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Consequence of Dam Genotypes on Productive and Reproductive Performance of Dairy Cows under the Rural Condition in Bangladesh

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Abstract: The main objective of the present study was to evaluate the consequence of dam genotypes on productive and reproductive performance of different cross-bred dairy cows under field condition. A total of 313 dairy cow's information were collected from 33 Artificial Insemination (AI) Sub-centers/Points from the District AI center of greater Rajshahi district for a period from 1993 to 2002. The information of the productive and reproductive parameters were analyzed from questionnaires answered by 33 field assistant (artificial inseminator) and owner's of cow in respective of AI Sub-Center/Points as well as from reading the AI and 100% progeny collection Registers. In general, the mean birth weight, age at puberty, age at first fertile service, age at first calving, gestation length, post-partum heat period, days open, wastage day, service per conception, milk production per day, peak milk production per day, lactation length, lactation yield, dry period, weaning period and calving intervals were 18.8 kg, 27.9 month, 29.2 month, 38.7 months, 278.7 days, 139 days, 160 days, 20.3 days, 1.62, 5.13 L, 10.45 L, 282 days, 1445 L, 146 days, 10.65 months and 438 days, respectively. Dam genotype of dairy cows were divided into 5 groups according to their genetic composition. L×F, S×SL, L, L×SL×F and L×S×SL of dam genotype had significant effect on all the productive and reproductive performances of the dairy cows except on age at first calving, gestation length and weaning period. The genotypes of dam's of cows like L×F and L×SL showed a better performance under field condition at greater Rajshahi district and poor performance were recorded in L and L×S×SL of dam genotype. The experiment reflects that the L×F and L×SL genotypes of dam showed the better productive and reproductive performances of dairy cows under rural condition in Bangladesh.

Key words: Dam genotypes, dairy cows, productive, reproductive performance

INTRODUCTION

The livestock plays an important role in the agricultural economy of Bangladesh and provides nutritious food for human consumption. Cattle play a vital role among the entire beast dual-purpose animal 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 dairy cows are essential for future improvement programme. The best performance record of the individual can be obtained by accurate estimation of economic traits in the dairy cattle, such as birth weight, age at puberty, age at first fertile service, age at first calving, gestation length, post-partum heat period, days open, wastage day, service per conception, milk production per day, peak milk production per day, lactation length, lactation yield, dry period, weaning period and calving intervals. The effect of breed on economic traits were studied by different workers (Ahmed and Islam, 1987; Becker *et al*., 1995; Bhuiyan *et al*., 1995, 2000; El-Barbary *et al*., 1983; Islam and Oliuzzaman, 1992; Majid *et al*., 1995; Sarder *et al*., 1997; Islam *et al*., 2000; Sultana *et al*., 2001; Khan *et al*., 2001; Mondal *et al*., 2005; Hossain *et al*., 2005). Majid *et al*. (1995) showed that performance of Friesian breed and its crosses with Local cows were better than the Sahiwal and its crosses. Proper insemination in right time, postpartum involution of uterus, pregnancy maintenance, easy parturition, nursing of the calves, balance feeding, adoption of appropriate feeding system

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and planned breeding must be improved to achieve the desired goal. These traits are integral parts of the profit-loss equation in livestock production. It is obvious from literature that no such attempt has been made so far to evaluate the genotype of dam effect on productive and reproductive performance of dairy cows under field condition. This study was therefore, under taken to evaluate the consequence of dam genotype on productive and reproductive performance of dairy cows under rural condition of greater Rajshahi district in Bangladesh. This may help in selecting appropriate programme for genetic improvement and thereby it is possible to develop cattle a breeds and types within breeds in Bangladesh.

MATERIALS AND METHODS

The present investigation is dealing with the dairy cows of different genotypes of dam in field condition considering the productive and reproductive performance of cows under the district Artificial Insemination (AI) center, Rajshahi and was conducted at 33 AI Sub-centers/Points of greater Rajshahi district from 1993 to 2002. The information regarding productive and reproductive performances of 313 dairy cows of different breeds belongs to 7 genotypes of bulls were accumulated from the record sheet maintained by field assistants (artificial inseminator) at 33 AI Sub-centers/Points of District AI center, Rajshahi. Thirty-three field assistants (AI) of respective AI Sub-center/Point were brought at District AI center, Rajshahi for the training on productive and reproductive performances records and organized by Assistant Director of District AI center, Rajshahi (Table 1).

A questionnaire was made on dairy cows and detail instruction was given to the trainer and owner of cows. The main instructions were how to fill up the questionnaire for dairy cows. The contents of this questionnaire such as date of AI, bull ID, type of semen used, breed of bull, dam history like genotype of dam, milk production, date of birth, birth weight and management of progeny, age of puberty, age at first fertile service, age at first calving, gestation length, post-partum heat period, days open, wastage days, S/C, milk production/day, peak milk production per day, lactation length, dry period, weaning period, calving interval and management of dairy cows. The questionnaire had two parts, one was for Field assistant (artificial inseminator) and other was for owners of cows. A total of 500 questionnaires were distributed among the 33 field assistant (AI) to recorded the progeny information from the field (Table 1). Field assistants (AI) had collected necessary information from AI and progeny register as

Table 1: No. of dairy cows were recorded in different AI Sub-centres/Points at greater Rajshahi under DAIC, Rajshahi

AI Sub-center/Point	No. of cows	AI Sub-centres/Points	No. of cows
Atria, Naogoan	12	Upazila Sadar, Naogoan	10
Bagatipara, Natore	8	Nakhopara, Bagmara	12
Laxmikul, Bariagram	10	Nawabgong Sadar	10
Bagha, Rajshahi	10	Paba, Rajshahi	5
Bodalgachi, Naogoan	12	Puthia, Rajshahi	14
Bonpara, Natore	9	Raninagar, Nawgoan	8
Charghat, Rajshahi	9	Rohonpur, Nawabgonj	8
Deluabari, Naogoan	7	Satbaria, Puthia	11
Dhanidho, Bariagram	11	Sibgonj, Nawabgonj	16
Gorudashpur, Natore	16	Singra, Natore	6
Lalpur, Natore	12	Tanor, Rajshahi	6
Madhnagar, Natore Sadar	16	Tokia, Natore Sadar	10
Mandha, Naogoan	6	Trimohoni, Nawabgonj	9
Mohadebpur, Nawgoan	6	Valukgachi, Puthia	9
Mohonpur, Rajshahi	6	Volarghat, Nawabgonj	6
Nachawal, Nawabgonj	8	Walia, Lalpur	6
Veterinary Hospita, Nawgoan	5	Total	313

obtained from respective AI Sub-centers/Points and rest of the information were collected from farmers by direct interviewing as per questionnaires. A total of 313 questionnaires for respective cow's information was collected from properly filled up forms or information collected by 33 Field Assistants (AI) of AI Sub-centers/Points of greater Rajshahi district. After collecting the questionnaire, preliminary sorting and checking, data were prepared for analysis.

The dairy cows of dam were classified into 5 genetic groups according to their nature of inheritance such as Group I: Local×Friesian (L×F) cross, Group II: Local×Sahiwal (L×SL) cross, Group III: Local (L), Group IV: Local×Sahiwal×Friesian (L×SL×F) cross and Group V: Local×Sindhi×Sahiwal (L×S×SL) cross.

Feeding and management: Semi-intensive management system was maintained for rearing of dairy cows. This means that the cows are tied up and provide with minimum facilities for exercise. Feeds, both roughage and concentrate, were procured by the farmers and fed while tied up. The house of the animal was made of straw and bamboo and brick. