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Productive and reproductive performance of crossbred and indigenous dairy cows under smallholder farming system

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Abstract

The present study was undertaken to investigate productive and reproductive performances of crossbreds and Indigenous dairy cows. A total of 400 dairy cows each are equal number of Friesian x indigenous (FI), Sahiwal x indigenous (Sal), Sindhi x indigenous (Sil) and indigenous (I) were selected from eight thanas in Jessore district. The study found that the daily milk yield from FI, Sal, Sil and I cows were 8.39 ± 2.01 , 4.63 ± 0.96 , 4.35 ± 1.12 and 2.38 ± 0.73 liters, respectively. The milk yield was found significantly ($P < 0.01$) higher in first stage of lactation than that of second and third both in crossbreds and I dairy cows. The lactation period of crossbreds was significantly ($P < 0.01$) higher than that of I cows. The service per conception was found higher in I cows and the gestation length was almost similar in all the groups. The post partum heat period and calving to first service were highest in Sil cows. The dry period and calving interval were higher in I cows. The age at first calving was almost similar in crossbreds but significantly ($P < 0.01$) higher in I cows. The birth weight was significantly ($P < 0.01$) lower in I than crossbred dairy cows. Considering all the parameters studied, FI showed better performance followed by Sal, Sil, and I.

Keywords: Crossbreds, Indigenous, Dairy cows, Productive and reproduction performance

Introduction

Bangladesh is a densely populated and agro-based developing country where most of the rural people are dependent for their livelihood mainly on cropping and livestock farming. Livestock sub-sector is playing a crucial role in the traditional subsistence farming, contributing about 6.5% of the GDP, 13% of the total foreign exchange earnings and providing employment to 20% of the population (BBS, 2004).

The total cattle population of Bangladesh is 22.87 million of which 3.79 million is dairy cows yielding 1.64 million metric ton milk per year which is only 14% of the total requirement indicates the importance of the requirement for increasing the milk production in Bangladesh. Dairy cattle population in Bangladesh ranks 12th in the world and 3rd in Asian countries. About 92 percent of the dairy cattle is nondescriptive indigenous and only 8 percent is reported to be crossbred (BBS, 2006). The average milk yield per cow per day is 1.5 liters for indigenous and 2.5 liters for crossbreds. Dairying is nearly always part of a mixed farming system in Bangladesh (Saadullah, 2001). The majority of the rural households in Bangladesh have 2-3 dairy cows. Sometimes these cattle are used as dual purpose for milk and draft power.

Bangladesh is importing powder milk to meet the deficit. The volume of imported milk has increased over the year due to faster domestic demand and costs of importation have exerted pressure on the countries balance of payments and have depressed the local initiative for milk production. About two-third of the total population in Bangladesh suffers from malnutrition. The magnitude of malnutrition can be substantially reduced by the consumption of milk or dairy products.

Bangladesh has given the priority on the development of dairying at farmer's level to increase the supply of milk from small-holder dairy farms. A large number of crossbreds and indigenous dairy cows are raised in the study areas and there is no study has done as far as we are aware. Moreover, the area is well communicated and the farmers are responsive make the research suitable in the study area. The present study was therefore undertaken to investigate the productive and reproductive performances of crossbreds and indigenous dairy cows in Jessore district and recommend farmers that are suitable in existing ecological and socio-economical condition.

