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PERFORMANCE OF DIFFERENT CROSSBRED CATTLE AT COMILLA DISTRICT OF BANGLADESH

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Abstract

This study was conducted to compare the performance of crossbred cow likely L×F (50% L and 50% F), L×H×F×F×L×F (68.75% F, 28.125% L and 3.125% H), L×F×F (75% F and 25% L), L×F×L×F×F (81.25% F and 18.75% L), L×SL (50% L and 50% SL), L×SL×SL (75% SL and 25% L), L×SL×F (50% F, 25% L and 25% SL), L×S (50% L and 50% S) and L×Rc (50% L and 50% Rc). A total of 240 crossbred cows were selected from five upazilas of Comilla district. It was observed that mean milk yield per day for L×F, L×H×F×F×L×F, L×F×F, L×F×L×F×F, L×SL, L×SL×SL, L×SL×F, L×S and L×Rc crossbreds cattle were 6.03±0.5, 7.3±0.6, 9±0.5, 10±0.5, 4.51±1.06, 5±1.06, 4.16±0.81, 4±0.5 and 3±0.5 litre, respectively. The lactation length of L×F, L×H×F×F×L×F, L×F×F, L×F×L×F×F, L×SL, L×SL×SL, L×SL×F, L×S and L×Rc crossbreds cattle were 285±5, 285±5, 285±5, 285±5, 251±5, 253±5, 259±5, 248±5 and 220±5 days, respectively. About the reproductive performances L×F, L×SL and L×SL×SL cross breed cattle need minimum (1.61±0.61) services per conception and LxS crossbred cattle need maximum (1.78±0.63) services per conception. Gestation length was shorter (277±3.31 days) in case of L×Rc cross and highest (279.7±4.2 days) in case of L×SL×SL crossbred cattle. The highest calving interval was 447±20 days and found in L×S crossbred cattle and the lowest calving interval was 430±20 days and observed in L×F, L×H×F×F×L×F, L×F×F and L×F×L×F×F crossbred cattle. Calving interval was lower (430±20 days) in L×F, L×H×F×F×L×F, L×F×F and L×F×L×F×F crosses and higher (447±20 days) in L×S crossbred cattle. Age at puberty was shorter in L×SL×F cross 26.2±2.4 months and longer in L×SL×SL cross 29.3±2.3 months. Based on the results obtained from current study, it can be concluded that the L×F (50% L and 50% F) crossbred cattle is more suitable under climatic and socio-economic condition of Comilla district in Bangladesh.

Keywords: Crossbred cattle, productive performance, reproductive performance

Introduction

Bangladesh is an agriculture-based developing country, where 85-90% of its people live in the rural area. The contribution of livestock and poultry sector in GDP is 2.6% (Bangladesh Economic Review, 2009). Dairy cattle of Bangladesh play a pivotal-role for improving human nutrition and national income. So, livestock sector must be given priority for its development at the industrial level in order to increase its contribution to GDP. Total milk production in Bangladesh is 2.286 million MT (Bangladesh Economic Review, 2009). The average milk production of local cows is very low and it varies from 300 to 400 litre per lactation period of 180 to 240 days and generally crossbred cows yield from 600 to 800 litre per lactation of 210 to 240 days (Hossain and Routledge, 1982). The most important animals are cattle and buffaloes, which provide the necessary draught power for ploughing, sugarcane and oilseed crushing. It provides income through sale of live animals, milk, meat, skin and hides as well as through hiring out of the draught animals. There are many commercial dairy farms in the country and most of the milk is produced by the rural households. Cattle play a vital role among the entire animals raised in our country. Unfortunately little attention has been paid to them for their productive and reproductive performance. The improvement of these cattle may contribute in solving the problem of malnutrition of our people and also can increase the national income considerably. Records of the productive ability and reproductive characteristics of different crossbred dairy cows are essential for future improvement programme. The best performance record of the individual crossbred cow can be obtained by accurate estimation of economic traits in the crossbred cattle. Considering these facts, the present study was designed to understand the productive and reproductive performances of different crossbred cattle of Comilla district in Bangladesh and to recommend farmers the best crossbred cattle

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which are to be more economic and suitable in existing ecological and socio-logical condition of Comilla district in Bangladesh.

