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Productive and Reproductive Performance of Indigenous and Crossbred Cows Bred Artificially in Rural Area of Gaibandha District

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Abstract

Crossbreeding and selection criteria has been considered as a quick way of increasing performance of low productive breeds. The goal of this study was to assess the reproductive and productive potential of indigenous and crossbred cows at the farmer level through artificial insemination in rural areas of Gaibandha district. A total of 200 dairy cows were examined across three genotypes. According totheir genetic composition selected genotypes were Friesian cross (F×I=90), Sahiwal cross (SL×I=70) and Indigenous (I=40). The three breeds differ significantly in terms of reproductive attributes.Results showed that shortest age at puberty (20.77±0.10 month), age at first service (22.65±0.22 month), age at first calving (31.95±0.30 month), gestation period (278.44±0.97 days) and calving interval (404.20±2.31 days) in Friesian cross. On the contrary longest age at puberty, age at first service, age at first calving, gestation period and calving interval were 25.58±0.11 month, 27.08±0.11 month, 37.01±0.34 month, 284.30±1.08 and 453.30±2.91 days found in indigenous cow, respectively. There is no significant variancein service per conception between indigenous and crossbred cows. Where indigenous cows need minimum (1.20±0.09) services per conception though Sahiwal cross required for maximum (1.56±0.13). Regarding productive attributes, significant variation between indigenous and crossbred cows were identified. The longest lactation period, highest birth weight and daily milk yield were 287.72±2.52 days, 25.08±0.58 kg and 13.44±.54 liter noted in Friesian cross.Whereaslowest lactation period, birth weight and milk yield were 229.3±2.52 days, 13.55±0.98 kg and 2.30±0.12 liter, respectively observed in indigenous. It was revealed that Friesian cross is superior in relation to milk production and lactation length.Compared to other breeds in this study area, Friesian cross cows might be more profitable for dairy farming, according to the mentioned point of view.

Keywords: *Productive and reproductive performance, indigenous, crossbred, artificial insemination*

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I. Introduction

Elimination of poverty and malnutrition are two major challenges in a densely populated, agro-based developing country like Bangladesh. The vast majority of Bangladesh's rural population relies mainly on farming for agricultural products and livestock. Livestock, particularly dairy cattle has been an important source of support in resolving these obstacles. One of the agricultural economy's fastest-growing markets is the livestock industry, especially in emerging economies (Delgado *et al.*, 2009). The livestock sector is the most significant segment in agriculture, contributing 1.90% of GDP, growth rate of livestock in GDP is 3.10% and in agriculturalpart is about 16.52% (DLS, 2022). Bangladesh has 24.70 million cattle overall, producing 13.07 million metric tons of milk annually, yet there is a 15.67 million metric ton demand, which emphasizes the need for increasing Bangladesh's milk production (DLS, 2022).Animal production relies heavily on reproduction and development depends on productivity (Getachew *et al.*, 2020).Probably the most significant factor influencing productivity and a necessary condition for a sustainable dairy production system is the breeding female's reproductive performance (Alemayehu and Moges, 2014). A dairy cow's lifetime profitability depends on its production per lactation, productive life span, age at first calving, and interval between calvings (Verma and Thakur, 2013). Common determinant attributes to breeding animals' for reproductive performance consist of age at puberty, age at first service, age at first calving, calving interval, number of services per conception, days open until conception, and conception rate (Alemayehu and Moges, 2014).Genetic makeup of the dam and sire