Material and Methods

Data were collected from November 2005 to April 2006. The names of selected thanas are Jhikorgacha, Sharsha, Bagharpara, Monirumpur, Keshobpur, Sadar, Chaugacha, and Avoynogar in Jessore District. A total of 120 smallholder dairy farmers, 15 from each thanas were interviewed randomly with scheduled questionnaire which was mainly based on the productive and reproductive information of Friesian x indigenous (FI), Sahiwal x indigenous (Sal), Sindhi x indigenous (Sil) and indigenous (I) dairy cows. The questionnaire was developed in accordance with the objectives of the study and designed in a simple manner to get accurate information from the dairy farm owners. Each respondent was given a brief description about the nature and purpose of the study. The questions were asked in a very simple manner with explanation where necessary and the responses were recorded directly on the survey schedule. The farmers under the study areas maintained the dairy cows under traditional management system. They housed the dairy cows in the shed and supplied *ad libitum* roughage and concentrate occasionally. The parameters investigated under the study were milk production at three stage (birth-3 months, 3-6 months and 6-rest) of lactation (L/day), lactation period (day), age at first calving (month), post partum heat period (PPHP) (days), service per conception (Number), length of gestation period (days), length of dry period (days), and birth weight (kg). The data were compiled, tabulated and were subjected to statistical analyses using Completely Randomized Block Design (CRBD) to compute analysis of variance according to Steel & Torrie (1980). Analysis of variance was done to come upon the differences of the productive and reproductive performances of crossbreds and indigenous dairy cows.

Results and Discussion

The productive and reproductive performance of crossbreds and indigenous dairy cows are discussed below. The milk production at different stage of lactation of crossbreds and indigenous dairy cows are presented in Table 1. The production was decreased significantly ($p < 0.01$) in 3rd than 1st and 2nd stage of lactation. The milk production was decreased with the increase of lactation stages.

Table 1. Milk production at different stage of lactation from crossbreds and indigenous dairy cows

Type	Stage of lactation (L/d)			LSD and significance
	1 st	2 nd	3 rd	
FI	9.56 ^a ± 2.39	8.68 ^a ± 2.23	6.84 ^b ± 1.79	1.61**
Sal	5.32 ^a ± 1.22	4.76 ^a ± 0.88	3.52 ^b ± 0.71	0.72**
Sil	4.96 ^a ± 1.37	4.52 ^a ± 1.05	3.40 ^b ± 1.00	0.86**
I	2.84 ^a ± 0.80	2.28 ^b ± 0.71	1.58 ^c ± 0.49	0.51**

^{abc} Means with different superscript in the same row differ significantly

** = Significant at $p < 0.01$

FI= Friesian x indigenous, Sal= Sahiwal x indigenous, Sil= Sindhi x indigenous and I= indigenous

1st= Birth to 3 months, 2nd= 3-6 months and 3rd= 6 onward

The milk production and lactation period of crossbreds and indigenous dairy cows are presented in Table 2. The highest and lowest milk production was found in FI and I, respectively and there was no differences between Sal and Sil. Sarker (1995) demonstrated the milk production from crossbreds and indigenous dairy cows were 6.74 and 1.63 L/d, respectively, which is almost similar with the present findings. Nahar *et al.* (1992) 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, the milk production was found lower than the present finding.

The lactation period of crossbred cows was almost similar but significantly ($p < 0.01$) higher than that of I cow. The lactation length of the present study is partially in agreement with the results of Halim (1992) where the lactation period for indigenous and crossbred dairy cows were 228 and 259 days, respectively. The lactation period found in the present finding are more or less similar with the findings of Hasan (1995), who reported the average lactation period of Jersey, Holstein, Sahiwal and Sindhi crosses were 286, 272, 262 and 255 days, respectively. Khan (1990) reported that the average lactation period of Pabna, Sindhi cross and Sahiwal cross were 200, 251 and 282 days, respectively, the result is almost similar with the present finding.

Table 2. Productive and reproductive performance of crossbreds and indigenous dairy cows

Parameters	FI	Sal	Sil	I	LSD and level of significance
Milk production /d/cow	8.36 ^a ±2.01	4.53 ^b ±0.96	4.29 ^b ±1.12	2.23 ^c ±0.73	0.97**
Lactation period (day)	262.0 ^a ±24.15	250.4 ^a ±28.06	258.8 ^a ±34.03	227.8 ^b ±32.50	22.31**
Age at first calving (month)	34.12 ^b ±3.78	35.48 ^b ±3.64	36.12 ^b ±4.35	40.48 ^a ±4.54	3.04**
PPHP (day)	86.48 ^c ±23.67	93.92 ^{bc} ±38.06	127.08 ^a ±43.47	121.2 ^{ab} ±52.90	30.41**
Service per conception	1.84 ^{ab} ±0.80	1.32 ^b ±0.48	1.48 ^{ab} ±0.58	1.92 ^a ±0.91	0.530**
Gestation Length (day)	275 ±3.95	276 ±4.26	275 ±4.41	277 ±3.31	NS
Dry period (day)	134.8 ^c ±30.02	134.8 ^c ± 27.25	163.2 ^b ±32.37	197.4 ^a ±52.28	27.37**
Birth weight of calf (kg)	22.52 ^c ±0.32	22.19 ^c ±0.35	20.16 ^b ±0.86	17.0 ^a ±0.36	0.47**