Materials and Methods

The study was conducted in five upazilas of Comilla district and these were Comilla Adarsa Sadar, Burichang, Brahmanpara, Chandina and Debidwar. Numbers of farms taken from those upazilas were 15, 12, 8, 4 and 3 respectively. Total 240 cows of different crossbreds such as fourty L×F (50% L and 50% F), thirty five L×H×F×F×L×F (68.75% F, 28.125% L and 3.125% H), twenty L×F×F (75% F and 25% L), ten L×F×L×F×F (81.25% F and 18.75% L), thirty L×SL (50% L and 50% SL), fourty L×SL×SL (75% SL and 25% L), twenty L×SL×F (50% F, 25% L and 25% SL), fifteen L×S (50% L and 50% S) and thirty L×Rc (50% L and 50% Rc) were collected from different locations of the study area. Here, L= Local cattle breed, F= Holstein Friesian cattle breed (Dairy), H= Hariana cattle breed (Dairy + Work), SL= Sahiwal cattle breed (Dairy + Beef), S= Sindhi cattle breed (Dairy + Beef), Rc= Red Chittagong cattle breed. The data were collected through direct interviewing from the farmers door to doors of the study area. To draw an accurate and reasonable date, care and cautions were taken during data collection. The traits used to measure the productive and reproductive performances of crossbred cattle were milk yield per day (litre), peak milk yield per day (litre), lactation length (d), lactation yield (litre), birth weight (kg), age at puberty (m), age at first fertile service (m), age at first calving (m), gestation length (d), post-partum heat period (d), days open (d), wastage days (d), number of service per conception, dry period (d), weaning period (m) and calving interval (d)**.** Peak milk yield per day is the highest amount of milk yields at their subsequent lactation length. The number of days from first milking to the end of milking of cows is called lactation length. The total quantity of milk produced throughout the lactation was taken as lactation yield. The birth weight of a new born calf is termed as birth weight. The age at which a heifer first shows estrus sign and behaviour may be defined as age at puberty. Age at first fertile service is defined as the age when a heifer first conceives followed by heat. Age at first calving is defined as the age when a heifer gives a calf. Gestation length is calculated as interval from conception to parturition. Post-Partum Heat Period (PPHP) is considered the interval between date of calving and the date of first insemination. Days open is referred as interval from parturition to conception of cows. Wastage Days (WD) is considered the first service to conception interval. Number of service per conception is considered as the number of artificial insemination required for one successful conception for heifer or cows. Dry period is the number of days from the end of milking to next parturition of cows. Age at which a calf leaves its mother or when a calf starts to take green grass or straw rather than suckling is called age of weaning. The number of days between two successive calving of the same cows or the period from one calving to the next is termed as calving interval. After collecting the questionnaires, preliminary sorting and checking, data were prepared for analysis. Collected data were processed, tabulated and analyzed through mean and standard deviation (SD).

Results and Discussion

Milk yield per day

The milk yield per day for L×F, L×H×F×F×L×F, L×F×F, L×F×L×F×F, L×SL, L×SL×SL, L×SL×F, L×S and L×Rc crossbreds cattle were 6.03±0.5, 7.3±0.6, 9±0.5, 10±0.5, 4.51±1.06, 5±1.06, 4.16±0.81, 4±0.5 and 3±0.5 litre, respectively (Table 1). The highest milk yield was 10±0.5 litre for L×F×L×F×F crossbred cattle. The lowest milk yield per day was 3±0.5 litre for L×Rc crossbred cows. Uddin *et al.* (2008) observed that mean milk yield (litre/day) of indigenous, Friesian cross, Sahiwal cross and Sindhi cross were 2.35±0.04, 7.36±0.11, 4.78±0.08 and 4.03±0.05 litre, respectively which is similar with this study. The significant effect of genetic group on dairy milk yield was found by Khan and Khatun (1998), Bhuiyan and Sultan (1994), Nahar *et al*. (1992) and Rahman *et al.* (1993). Sarder *et al.* (1997) observed that average milk yield (litre/day) for Holstein Friesian cross, Sahiwal cross, Sindhi cross, Jersey cross and Local cows were 7.2±2.6, 5.8±2.2, 6.4±2.76, 6.9±2.7 and 4±1.5 litre, respectively and these are slightly higher than the present study. The daily milk yield variation possibly occurred due to genetic, biological phenomenon, hormonal influences, feeding system, quality and quantity of feed, irresponsible care taker and severe intensive sun light.

