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Productive and Reproductive performance of different breed and cross breds dairy cattle at Central Cattle Breeding and Dairy Farm, Savar, Dhaka, Bangladesh

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ABSTRACT

A study was conducted on 80 cows of different genotype of dairy cattle at Savar Dairy Farm, Dhaka to know about existing genotype and their performance. In this farm, Theexisting genotypes of cattlewere Local (L), Sahiwal (SL), Fresian (F), Australian FresianSahiwal (AFS), Local×Fresian (L×F), Sahiwal×Fresian (SL×F), Local × Friesian × Friesian (LF_1×F), Local × Friesian × Friesian × Friesian (LF_2×F). Maximum birth weight was found in case of Fresian (37.5 ± 0.65 kg); minimum in Local (16.7±0.48kg). Highest milk yield was found in case of Fresian (11.57 ± 0.32 L/day) and lowest in Local (1.42±.56 L/day). The highest age at puberty was (1525.58±28.05) day found in AFS. The lowest age at puberty was found (1055.97±11.5) day in LF2×F cow. Maximum number of service per conception was found in case of Friesian (3.36 ± 0.31) and minimum in local (1.3±0.2). The higher age of first calving was found (1779 ± 20.76) day in case of Holstein-Friesian. The lower age of first calving was (1380.5±0.6) day found in case of Local milch cow. The highest Post partum Heat period was found in case of LF (299.1 ± 9.27) and lowest in case of Local (103.2±3.8) milch cow. The highest lactation length was observed in Holstein Friesian milch cow (513.8 ± 28.1days) & lowest was found in Local (197.5±5.3 days). The highest calving interval was found in Holstein-Friesian x Sahiwal (607.7 ± 6.7) days and lowest in Local (481.3±0.8). The highest gestation length is 286.9 ± 1.23 days and it was for Sahiwal mulch cow and gestation length is 277.2 ±3.93 days and it was for LF_2×F cow. Production performances of Holstein-Friesian were superior to other dairy crossbreds. Australian Friesian Sahiwal breed ranked second and performances of other genotypes were nearly similar.

Keywords: Breed, Cross Breds, Production, Reproduction, Central Catlle Breeding and Dairy Farm, Bangladesh

INTRODUCTION

Livestock plays an important role in the development of the traditional economy of Bangladesh. Bangladesh is a densely populated agricultural country with an acute shortage of meat and milk. The contribution of livestock sector in GDP was 2.57% and growth rate was 2.41% in the year of 2009-2010[3]. The landless and marginal farmers largely depend on livestock for their survival. Despite this large cattle population in the country, the output of milk falls short of requirement. On the other hand, Cattle are our main sources of milk, meat and leather. Although the cattle are main sources of protein, but our present status is very hopeless. Generally crossbred cows yield from 600 to 800 litters per lactation of 210 to 240 days [9].At present Bangladesh have 40 million cattle, out of which 13 million are dairy cattle of local and crossbreed[4]. Rapid improvement in, dairy productivity for food security and livelihood leading to poverty reduction is needed in Bangladesh. The Department of Livestock Services (DLS), Government of Bangladesh has established Central Cattle Breeding and Dairy Farm (CCBDF) at Savar, Dhaka. This farm is located about 30 km northwest of the capital city of Dhaka. The farm was established in 1973 on 1300 acres of land with assistance of German Agency for Technical Cooperation. This is the largest farm in Bangladesh and the major objectives of the farm are: (1) To produce others-bred heifers and bulls for distribution to farmers (2) To collect semen from the proven bulls that are produced and reared in order to support national artificial insemination program, and (3) To supply milk to Dhaka city[25].The native cattle of Bangladesh have low productivity but disease resistance capacity was higher than that of exotic breeds. To develop the performance of native cattle, up gradation is necessary. Livestock development depends mainly on genetic potential of the animal. Native ruminant animals are non-descriptive and their genetic potential has not yet been recognized. Conservation and improvement of native animal germplasm are essential for profitable livestock farming to meet the increasing demand of milk and meat. Optimum

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nutrition, disease control and management practices permit better expression of genetic potential. Climatic stresses in the form of high ambient temperature, high humidity and erratic or inadequate rainfall affect the productivity of dairy cattle in the tropics. Reproductive efficiency is a major factor in the profitability of a dairy enterprise through its effect on the annual milk production of the herd and the cost of herd depreciation. In this study an attempt was made to evaluate the reproductive performance of different crossbred cows and to find out the suitable crossbred animals. This study was therefore, under taken at cattle of Central cattle breeding and dairy farm Savar, Dhaka.