contributes a major role in the development of these traits.The two primary factors which influence profitability are dairy cows' ability to reproduce and the production of milk (Ayeneshet *et al.,* 2018).The poor reproductive performance of high yielding cows may affect the overall economic performance of the herd. Crossbreeding of native breeds with high-producing exotic cattle has been proposed as a workable solution for enhancing the low yields of local cattle (Tadesse, 2002).The majority of farmers in Bangladesh raise native cattle breeds like Munshiganj, Pabna, RCC, North Bengal grey, and other individuals (Hossain *et al.,* 2021).Although native cattle are not as productive as exotic breeds, they are more immune to disease. Upgrading is necessary for bettering native cattle's performance.The most popular moderate crossbreeds are Jersey, Sahiwal, and Holstein Friesian, which first appeared in 1973 (Hamid *et al.,*2017).Crossbred cows yield more when given proper care and nutrition. Several attempts have been made over the past century to increase the potential for milk production of native cattle through crossbreeding. Although the milk production potential of the crossbred and pure breeds are higher than that of our indigenous cattle. Due to this, there is debate regarding the crossbreeding program, even though the number of crossbred cattle is growing daily as artificial insemination (AI) becomes more widespread. The first generation of reproductive biotechnology, artificial insemination, has significantly improved the genetic makeup of cattle (Mazumder *et al.,* 2020).Because of the effects of heterosis and recombination, crossbred animals have superior reproductive and productive performance than native animals. Though artificial insemination (AI) has been investigated for more than 200 years, its business implementation has only taken place in Bangladesh for the past 75 years, and AI initially arrived in 1959 (Shamsuddin *et al.,* 1987; Alam and Ghosh, 1988).Insemination technique and AI technician capacity are both important factors in low fertility indices (Paul *et al.,* 2011). District AI institutes are the main suppliers of AI services (Uddin *et al.,* 2014). Pure exotic breeds are not suited to the environmental conditions in Bangladesh because they are less capable of preventing disease than indigenous breeds.As a result, selective breeding is required to enhance indigenous breeds and boost cow productivity and reproductive efficiency. Productive and reproductive efficiency of indigenous cattle across the country has not yet been thoroughly evaluated. The reported scientific information on various traits of these cattle in a selected district of Bangladesh is still insufficient, so the current study was conducted to evaluate the productive and reproductive performance of indigenous and crossbred cows bred artificially in the rural area of Gaibandha.

II. Materials and Methods

Study Area:

The study was investigated in different rural areasof Gaibandha district which was situated at northern part of Bangladesh.Cattle, small ruminants, and poultry are the main livestock species raised in the district. The economy of Gaibandha district is mainly depends upon agriculture and livestock based production.

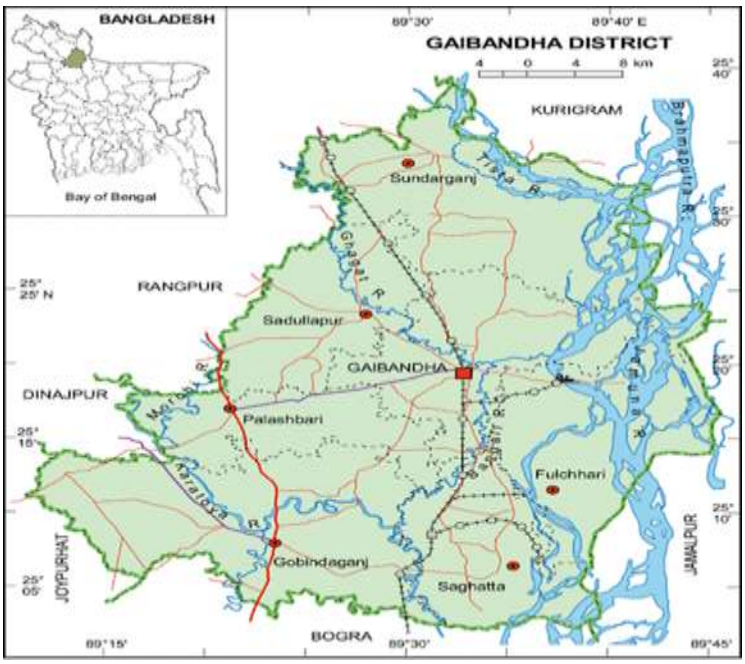

Figure 1: A map showing the study area

Study Population:

People in this area raised a large number of crossbred dairy cows, such as Holstein Friesian cross and Sahiwal cross, as well as indigenous cows. Regular cyclic cows were evaluated for this study. Based on the inherited traits of the cows, three genetic categories were made such as Indigenous cows (I; n=40), Friesian cross (F×I; n=90) and Sahiwal cross (SL×I; n=70).