Peak milk yield per day

The peak milk yield per day for L×F, L×H×F×F×L×F, L×F×F, L×F×L×F×F, L×SL, L×SL×SL, L×SL×F, L×S and L×Rc crossbreds cattle were 7.02±0.5, 8.02±0.5, 9.5±0.5, 12±0.5, 4.75±0.5, 5.4±0.5, 4.5±1.7, 4.3±0.4 and 3.2±0.5 litre, respectively (Table 1). The highest peak milk yield per day was 12±0.5 litre for L×F×L×F×F. The lowest peak milk yield per day was 3.2±0.5 litre for L×Rc crossbred cows. Genetic group of dam of cows had effect on peak

milk yield per day. Breed management and environmental factors are major causes for the variation of peak milk yield per day.

Table 1. Productive and reproductive performance of different crossbred cattle

Productive and reproductive parameters	**L×F** (Mean± S.D)	**L×H×F×F× L×F** (Mean± S.D)	**L×F×F** (Mean± S.D)	**L×F×L×F×F** (Mean± S.D)	**L×SL** (Mean± SD)	**L×SL×SL** (Mean± SD)	**L×SL×F** (Mean± S.D)	**L×S** (Mean± S.D)	**L×Rc** (Mean± SD)
Milk yield per day (litre)	6.03±0.5 n= 40	7.3±0.6 n= 35	9±0.5 n= 20	10±0.5 n= 10	4.51±1.06 n= 30	5.0±1.06 n= 40	4.16±0.81 n= 20	4±0.5 n= 15	3±0.5 n= 30
Peak milk yield per day (litre)	7.02±0.5 n= 40	8.02±0.5 n= 35	9.5±0.5 n= 20	12±0.5 n= 10	4.75±0.5 n= 30	5.4±0.5 n= 40	4.5±1.7 n= 20	4.3±0.4 n= 15	3.2±0.5 n= 30
Lactation length (d)	285±5 n= 40	285±5 n= 35	285±5 n= 20	285±5 n= 10	251±5 n= 30	253±5 n= 40	259±5 n= 20	248±5 n= 15	220±5 n= 30
Lactation yield (litre)	1710±6 n= 40	2080.5±6 n= 35	2565±6 n= 20	2850±6 n= 10	1129.5±6 n= 30	1265±6 n= 40	1077.44±6 n= 20	992±7 n= 15	748±8 n= 30
Birth weight (kg)	22.3±2 n= 40	23±1 n= 35	24±1 n= 20	25±2 n= 10	19.8±1.6 n= 30	21.8±1.6 n= 40	22.6±1.6 n= 20	18.6±1.5 n= 15	15±1.02 n= 30
Age of puberty (m)	26.8±2 n= 40	26.9±2 n= 35	26.9±2 n= 20	27±2 n= 10	29.1±2.2 n= 30	29.3±2.3 n= 40	26.2±2.4 n= 20	28±2.3 n= 15	29.2±2.7 n= 30
Age at first fertile service (m)	28.1±2 n= 40	28.3±2 n= 35	28.4±2 n= 20	28.5±2 n= 10	30.1±2 n= 30	30.2±2 n= 40	27.3±2 n= 20	30.1±2 n= 15	30.2±2 n= 30
Age at first calving (m)	37.4±3 n= 40	37.6±2 n= 35	37.7±2 n= 20	37.8±2 n= 10	39.5±2.7 n= 30	39.7±2.5 n= 40	37.3±2.3 n= 20	38.2±2 n= 15	40±2 n= 30
Gestation length (d)	278.2±5 n= 40	278.2±5 n= 35	278.2±5 n= 20	278.2±5 n= 10	279.5±3.8 n= 30	279.7±4.2 n= 40	279.6±4.3 n= 20	278.8±4.2 n= 15	277±3.31 n= 30
Post-partum heat period (d)	133±4 n= 40	135±5 n= 35	136±5 n= 20	137±5 n= 10	142±10 n= 30	143±10 n= 40	129±10 n= 20	144±10 n= 15	147±10 n= 30
Days open (d)	153±8 n= 40	155±10 n= 35	155±10 n= 20	155±10 n= 10	167±15 n= 30	168±15 n= 40	145±15 n= 20	169±15 n= 15	166±15 n= 30
Wastage days (d)	19.8±5 n= 40	19.9±5 n= 35	20±5 n= 20	20.1±5 n= 10	26±10 n= 30	27±10 n= 40	16.2±10 n= 20	25.5±10 n= 15	22±10 n= 30
Service per conception (S/C)	1.61±0.61 n= 40	1.62±0.6 n= 35	1.63±0.6 n= 20	1.63±0.6 n= 10	1.61±0.61 n= 30	1.61±0.61 n= 40	1.49±0.57 n= 20	1.78±0.63 n= 15	1.63±0.62 n= 30
Dry period (d)	141±10 n= 40	142±10 n= 35	143±10 n= 20	144±10 n= 10	144±15 n= 30	145±15 n= 40	144±15 n= 20	150±14 n= 15	156±15 n= 30
Weaning period (m)	8.5±1.5 n= 40	8.5±1.5 n= 35	8.5±1.5 n= 20	8.5±1.5 n= 10	8.62±1.3 n= 30	9.63±1.4 n= 40	9.9±1.3 n= 20	9.8±1.2 n= 15	9.7±1.2 n= 30
Calving intervals (d)	430±20 n= 40	430±20 n= 35	430±20 n= 20	430±20 n= 10	445±20 n= 30	446±20 n= 40	423±20 n= 20	447±20 n= 15	444±20 n= 30