MATERIALS AND METHODS

Study site

The study was conducted at the CCBDF at Savar, Dhaka, Bangladesh. The CCBDF was established in 1973 on 1300 acres of land with the assistance of the German Agency for Technical Cooperation at SavarUpazila in the Dhaka district of Bangladesh. This farm is located between 23 46' and 23 58' North latitude and 90 12' and 90 20' East longitude and about 30 km northwest of the capital city of Dhaka.

Study animals and duration

A study was conducted by taking last 3 years data (2013, 2014 and 2015) on 80 cows at Savar Dairy Farm, Dhaka on February 2016to know existing genotypes and performance of Dairy Cattle.

Data collection

The data was collected from record books of Byre section of Central Cattle Breeding Dairy Farm with the help of Record Keeper.

Data analysis

The data were checked manually for obvious inconsistencies, recording errors or missing Data. The potential errors were evaluated and corrected, if possible, following discussion with the relevant veterinarians. Data with suspicious values were excluded. Data were entered in Microsoft Excel 2007 for descriptive study.

RESULTS AND DISCUSSION

Birth weight of Calves (Kg):

In this study, the average birth weight of L, F, AFS, SL, F×SL, L×F, LF1×F and LF2×F were 16.7±0.48, 37.5 ± 0.65, 30.02±1.08, 19.45 ± 0.42, 21.25 ± 2.89, 22.57 ± 0.30, 23.88±0.5, 25.5±.48 kg respectively (shown in Table 1). Maximum birth weight found in case of Holstein Friesian 37.5 ± 0.65kg and minimum was found in case of Local (16.7 ± 0.48 kg).

Rokonuzzaman*et al.* [23] reported that the birth weight of Local, Local×friesian, were 17.0±0.4 and 22.5±0.kg respectively. Saha*et al.*[25] found that the mean value of birth weight of F × L crossbred cows was 24.95 ±5.83 Kg. It was dissimilar with my study because the study found that, the mean value of birth weight of F×L was 22.57 ± 0.30Kg. The mean birth weight of F x SL cows was 21.25 ± 2.89 kg; It was also similar with this study. From the above data we can stated that the birth weight of different cross breed is lower than study of Saha*et al.* [25]due to the breed factor, managemental maintenance, hereditary factor, feeding practice and physiological status were also responsible for the birth weight.

Milk yield /Day:

Milk yield is the most economic traits of a lactating cow. In this study the average milk yield/day of L, F, AFS, SL, F×SL, L×F, LF1×F and LF2×F were 1.42±.56, 11.57 ± 0.32, 4.68±.02, 2.24 ± 0.06, 3.55 ± 0.08, 3.36 ± 0.03, 4.1±0.4, 4.5±0.8 Littre respectively (Shown in Table1). Highest milk yield found in Holstein Friesian 11.57 ± 0.32 Littre. Rahman*et al.*[22] reported that daily milk yield mean 14.38±0.2 for Local, 17.63±0.2 for L×F and 19.5±0.3 for LF1×F.Nahar*et al.*[18] reported that the average daily milk yield of Holstein x indigenous, Sahiwal x indigenous, Sindhi x indigenous, and Jersey x indigenous crossbreds were 5.5±0.1, 2.9±0.1, 3.0±0.1, 3.8±0.1 kg, respectively.Saha*et al.* [25] found that, the daily milk yield mean 12.54±3.50 litters for HF x L crossbred cows. Milk yield is highly heritable, as cows produce more milk either by using ingested food or by mobilizing body fat[27]. Management and nutrition are important for milk production and fertility[30][31].

Age at puberty (Day):

In this study the average age at puberty (Day) of L, F, AFS, SL, F×SL, L×F, LF1×F and LF2×F were 1125.8±6.8, 1401.5± 30.47, 1525.58±28.05, 1138.4± 22.5, 1092.2 ± 9.36, 1086.7± 10.5, 1070.8±12.2, 1055.97±11.5 days respectively (Shown in Table 2). Qureshi*et al.*[20] reported that age of sexual maturity ranged from 420 to 1110 day with a mean of 745.3±51.0 days. Rahman*et al.* [22] reported that late sexual maturity was observed in local cow (1125.8±6.8 days) and early in LF (916.9±1.2 days). Sultana *et al.*[28] who found that the ages at puberty of *Desi*, Friesian × Desicross and Sahiwal × Desicross cows were 25.2, 21.4 and 24.4 months, respectively.The highest age at puberty was (1525.58±28.05) day found in AFS. The lowest age at puberty was (1055.97±11.5) day in LF2×F mulch cow. Saha*et al.*[25] found that, the mean value of age at puberty was 1138.5± 110.60 days for HF × L crossbred. The age at puberty is different in dairy cows might be due to environmental, feeding and manage mental effects. On the other hand, Khan et al. [12] found that age at puberty of Holstein-Friesian and Sahiwal were 1378±30.45 and 1114±12.23 days that was similar with my findings.