Animal Management

In the studyarea, most of the animals were raised under strict traditional management protocols. Under this system, cows are confined at night and permitted to graze on naturally occurring feeds during the day. Farmers only give their animals bedding materials like rice husks, straw, or dry tree leaves during the winter. A few farmers in the village raised german, dutch, and maize for their cows next to their houses. The animals are fed using a "cut and carry system," in which native grass is collected from different locations and returned to the enclosures. Although household residue, rice polish, wheat bran, and oilcake are common supplements, their availability to animals is random and low. Farmers monitor their cows closely both during pregnancy and after the calf is born.

Preparation of Questionnaire

A cross-sectional survey was carried out to collect the necessary primary data for the study. In order to collect information required for the study's goals, a structured questionnaire was prepared.

Study Period and Data Collection

Collection of data for the study was conducted through door to door visit at farmer's house during two year. Data were collected through previously prepared interview schedule. Simple questions were used, with explanations provided when needed, and the survey schedule immediately recorded the respondents' answers.

Parameters of the Study

To evaluate the productive and reproductive performance of cows the following parameters were considered for the study.

Productive Traits

Birth Weight of Calves (kg)

It is the newborn animal's first weight, measured shortly after birth and recorded in the data sheet.

Daily Milk Yield (l)

The amount of milk produced daily by each cow during the lactation phase, expressed in liters per day.

Lactation Period (d)

It is the time, expressed in days on the data sheet, between the cow's calving and drying off.

Reproductive Traits

Age at Puberty (m)

The period during which an animal produced mature fertile ova, which is recorded in the data sheet for analysis by month.

Age at First Service (m)

It indicates the age, expressed in months, at which heifers reach the physical and sexual maturity necessary to accept service for the first time.

Age at First Calving (m)

It is the age which is expressed in months, at which a cow gives birth to a calf for the first time.

Service per Conception (no.)

The usual number of services needed in a specific population in order to conceive. It is recorded in the data sheet and utilized for evaluating a cow's reproductive efficiency.

Conception Rate (%)

With the support of an artificial insemination (AI) technician rectal palpation revealed the pregnancy between 60 and 90 days after insemination at farmer's house. The equation used to calculate the Conception rate (%) of cows:

$$\text{Conception rate (\%)} = \frac{\text{Number of cows /heifer pregnant}}{\text{Number of cows /heifer inseminated}} \times 100$$

Gestation Length (d)

Gestation length was defined as the duration of the embryo's and fetus's intrauterine development. It was calculated as the time interval between fertile service and parturition. The gestation period was determined in days.

Post-partum Heat Period (d)

The time of post-partum heat was calculated as the time between parturition and the next heat observed after a specific period of parturition. The period of time was measured in days.

Calving Interval (d)

Calving interval refers to the time period between one calving and the next. The calving intervals have been recorded as days.

Statistical Analysis

All the collected data was compiled, tabulated, and analyzed to meet the study's objectives. The data were subjected to statistical analysis and computed the means of each variance with standard error (SE) according to Steel and Torrie (1980). Turkey test and ANOVA were performed out using SPSS (26 version) for meaningful comparison.

III. Results and Discussion

Reproductive Performance

Age at Puberty

Average age at puberty of Friesian cross (F×I), Sahiwal cross (SL×I) and Indigenous (I) cows were 20.77±0.10, 23.91±0.09, and 25.58±0.11 month, respectively presented in table 1. From the three breeds, there is a significant ($P<0.05$) difference in the age at puberty. From the result highest age at puberty was found in Indigenous (25.58±0.11 month) and the lowest value was observed in Friesian cross(20.77±0.10 month). Here F×I cross exhibited the better results from others. These findings were agreed with Uddin *et al.* (2008) who found that, age at puberty of Indigenous and Friesian cross cows were 24.17±7.74 and 22.08±2.52 month, respectively. Additionally, Kabir and Islam (2009) noticed significant differences ($P<0.01$) between crossbred and indigenous cows. The age at puberty of Indigenous and Holstein×Indigenous were 26.62±1.58 and 21.16±3.40 month, respectively and these results are closely similar with my study. Sultana *et al.* (2001) stated that Desi and Friesian×Desi cross cows attain puberty at different ages 25.20 and 21.40 month, respectively and these results are also similar the present study. Other findings reported those ages at puberty of Local, Friesian×Local cross cows were 25.92±1.08 and 20.6±2.10 month, respectively (Miazi*et al.,* 2007). In this present study F×I cross reached puberty earlier than other genetic groups of like Indigenous and SL×I. This could be because animals raised in an abundance of green grass under good management practices have higher nutritional statuses and their offspring reach puberty earlier, which is among the dairy farmer's main demands of his cows.