Here, L= Local cattle breed, F= Holstein Friesian cattle breed (Dairy), H= Hariana cattle breed (Dairy + Work), SL= Sahiwal cattle breed (Dairy + Beef), S= Sindhi cattle breed (Dairy + Beef), Rc= Red Chittagong cattle breed.

Lactation length

The lactation length of L×F, L×H×F×F×L×F, L×F×F, L×F×L×F×F, L×SL, L×SL×SL, L×SL×F, L×S and L×Rc crossbreds cattle were 285±5, 285±5, 285±5, 285±5, 251±5, 253±5, 259±5, 248±5 and 220±5 days, respectively (Table 1). The highest lactation length was 285±5 days and it was for L×F, L×H×F×F×L×F, L×F×F and L×F×L×F×F crossbred cows. The lowest lactation length was 220±5 days and for L×Rc crossbred cattle. Uddin *et al.* (2008) observed that mean lactation length of indigenous, Friesian cross, Sahiwal cross and Sindhi cross were 218.22±28.35, 284.69±1.64, 251.77±3.66 and 259.77±4.9 days, respectively which was lower than the present study. Sultana (1995) reported longest lactation period in SL cows (293 days) over eight genetic groups, which was higher than the present study (For L×SL lactation period 251±5 days). Breed, managemental and environmental differences are the major causes for the variation of lactation length.

Lactation yield

The lactation yield of L×F, L×H×F×F×L×F, L×F×F, L×F×L×F×F, L×SL, L×SL×SL, L×SL×F, L×S and L×Rc crossbreds cattle were 1710±6, 2080.5±6, 2565±6, 2850±6, 1129.5±6, 1265±6, 1077.44±6, 992±7 and 748±8 litre, respectively (Table 1). The highest lactation yield was 2850±6 litre for L×F×L×F×F crossbred cows. The lowest lactation yield was 748±8 litre for L×Rc crossbred cows. Nahar *et al.* (1992) reported lactation yield of 1702.8±10 kg in L×F crossbreds which was very close to the present study for L×F crossbred cattle.

Birth weight

The birth weights of calf of L×F, L×H×F×F×L×F, L×F×F, L×F×L×F×F, L×SL, L×SL×SL, L×SL×F, L×S and L×Rc crossbreds cattle were 22.3±2, 23±1, 24±1, 25±2, 19.8±1.6, 21.8±1.6, 22.6±1.6, 18.6±1.5 and 15±1.02 kg,

respectively (Table 1). The higher birth weight of calf was 25±2kg for L×F×L×F×F crossbred cattle. The lower birth weight of calf was observed in L×Rc (15±1.02 kg/calf). The mean birth weight of Pabna calves was consistent with the findings of Udo *et al.* (1990) and Hoque *et al.* (1999) who reported 15.60 and 17.92 kg, respectively. According to Hoque *et al.* (1999) the average birth weight of SL×Pabna and Pabna cows were 21.26±2.89 and 17.92±3.47 kg and this result is consistent with the results of present study.