Service per conception:

Service per conception means the number of services or insemination required per conception. In this study the average number of service per conception were 1.3±0.2, 3.36 ± 0.31, 1.40±0.69, 3.2 ± 0.24, 1.8 ± 0.15, 2.43 ± 0.17, 1.70±0.67, 1.50±0.70 for L, F, AFS, SL, F×SL, L×F, LF1×F and LF2×F respectively (shown in Table 2.) Ali[1] reported that the service per conception of crossbred and local cow were 3.3 and 2.0 respectively in gaibandha district.

Rahman*et al.* [22] reported 13.02 ± 0.2, 1.4 ± 0.2, 1.2 ± 0.1 for L, LF and LF1×F respectively. Islam and Bhuiyan[10] found that service per conception was 1.23±0.17 in JR, 1.46±0.19 in JR×SN, 1.45±0.12 in first calving was lower in spring and summer than in winter: autumn and the rainy season. Wojeik[32] considered 711-720 days of age as the optimum period for successful calving. Rahman*et al.*[22]

Table1: productive traits of different Genotype of dairy cattle of CCBDF

Productive Traits	**Genotypes**							
	L (Mean ± SE)	**F (Mean ± SE)**	**AFS (Mean ± SE)**	**SL (Mean ± SE)**	**F×SL (Mean ± SE)**	**F×L (Mean ± SE)**	**LF_1×F (Mean ± SE)**	**LF_2×F (Mean ± SE)**
Birth Weight (Kg)	16.7 ± 0.48	37.5 ± 0.65	30.02 ± 1.08	19.45 ± 0.42	21.25 ± 2.89	22.57 ± 0.30	23.88 ± 0.5	25.5 ± 0.48
Milk Yield/Day (Littre)	1.42 ± 0.56	11.57 ± 0.32	4.68± 0.02	2.24 ± 0.06	3.55 ± 0.08	3.36 ± 0.03	4.1 ± 0.4	4.5 ± 0.8

Table 2 Reproductive traits of different Genotype dairy cattle of Central Cattle Breeding and Dairy Farm:

Reproductive Traits	**Genotypes**							
	L (Mean ± SE)	**F (Mean ± SE)**	**AFS (Mean ± SE)**	**SL (Mean ± SE)**	**F×SL (Mean ± SE)**	**L×F (Mean ± SE)**	**LF_1×F (Mean ± SE)**	**LF_2×F (Mean ± SE)**
Age at puberty (D)	1125.8± 6.8	1401.5 ± 30.47	1525.58 ± 28.05	1138.4± 22.5	1092.2 ± 9.36	1086.7± 10.5	1070.8 ± 12.2	1055.97± 11.5
Service/Conception(N)	1.3 ± 0.2	3.36 ± 0.31	1.40 ± 0.69	3.2 ± 0.24	1.8 ± 0.15	2.43 ± 0.17	1.70 ± 0.67	1.50 ± 0.70
Age at 1st Calving(D)	1380.5± 0.6	1779 ± 20.76	1624.45 ± 0.36.05	1488.5± 24.8	1394.9 ± 16.11	1422.8± 12.9	1448.5 ± 8.5	1455.7 ± 16.8
Post partum period (D)	103.2 ± 3.8	148.3 ± 22.54	177.6 ± 10.24	212.9 ± 2.03	223.9 ± 3.92	299.1 ± 9.27	201.7 ± 17.40	181.1 ± 11.74
Lactation length(D)	197.5 ± 5.3	513.8 ± 28.1	499.5 ± 20.7	231 ± 10.58	337 ± 15.7	324.5 ± 3.3	338.4 ± 6.2	340.5 ± 7.8
Calving Interval(D)	481.3 ± 0.8	581.5 ± 17.48	478.6 ± 8.52	582.2 ± 21.6	607.7 ± 6.7	516.2 ± 8.28	530.4 ± 16.19	508.6 ± 12.01
Gestation Length(D)	286.2±1.5	282 ± 2.86	274.5 ± 6.83	286.9 ± 1.23	278.9 ± 2.02	279.2 ± 1.42	279.3 ± 4.54	277.2 ± 3.93