Age at First Service

The heifer's age at first service marks the start of her reproductive and productive life. It also affects th e female's lifetime calf yield, which in turn affects her reproductive and productive life.From the present study average age at first service of Friesian cross(F×I), Sahiwal cross (SL×I) and Indigenous (I) cows were found 22.65 ±0.22, 24.88±0.08 and 27.08±0.11 month, respectively showed in table 1. For this attribute, there was a significant difference ($P<0.05$) between indigenous and crossbred cows. Maximum value of age at first service was 27.08±0.11 month found in indigenous cows, on contrary minimum value 22.65 ±0.22 month was recorded from F×I cross. The stage at which heifers reach the physical and sexual maturity essential to accept service for the first time is referred to as the age at first service. So findings say that F×I cross are superior as they gaining early maturity than other breeds. Famous *et al.* (2021) observed that the average age at first service of F×I crossbred cows was 24.20±1.10 month which are almost similar to present study. Average age at first service for the Local and Local×Friesianwere 29.48±0.51 and 24.64±0.33 month found by Islam *et al.* (2016)which keep a similarity to the study. Beside this Sarder and Hossain (2001) stated that age at first service was 30.30±0.7 month for the indigenous cows which are higher from present study. Age at first heat and age at first service differ, suggesting farmers are purposefully avoiding the heat to serve first for at least two or three estrous cycles. Numerous environmental factors including nutrition, feeding practices, and genotype, affect an individual's age at first service.

Table 1: Reproductive performances of indigenous and crossbred dairy cows

Breed (♂ × ♀) Reproductive Trait	Friesian cross (F×I) Mean ± SE n=90	Sahiwal cross (SL×I) Mean ± SE n=70	Indigenous (I) Mean ± SE n=40	Level of Significance
Age at puberty (m)	20.77^{c}±0.10	23.91^{b}±0.09	25.58^{a}±0.11	*
Age at first service (m)	22.65^{c}±0.22	24.88^{b}±0.08	27.08^{a}±0.11	*
Age at first calving (m)	31.95^{c}±0.30	34.04^{b}±0.08	37.01^{a}±0.34	*
Service per conception (no.)	1.40±0.10	1.56±0.13	1.20±0.09	NS
Conception rate (%)	56.92^{ab}±1.98	51.26^{b}±2.00	62.72^{a}±1.11	*
Gestation period (d)	278.44^{b}±0.97	280.84^{b}±0.92	284.30^{a}±1.08	*
Post-partum heat period (d)	93.80^{b}±1.06	111.96^{a}±1.09	113.95^{a}±1.84	*
Calving interval (d)	404.20^{c}±2.31	423.88^{b}±2.73	453.30^{a}±2.91	*

In a row, values having the same superscripts under each breed do not differ significantly whereas values with dissimilar superscripts differed significantly. * = Significant at 5% (P< 0.05) level of significance, NS= Non-significant. Here, I= Indigenous, F= Friesian and SL= Sahiwal

Age at First Calving

Age at first calving refers to a heifer's starting a productive life. Age at first calving of Friesian cross (F×I), Sahiwal cross (SL×I) and Indigenous (I) cows were found 31.95±0.30, 34.04±0.08, and 37.01±0.34 month, respectively shown in table 1. There was a significant difference (P< 0.05) age at first calving among the three breeds. The results revealed that highest age at first calving was found in Indigenous (37.01±0.34 month) and the lowest value (31.95±0.30 month) was observed in Friesian cross. It determines that the cow's productive life begins at early calving date and had a direct effect on her lifetime productivity. Paul *et al.* (2013) stated that the average age at first calving of Desi and Friesian×Desi were 37.36 ± 1.1 and 32.6±2.3 month, respectively and similar findings also found by Omar *et al.*(2007). This consequence is more or less similar in this conducted study. Findings from Islam *et al.*(2009) on age of first calving were 40.51±4.5 and 34.10±3.8 month in L and L×F, which is differ from the study might be due to management and environmental factors. The age of a cow at first calving is a significant financial characteristic that affects generation interval, genetic gain, and lifetime productivity.