Age at puberty

The ages of puberty of calf of L×F, L×H×F×F×L×F, L×F×F, L×F×L×F×F, L×SL, L×SL×SL, L×SL×F, L×S and L×Rc crossbreds cattle were 26.8±2, 26.9±2, 26.9±2, 27±2, 29.1±2.2, 29.3±2.3, 26.2±2.4, 28±2.3 and 29.2±2.7 months, respectively (Table 1). The higher age was 29.3±2.3 for L×SL×SL crossbred. The lower age was 26.2±2.4 months for L×SL×F crossbred cattle. These results are partially supported by those of Hoque *et al.* (1999) who noted that the age at puberty of SL×Pabna (35.10 m), F×Pabna (25.53m) and Pabna×Pabna (39.23m) did differ significantly. Khan and Khatun (1998) found no significant difference ($p>0.05$) among SL×Pabna (37.29m), F×Pabna (33.57m) and Pabna×Pabna (38.8m) and this is higher than the present study. This results further support the previous reports of Islam and Bhuiyan (1997) who found significant ($p<0.05$) affect on ½ SL×1/2 Pabna (38.53m) and ¾ SL×1/4 Pabna (31.12m). Majid *et al.* (1993) reported the age of puberty of SL×F cattle ranging from 606.4 days (20.2m) to 770.31 days (25.68m). In the present study, the progeny of L×SL×F cows reached early age at puberty than other genetic groups of dam. Environmental condition, nutrition, care and management may affect this trait. Finally, genetic makeup is the main factor, which remarkably influences this trait.

Age at first fertile service

In the present study the age at first service for progeny of L×F, L×H×F×F×L×F, L×F×F, L×F×L×F×F, L×Sl, L×SL×SL, L×SL×F, L×S and L×Rc crossbreds cattle were 28.1±2, 28.3±2, 28.4±2, 28.5±2, 30.1±2, 30.2±2, 27.3±2, 30.1±2 and 30.2±2 months, respectively (Table 1). The highest age at first fertile service was 30.2±2 months for L×Rc and L×SL×F crossbred cattle. The lowest age at first fertile service was 28.1±2 months for L×F. Majid *et al.* (1993) observed that the ages at first service of L, 50%L×50%F and 50%SL×50%F was 32.2±5.9, 26.3±2.5 and 25.6±3.9 months, respectively which are close to this present study. Sarder (2001) reported that age at first service had 30.3±7 months for the indigenous cows which were close agreement in the present study. Friesian cross progenies showed early age at first service than other genetic groups of dam whereas Rahman *et al.* (1993) reported that average age at first service 47.3±0.5 months. Factor which results in delayed initiation of puberty include inadequate management and health care (Oyedipe *et al.* 1982; Alam and Ghosh, 1988), state of nutrition (Dobson and Alam, 1987).

Age at first calving

The ages at first calving of L×F, L×H×F×F×L×F, L×F×F, L×F×L×F×F, L×SL, L×SL×SL, L×SL×F, L×S and L×Rc crossbreds cattle were 37.4±3, 37.6±2, 37.7±2, 37.8±2, 39.5±2.7, 39.7±2.5, 37.3±2.3, 38.2±2 and 40±2 months, respectively (Table 1). The highest age at first calving was 40±2 months for L×Rc crossbred cattle. The lowest age at first calving was 37.4±3 months for L×F crossbred cattle. Wilson (1985) reported that tropical indigenous cattle normally calved for the first time between the ages of 36-42 months and which is similar with this study. Sarder (2001) also reported that average age at first calving was 39.7±7 months in indigenous cows and this finding is similar with this study. Majid *et al.* (1993) also obtained age at first calving was 42.3 months which is higher than the results obtained in present study. Earlier reports showed that under improved management, health care and optimum nutritional status; seasonal stress can be minimized to obtain first calving at about 3.5 years (Oyedipe *et al.* 1982).