SL×PMC and 1.23±0.10 in ¼ PMC × ¾ SL cows at Baghabarighat milk shed area. Hossen*et al.* [8] observed the lowest service per conception (1.22) in PMC cows. Rahman*et al.*[22]who found that the number of services per pregnancy of Desicows was 1.5.Sarder*et al.* [26]stated that the number of services per pregnancy in Friesian × Desiand Sahiwal × Desicows was 1.6.Saha*et.al* [25]found that the mean values of service per conception was 1.4± 0.25 for Holstein-Friesian x Local. The mean value of service per conception 1.69 ± 0.18 for Holstein-Friesian x Sahiwal according to Saha*et al.*[25].

Age at first calving (Day):

In my study, it is found that the age at first calving (Day) of L, F, AFS, SL, F×SL, L×F, LF1×F and LF2×F were 1380.5±0.6, 1779 ± 20.76, 624.45±.36.05, 1488.5± 24.8, 1394.9± 16.11, 1422.8± 12.9, 1448.5±8.5, 1455.7±16.8 respectively (Shown in Table 2).Islam *et al.*[9]sated that there was no constant trend in age at first calving wit level of Friesian inheritance. They also reported that age at reported 45.8±0.6, 41.6±0.2, 40.6±0.1 month for local, LF and LF1×F respectively.Saha*et al.*[25] found that, the age at first calving was 1129± 9.62 days for Holstein-Friesian x Local. It is slightly dissimilar with my study.

Post Partum Heat Period (PPHP) (Day) :

In my study, it is found that the Post partum heat period (PPHP) of L, F, AFS, SL, F×SL, L×F, LF1×F and LF2×F were 103.2±3.8, 148.3 ± 22.54, 177.6±10.24, 212.9 ± 2.03, 223.9 ± 3.92, 299.1 ± 9.27, 201.7±17.40, 181.1±11.74 respectively (Shown in Table 2).Rahman*et al.* [22] reported that 103.2±6.8, 117.9±0.8, 113.0±0.4 day PPHP for L, L*F, LF1*F respectively. Rokonuzzaman*et al.* [23] who found shortest time of PPHP 86.5±23.7 in LF cow.Majid*et al.* [15] who found longest average postpartum heat period (223.5±40.14 days) in ¼ Local-Friesian cross-breed and the lowest (117.24±7.2 days) in ½ Local – ½ Friesian cows at the Central Cattle Breeding and Dairy Farm, Savar, Dhaka. Postpartum heat period is an important economic reproductive trait in a dairy

herd. Hafez[6] suggested that the postpartum breeding delayed up to 60 to 70 days after parturition, when the uterus under goes recovery and preparation for the next conception. Chowdhury*et al*.[3] was found the postpartum heat period 154.8 days in FN×SL crossbred cows. Hossen*et al.* [8] observed that the shortest postpartum heat period (133.23 days) was in PMC cows. Saha*et al.*[25] found that, the mean values of post partum heat period were 122±35.5 days for HF x SL and 110±29.6 days for HF x L crossbred cows. The post partumheat period of Holstein-Friesian was 121 days. On theother hand, Nahar and Mustafa[17] found that the average PPHP of Holstein-Friesian and Sahiwal were 150± 24.4 and 216±2.78 days that is similar with my findings.

Lactation length (Day):

In this study, the Average lactation length of L, F, AFS, SL, F×SL, L×F, LF1×F and LF2×F were 197.5±5.3, 513.8 ± 28.1, 499.5±20.7, 231 ± 10.58, 337 ± 15.7, 324.5 ± 3.3, 338.4±6.2, 340.5±7.8 days respectively (Shown in Table 2). Rahman*et al.*[22] reported that 197.5±5.3, 232.1±2.4, 266.7±2.7 day Lactation length for L, LF and LF1×F. Hossen*et al.*[8] have stated that season of calving had a significant effect and sire, parity and year of calving had a non significant effect on lactation length. Hasan[7] who reported the average lactation period of Jersey, Holstein, Sahiwal and Sindhi crosses were 286, 272, 262 and 255 days, respectively. Khan[13] reported that the average lactation period of Pabna, Sindhi cross and Sahiwal cross were 200, 251 and 282 days, respectively. Khan *et al.*[12] who found that lactation length of Desiand Friesian × Desicross were 221 and 281 days, respectively. Sultana *et al.* [28] found that the lactation length of *Desi*, Friesian × *Desi*cross and Sahiwal × *Desi*cows were 221, 287.5 and 254 days, respectively.Miazi*et al.*[16] found that the average lactation length of Holstein-Friesian x Sahiwal and Hostein- Friesian x Local were 270±15 and 234.0±24.0 days, respectively & these results have difference with the present study. Hasan (1995) found that average lactation lengths of HF x SL, HF x L were 256.3±24.37 and 263.0±30.68 days, respectively.