Service per Conception

In this study the usual number of service is required per conception were 1.40±0.10, 1.56 ± 0.13 and 1.20±0.09 for Friesian cross (F×I), Sahiwal cross (SL×I) and Indigenous (I) cows, respectively exhibited in table 1. In case of service per conception no significant deviation (p<0.05) was found between Indigenous and crossbred cows. Indigenous cows were required minimum (1.20±0.09) number of insemination per conception whereas Sahiwal cross needed to maximum (1.56±0.13) number of insemination per conception. Service per conception refers to the number of services or insemination required for each conception. About this reproductive characteristics every test breeds were showed more or less similar performance. Number of AI per conception required for L×F and L cows was 1.40±0.09 and 1.36±0.08, respectively (Rahman *et al.*, 2017) and these result are closely agree with this study. Miazi*et al.* (2007) found that the AI per conception of Local, Friesian×Local cross cows were 1.32±0.13, 1.60±0.24 respectively and these findings also nearly similar to present study. The discrepancy in services per conception may be influenced by a number of factors, such as breed, body weight, nutrition, quality of semen, insemination time, skill of AI workers, and low fertility in cows. Also lower husbandry practices, improper heat detection and timing of the cows' insemination could all be contributing factors.

Conception Rate

Conception rate is the most noticeable indication of a dairy cow's reproductive performance. Findings from this present study the average percentage of conception rate of Friesian cross (F×I), Sahiwal cross (SL×I) and indigenous (I) cows were observed 56.92±1.98, 51.26±2.00 and 62.72±1.11, respectively shown in table 1. The conception rates of the three test breeds showed a significant difference (p<0.05).Indigenous (I) cows (62.72%) had the highest conception rate, whereas lowest value was observed in case of Sahiwal crosscows (51.26%).Khan et al. (2015) found that the local, Friesian, and Sahiwal conception rates were 63.8, 57.1, and

52.6%, respectively. These results seem to be consistent with the findings of this study. Khatun *et al.* (2014) observed that the AI per conception of Local (52.9%), Friesian cross (62.3%), and Sahiwal cross (40%) which was lower than the present findings. Howlader*et al.* (2019) observed the dairy cattle conception rate after artificial insemination and he reported that the conception rate of Local, Local×Friesian were 73.98%, 70.02%, respectively that was higher than from this study. The age of cow, the technician's skill, the age of semen, the time between calving and insemination, and the sire's breeding value are all variables that could affect the rate of conception (Visser *et al.,* 1988).

Gestation Period

Average gestation period of Friesian cross (F×I), Sahiwal cross (SL×I) and Indigenous (I) cows were found 278.44±.97, 280.84±.92, and 284.30±1.08 days, respectively are shown in table 1. There was a significant difference (P< 0.05) in gestation period between the three breeds (Table 1). From the result longest gestation period was found in Indigenous (284.30±1.08 days) and the shortest period was observed in Friesian cross (278.44±.97 days). Above outcomes indicate that period of gestation of all breed are closely similar but statistically dissimilar. Every genotype has a generally constant gestation period, with a few exceptions depending on the breed, calf sex, litter size, dam age, and calving month(Fikirie*et al.,* 2007). Rahman *et al.* (2016) who found that the gestation period of Local and Local× Friesian were 286±2.0 and 279±4.0 days, respectively and these results are fall in with the present study. In another study the gestation period of Indigenous and Holstein cross were 281±2.31 and 279±3.85 days, respectively (Islam *et al.,* 2014) and these result is closely parallel to this study. Factors related to the maternal and fetal may contribute to differences in gestation length within the species. In addition to environmental factors like season,feeding, and care, fetal factors also include the sex, twinning, and hormonal functions of the fetus (Hafez, 1993).