Gestation length

The gestation lengths of L×F, L×H×F×F×L×F, L×F×F, L×F×L×F×F, L×SL, L×SL×SL, L×SL×F, L×S and L×Rc crossbreds cattle were 278.2±5, 278.2±5, 278.2±5, 278.2±5, 279.5±3.8, 279.7±4.2, 279.6±4.3, 278.8±4.2 and 277±3.31 days, respectively (Table 1). The highest gestation length was 279.7±4.2 days for L×SL×SL crossbred cattle. The lowest gestation length was 277±3.31 days for L×Rc crossbred cattle. Khan and Khatun (1998), Sultana (1995) and Rahman *et al.* (1993) reported that gestation length was not significant between genetic groups of cattle. Islam and Bhuiyan (1997) found the gestation length was corresponding figures for1/2SL×1/2Pabna and 3/4SL×1/4Pabna genetic groups to be 282.35 and 282.94 days, respectively which is slightly higher than this study. Khan and Khatun (1998) reported the gestation length of SL×Pabna group to be 285.61 days which differs a little from the present findings. In case of F×Pabna and Pabna×Pabna genetic groups the present study was partially supported by Khan and Khatun (1998) who reported that the gestation lengths of two genetic groups were 282.75

and 286.20 days, respectively. The effect of sire and dam on gestation length was significant, because if the species characteristic which was fixed genetically and variation may occur due to maternal and fetal and as well as seasonal influence.

Post-Partum Heat Period (PPHP)

The PPHP of L×F, L×H×F×F×L×F, L×F×F, L×F×L×F×F, L×SL, L×SL×SL, L×SL×F, L×S and L×Rc crossbreds cattle are 133±4, 135±5, 136±5, 137±5, 142±10, 143±10, 129±10, 144±10 and 147±10 days, respectively (Table 1). The highest PPHP was 147±10 days for L×Rc crossbred cattle. The lowest PPHP was 129±10 days for L×SL×F crossbred cattle. Islam and Bhuiyan (1997) found no significant ($p>0.05$) difference between the genetic groups of 1/2SLx1/2Pabna (4.33 month or 121 days) and 3/4SL×1/4Pabna (4.38 months or 131.4 days) whereas, Majid *et al.* (1993) found a little variations in PPHP between different genetic groups which was not statistically significant. They reported that PPHP for1/2L×1/2F cows were 117.24±7.20 days which are lower than this study (For L×F cross PPHP was 133±4 days). Genetic, environmental and management factors are responsible for variation of PPHP between different crossbred cattle.

Days Open

The days open of L×F, L×H×F×F×L×F, L×F×F, L×F×L×F×F, L×SL, L×SL×SL, L×SL×F, L×S and L×Rc crossbreds cattle were 153±8, 155±10, 155±10, 155±10, 167±15, 168±15, 145±15,169±15 and 166±15 days, respectively (Table 1). The highest days open was 168 days for L×S crossbred cattle. The lowest days open was 145±15 days for L×SL×F crossbred cattle. Sarder *et al*. (1997) reported that calving to conception interval in Friesian cross for 148±8 days, SL cross for 139±8 days and Local for 116±10 days. The days open was relatively higher in present study, which may be due to breed, sire, dam, nutrition, semen type, lactation length and frequency, poor heat detection and extension of postpartum waiting period etc.

Wastage Days (WD)

The wastage days of L×F, L×H×F×F×L×F, L×F×F, L×F×L×F×F, L×SL, L×SL×SL, L×SL×F, L×S and L×Rc crossbreds cattle were 19.8±5, 19.9±5, 20±5, 20.1±5, 26±10, 27±10, 16.2±10, 25.5±10 and 22±10 days, respectively (Table 1). The highest wastage days were 27±10 days for L×SL×SL crossbred cattle. The lowest wastage days were 16.2±10 days for L×SL×F. The lowest wastage days are required for successful conception in genotype of L×SL×F (16.2 days) than other groups. Wastage days may depend on semen quality, inseminator skillness, free from reproductive diseases of cows, proper heat detection and management.