Calving interval (Day):

It is defined as the interval between two successful calving of the same cows. Calving interval of L, F, AFS, SL, F×SL, L×F, LF1×F and LF2×F were 481.3±0.8, 581.5 ± 17.48, 478.6±8.52, 582.2 ± 21.6, 607.7 ± 6.7, 516.2 ± 8.28, 530.4±16.19, 508.6±12.01 days respectively (Shown in Table 2). Rahman*et al.*[22] reported 481.3±0.8, 462.1±2.6, 435.6±2.4 calving interval for L, LF and LF1×F respectively. Ghose*et al.*[5] who recorded calving interval of 489.52 days for Pabna, 524.00 days for Dhaka, 430.86 days for Red Chittagong, 491.16 days for Sahiwal, 490.00 for Sindhi, 571.00 days for Sindhi×Pabna, 457.00 days for Sindhi × Local and 485.25 days for Sahiwal×Local cows. Hossen*et al.*[8] found the shortest calving interval (414.90 days) in PMC cows. Uddin*et al.* [29] who found that calving intervals of *Desi*and Friesian x *Desi*cows were 484.1 and 489.2 days, respectively. Sultana *et al.*[28]found that the calving interval of Sahiwal × *Desi*cows was 453.7 days.Saha*et al.*[25] found that, the calving interval of HF x SL and HF x L were 450.12±48.16 days and 395.28±36.51 days respectively.

Gestation length (Day):

In this study the average gestation length of L, F, AFS, SL, F×SL, L×F, LF1×F and LF2×F were 286.2±1.5, 282 ± 2.86, 274.5±6.83, 286.9 ± 1.23, 278.9 ± 2.02, 279.2 ± 1.42, 279.3±4.54, 277.2±3.93 days respectively (Shown in Table 2). Rahman*et al.*[22]reported that 286.2±1.5, 279.0.6±0.6, 277.8±0.4 days gestation length for Local, LF and LF1×F respectively. Kabir*et al.*[11] have found the gestation period of 277.5±5.2 and 279.3±4.5 days in te genotypes LF, LLF respectively.Rahman[21] demonstrated the gestation length for Sahiwal x indigenous and Friesian x indigenous was 281.1 and 282.7 days, respectively. Sarder*et al.*[26] who found that gestation lengths of *Desi*, Friesian x Desiand Sahiwal x Desicows were 279.7, 278.2 and 278.8 days, respectively. The gestation length of present findings are more or less similar with the findings of Maarrof*et al.*[14] who analyzed the data of 85 Jenubi cattle in dairy farms of central Iraq, where average gestation length was 283±1.5 days. Variation in gestation length within the species may be contributed mainly by maternal and fetal factors. The maternal factors include age of the dam, nutritional status and body condition of the dam. Fetal factors include the sex of the fetus, twinning and hormonal functions of the fetus. Environment such as season, feeding, and management also contribute to some extent[6]. Rukonojjaman*et al.*[23] found that the average gestation length of Holstein-Friesian, sahiwal, were 275±3.95, 276±4.26 days respectively and the findings are almost dissimilar to my findings. In another study, Majid*et al.* [15] observed that the gestation length for Hosltein-Friesian x Sahiwal and Holstein-Friesian x Local were 282 & 284 days, respectively. It is also dissimilar with my findings.

CONCLUSION

According to the result of this study Production performances of Holstein-Friesian were superiorthanthe other dairy crossbreds. Australian Friesian Sahiwal breed ranked second and performances of other genotypes were nearly similar.Although, Production performances of Holstein-Friesian were superior, but it is not suitable in context of Bangladesh in terms of environmental condition. It may require low temperature, better feeding and management. The disease prevention capacity is also lower than that of native cattle. On the other hand, the local cattle are well adapted as well as high disease resistance than exotic pure breed. The crossbred cattle performed better than that of exotic and native cattle in terms of adaptability and production. So, it is necessary to improve native cattle by selective breeding to increase the productive and reproductive performance. Considering the above perspective it is concluded

that Local×Freisean crossbred cows will most suitable for Bangladesh.

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