Post-partum Heat Period

It is a crucial period after calving to next heat that determine the conception of cow. Average post-partum heat period of Friesian cross (F×I), Sahiwal cross (SL×I) and Indigenous (I) cows were found 93.80±1.06, 111.96±1.09 and 113.95±1.84 days, respectively (Table 1). There is a significant variance (p<0.05) of post-partum heat period among three studied breed. The results indicated that longest post-partum heat period was found in Indigenous (113.95±1.84 days) and the shortest period of post-partum heat was observed in Friesian cross (93.80±1.06 days). This result supported to the findings of Paul *et al.* (2013), who observed that the average post-partum heat period of Desi, Friesian × Desi was 102 ± 8.7, 90.0 ± 13.42 days, respectively. According to Hauque*et al.* (2011) the usual post-partum heat periods of Friesian cross, Indigenous cows were 89.48±28.65 and 119.42±52.10 days, respectively and both values were found significantly different. These findings are closely similar with the current study. The duration of the post-partum heat period may be impacted by factors such as diet, physical state, age, heredity, daily milk production, frequency of breastfeeding, and the presence of the calf.

Calving Interval

The calving interval is the most significant indicator of a dairy cow's reproductive performance. Findings from this study the average duration of calving interval of Friesian cross (F×I), Sahiwal cross (SL×I) and indigenous (I) cows were 404.20±2.31, 423.88±2.73 and 453.30±2.91 days, respectively shown in table 1. A significant variance (p<0.05) was found in calving interval among three breeds. The lowest calving interval was found in F×I cows (404.20±2.31 days) but the highest calving interval was observed in indigenous cows (453.30±1.84 days). So findings says that F×I cows are superior as their shortest duration of calving interval than other breeds. Uddin *et al.* (2008) stated that, the calving interval of Indigenous, Friesian cross cows were found 472.55±69.17, 413.77±53.87 days, respectively. These result almost similar with this study. Calving interval of desi cows were observed 415.00±5.00 days (Al-amin and Nahar, 2007), and 418.78±36.74 days (Islam *et al.,* 2002) which is almost comparable to this present study. Famous *et al.* (2021) observed that the mean value of calving interval of F×I crossbred cows was 410±10 days which are almost similar to present study. Calving interval reported to 50% HF-50% D cross cow was 411.0±0.40 days (Khoda*et al.,* 2015). These results align with the present studies. Apart from genetics Indigenous cows had a longer calving interval than F×I cows because they were not as fed properly and managed by low-input farmers (Mulugeta and Belayeneh, 2013).

Breed (♂ × ♀)	**Friesian cross (F×I)**	**Sahiwal cross (SL×I)**	**Indigenous (I)**	**Level of Significance**

Table 2:Productive performances of indigenous and crossbred dairy cows

	Mean ± SE n=90	**Mean ± SE n=70**	**Mean ± SE n=40**	
Birth weight of calves (kg)	25.08^{a}±0.58	21.80^{b}±0.91	13.55^{c}±0.98	*
Daily milk yield (l)	13.44^{a}±0.54	5.86^{b}±0.21	2.30^{c}±0.12	*
Lactation length (D)	287.72^{a}±2.52	255.20^{b}±2.45	229.3^{c}±2.52	*

In a row, values having the same superscripts under each breed do not differ significantly whereas values with dissimilar superscripts differed significantly. * = Significant at 5% (P< 0.05) level of significance, NS= Non-significant.

Productive Performance

Birth Weight of Calves

The average birth weight of calves of Friesian cross (F×I),Sahiwal cross (SL×I) andIndigenous (I) dairy cows were found 25.08±0.58, 21.80±0.91 and 13.55±0.98 kg, respectively in this study presented in table 2. Among three breeds there is a significant difference (P<0.05) in birth weight of calves. The results stated that highest birth weight of calves (25.08±0.58 kg) was observed for Friesian cross calves, whereas lowest birth weight of calves (13.55±0.98 kg) was found in Indigenous (I). Crossbred of F×I found superior as their maximum birth weight of calves than other breeds.Findings from the present study are closely agreed with Kabir and Islam (2009), who found that calves' average birth weight of Friesian cross was 24.1±1.73 kg and the weight of indigenous was 14.30±0.06 kg found by Rahman *et al.* (2017) which is slightly closer this study. As reported by Saha *et al.* (2008), the average birth weight of F×L crossbred cows was 24.95±5.83 kg. Birth weight of calves of Local, Local x Friesian were found 17.0±0.4 and 22.5±0.3 kg, respectively (Islam *et al.,* 2009) which differs slightly compared to the study's results. The breed, management, feeding practices, and physiological status that were observed in the selected research areas contributed to the variation in birth weight of the calves.