^{abc} Means with different superscript in the same row differ significantly

** = Significant at p<0.01, NS= Non significant

FI= Friesian x indigenous, Sal= Sahiwal x indigenous, Sil= Sindhi x indigenous and I= indigenous

PPHP=Post partum heat period

The age at first calving, PPHP, service per conception, gestation length, dry period and birth weight of crossbreds and I dairy cows are presented in Table 2. The Age at first calving of crossbred cows was almost similar but significantly ($p<0.01$) lower than that of I cow. The age at first calving was 32-40 months in Friesian crosses demonstrated by Lahouse (1960), the result being similar with the present finding.

The lowest PPHP was found in FI followed by Sal, I and Sil. The PPHP was significantly different ($p<0.01$) between FI and Sil, FI and I and Sal and Sil. Ali (1998) conducted an experiment and reported the PPHP of crossbred and I cows were 109.59 and 103.83 days, respectively. The result of the present experiment nearly agrees with the findings of Ali (1998).

The service per conception was found highest in I and lowest in Sal dairy cows and differed significantly ($p<0.01$) but there was no significant difference between the crossbreds. Sultana (1995) demonstrated service per conception of 540 cows from Indigenous, Sahiwal, Sahiwal x Friesian (F_1), Jersey, Indigenous x Jersey (F_1), and Indigenous x Friesian were 1.78, 1.12, 2.05, 2.01, 1.4 and 1.68, respectively. Mondal (1998) found that the service per conception was 1.63, 1.67, 1.53, 1.75 and 1.94 for Jersey cross, Sahiwal cross, Sindhi cross, Holstein cross and Red Chittagong cows, respectively in Bangladesh Agricultural University dairy Farm. Jabbar and Ali (1988) studied the productive performance of Indigenous and crossbred cows in Bangladesh and demonstrated the overall service per conception was 1.66. Chowdhury (1995) reported that average service per conception for Indigenous, indigenous x Holstein and Sahiwal x Holstein cows were 1.70, 1.72 and 2.01, respectively.

The gestation length of crossbreds and I dairy cows was almost similar and no significant difference was observed between the groups. Gestation length of different crossbred dairy cows under farm and urban conditions were studied by Nahar (1987) and found the gestation period of Sindhi, Sahiwal, Jersey and Holstein crossbred cows under farm condition was 281, 280, 280, and 282 days, while under urban condition it was 280 days for all four crossbreds. In an another study, Hasan (1995) observed that the gestation length for indigenous, Jersey cross, Sindhi cross, Sahiwal cross and Holstein cross was 284, 281, 286, 282 and 284 days, respectively. Asaduzzaman and Miah (2004) demonstrated the gestation length for Sahiwal x indigenous and Friesian x indigenous was 281.1 and 282.7 days, respectively. It was observed from the above discussion that crossbreds and indigenous cows have no significant effect on gestation length.

The dry period of crossbreds was significantly ($P<0.01$) lower than that from indigenous dairy cows. The present results are almost similar with Nahar (1987) who found the dry period of F_1 Sindhi and Sahiwal was 145.9 and 127.2 days, respectively.

The birth weight of SI and Sal calves was almost similar and significantly ($p < 0.01$) higher than Sil and I dairy cows. Khan (1990) found that the average birth weight for Jersey, Sahiwal, Sindhi crossbred and Red Chittagong calves were 17.1, 17.8, 17.9 and 17.4 kgs, respectively.

From the above discussion it is assumed that crossbreds are better both for productive and reproductive performances and may recommend replacing with Indigenous dairy cows.

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