et al*. (1999) who found that the average milk yield of the Desi, Shahiwal × Desi, Friesian × Desi cows was 2.1 ± 0.7, 4.7 ± 1.0 and 6.2 ± 3.2 liters/day, respectively. Shamsuddin *et al*. (2006) found the average milk yield per cow per day is 7.2 liters in Sirajgonj-Pabna region of Bangladesh, while it was 3.5 liters, 4.8 liters and 5.1 liters per cow/day in Mymensingh, Khulna-Satkhira and Chittagong, respectively. Talukder *et al*. (2001) found that Holstein-Friesian crossred cows yielded 2.5 kg more milk daily than that of Desi cows (7.2 *vs*. 4.7 kg per day).

7. Lactation Length

The average lactation length of Desi, Shahiwal × Desi, Frie- sian × Desi and Jersey × Desi was 235.0 ± 6.9, 270 ± 0.0, 234.0 ± 24.0, 274.0 ± 3.7 days, respectively (Table 2). It was observed that genotype had no significant (p>0.05) effect on lactation length. Lactation length was highest for Jersey × Desi (270 ± 0.0 days) and lowest for Friesian × Desi (234.0 ± 24.0 days). On the other hand, Asaduzzaman and Miah (2004) found that lactation length was highest for Friesian × Local cows (263 ±

34.0 days) and lowest for the indigenous cows (252.5 ± 68.2 days). This finding of lactation length of the present study was partially in agreement with the finding of Islam *et al.* (1999) who found that average lactation length of Desi, Desi × Shahiwal, Friesian × Desi dairy cows were 230.6 ± 30.7, 256.3 ± 24.4 and 263 ± 30.7 days, respectively. Hossain *et al.*, (2005) stated that the average lactation period for crossbred and indigenous cows was 283 and 207 days, respectively, which differ significantly ($p<0.01$). Shamsuddin *et al.* (2006) reported that the lactation length of dairy cows of Sirajgonj-Pabna region was 249 days. The figure was 285 days for Mymensingh, 251 days for Khulna-Satkhira and 286 days for Chittagongareas.

8. Post-partum Anoestrus Period

The average post-partum heat period of Local, Shahiwal × Desi, Friesian × Desi and Jersey × Desi was 102 ± 8.7, 95.0 ± 25.0, 90.0 ± 13.42 and 92.9 ± 7.2 days, respectively (Table 2). These results support the findings of other author who found that the average post-partum heat period of Desi, Shahiwal × Desi and Friesian × Desi was 108.5 ± 36.3, 97.6 ± 36.0 and 98.7 ± 40.6 days, respectively. In this study the post partum anestrous period of Desi cows was (102 ± 8.7 days) which was higher than the crossbred cows (92.4 ± 5.8 days) and the difference between them was significant ($p>0.05$). These results are partially similar with Majid *et al.* (1993) who observed that average post partum anestrous period for Local and Friesian × Desi were 120.0 ± 7.8 and 117.2 ± 7.3 days, respectively. Hossain *et al.* (2005) stated that the average calving to first service for crossbred and indigenous were 116 and 137 days, respectively, which were significantly different ($p<0.01$).

It is concluded that crossbreds are better reproductive performances than Desi cows. It is recommended to replace the Desi cattle through AI and at the same time the management system of these cattle should be improved.

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