Daily Milk Yield

One of the most important economic characteristics of a lactating cow is milk production, which refers to a combination of milk yield and lactation length. Average daily milk yield of Friesian cross (F×I),Sahiwal cross (SL×I) and Indigenous (I) dairy cows were recorded 13.44±0.54, 5.86±0.21 and 2.3±0.12 liter, respectively (Table 2). There were significant differences (p<0.05) in daily milk yield between two crossbreds and indigenous cows. In this study highest milk yield per day (13.44±0.54 liter) was recorded in Friesian crossbred followed by lowest yield value (2.3±0.12 liter) was found in indigenous cows. Famous *et al.* (2021) found that the average daily milk yield ofF×I, I×SL crossbred cattle were 13.9±0.73, 6.3±1.01 liter, respectively and these results are closely similar with this study. Nearly similar results were found for indigenous cows 2.10±0.41 liter (Kabir and Islam, 2009), 2.38±0.73 liter (Rokonuzzaman*et al.,* 2009), 2.26±0.19 liter (Faruk *et al.,* 2007), respectively. The variation in daily milk yield might be attributed to the following factors: genetics, biological phenomena, hormonal influences, feeding system, quality and quantity of feed, irresponsible caretaker, intense sunlight, and overall management. The amount of milk a cow produces is highly heritable either of using ingested food or by mobilizing body fat (Schei *et. al.,* 2005).

Lactation Length

Lactation length is a vital production characteristic because it impacts a cow's overall milk yield. Average lactation length of Friesian cross (F×I), Sahiwal cross (SL×I) and Indigenous (I) cows were observed 287.72±2.52, 255.2±2.45, and 229.3±2.52 days, respectivelyshowed in table 2. A significant variation (p<0.05) was found in lactation length among three studied breed. In this results higher lactation length (287.72±2.52 days) was recoded in Friesian cross cow, on contrary lower length (229.3±2.52 days) of lactation length was found in Indigenous cow. A lactation duration of 305 days is typically accepted as a benchmark in the majority of upgraded dairy farms. This standard permits calving with a 60-day dry period once every 12 months. According to Paul *et al.* (2013) the average lactation length of Friesian×Desi, Sahiwal×Desi and Desi were 270.0±0.0, 234.0±24.2 and 235.4±7.0 days respectively and these results are different from the present-day study. Another findings (2.63±0.38 liter) is that recorded from indigenous cows (Sultana *et al.,* 2001), which are above to the present study. Another finding revealed that average lactation length of Friesian cross, Sahiwal cross and indigenous cows were 284.69±1.64, 251.77±3.66, 251.77±3.66 and 218.22±8.35 days respectively (Uddin *et al.,* 2008). Kabir and Islam (2009);Rokonuzzaman*et al.* (2009);found that lactation length of indigenous cows 170.0±22.36 and 227.8±32.50 days respectively; which values are similarly close to the present study. Variations in the length of lactation in different crossbreds might be caused by disease incidence, management practices, cow housing, feeding, and nutritional supplements.

IV. Conclusion

The outcomes of this study demonstrated that Friesian cross (F×I) cows outperformed the other two breeds in terms of productive and reproductive abilities, including shortest gestation length and calving interval, lowest age at first service, longest lactation period, and highest amount of milk yield. In terms of both production and adaptability, the crossbred cattle superior to the native cattle. To increase productive and reproductive performance of native cattle must be improved through selective breeding using AI. Based on the preceding information, it can be said that Friesian crossbred (F×I) cows appear to be more appropriate for generating income and sustaining dairy farming given the research area's village context. Further studies with larger sample sizes as well as diverse management systems would be required to describe better inference in this regard.

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Conflict of Interest

There is no conflict of interest disclosed by the writers.

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