Service per conception

Services per conception of L×F, L×H×F×F×L×F, L×F×F, L×F×L×F×F, L×SL, L×SL×SL, L×SL×F, L×S and L×Rc crossbreds cattle were 1.61±0.61, 1.62±0.6, 1.63±0.6, 1.63±0.6, 1.61±0.61, 1.61±0.61, 1.41±0.57, 1.78±0.63 and 1.63±0.62 numbers, respectively (Table 1). The highest number of service per conception was 1.78±0.63 for L×S crossbred cattle. The lowest number of service per conception was 1.61±0.61 and it was for L×F, L×SL and L×SL×SL crossbred cattle. Bhuiyan and Sultana (1994) found that service per conception was 1.68±0.15 for L×F crossbred which coincides with the present study findings. The number of services per conception may be influenced by physio-logical condition of the sire, numbered percentage of viable sperm, semen preservation method, insemination technique, and timing of artificial insemination, skillness of the inseminators and also reproductive soundness of the cows.

Dry period

The dry periods of L×F, L×H×F×F×L×F, L×F×F, L×F×L×F×F, L×SL, L×SL×SL, L×SL×F, L×S and L×Rc crossbreds cattle were 141±10, 142±10, 143±10, 144±10, 144±15, 145±15, 144±15, 150±14 and 156±15 days, respectively (Table 1). The highest dry period was 156±15 days for L×Rc crossbred cattle. The lowest dry period was 141±10 days for L×F crossbred cattle. Genotypes of dam had effect on dry period of cow. Gajbhiye and Dhanda (1987) also found same result the length of dry period ranging from 131±11 to 162±7.9 days for cattle.

Weaning period

The ages at weaning of L×F, L×H×F×F×L×F, L×F×F, L×F×L×F×F, L×SL, L×SL×SL, L×SL×F, L×S and L×Rc crossbreds cattle were 8.5±1.5, 8.5±1.5, 8.5±1.5, 8.5±1.5, 8.62±1.3, 9.63±1.4, 9.9±1.3, 9.8±1.2 and 9.7±1.2 months, respectively (Table 1). The highest age at weaning was 9.9±1.3 months for L×SL×F crossbred cattle. The lowest age at weaning was 8.5±1.5 months and it was for L×F, L×H×F×F×L×F, L×F×F and L×F×L×F×F crossbred cattle. Management is the main factor which influences this trait remarkably.

Calving interval

The calving intervals of L×F, L×H×F×F×L×F, L×F×F, L×F×L×F×F, L×SL, L×SL×SL, L×SL×F, L×S and L×Rc crossbreds cattle were 430±20, 430±20, 430±20, 430±20, 445±20, 446±20, 423±20, 447±20 and 444±20 days, respectively (Table 1). The highest calving interval was 447±20 days for L×S crossbred cattle. The lowest calving interval was 430±20 days and it was for L×F, L×H×F×F×L×F, L×F×F and L×F×L×F×F crossbred cattle. Majid *et al*. (1993) reported the average calving interval range from 434±20 to 454±20 days which are similar with this study. Calving interval is the best economic index of any dairy enterprises and it is expected not more than 13 months for cattle. In this study the average calving interval is higher than the expected standard. Lack of nutrition, poor heat detection, environmental determinant, little rainfall, high ambient temperature, sucking and post calving infection of female reproductive traits are responsible for increasing calving interval.

Approximately 50-81.25% Holstein Friesian crossbreds cattle were present in Comilla district but 50% Holstein Friesian crossbred cattle that means L×F (50% L and 50% F) are more suitable because it gives 6-7 litre of milk in semi-intensive housing system, more disease resistant than other Holstein Friesian crossbred cattle, needless feeding than other Holstein Friesian crossbred cattle, give 5-6 calves in their lifetimes, lactation length is good and electric fan is not required for this crossbred. Other crossbred cattle L×SL×SL (75% SL and 25% L) are also suitable because it gives 4-5 litre of milk in semi-intensive housing system, body colour is reddish and has a well-developed hump so it gets more preference from the farmers because the male calf of this crossbred cattle is used for beef fattening, give 5-6 calves in their lifetimes and more disease resistant than Holstein Friesian crossbred cattle.

In conclusion, productive and reproductive performance of different crossbred cattle is better than indigenous cattle breed. For better performance suitable crossbreds of cows have to be developed in our country through selection, cross breeding and upgrading together with improved management practices. If the Government of Bangladesh takes necessary steps to upgrade the indigenous cattle by crossing with high yielding cattle breed and stop inbreeding than it will be better for our country.

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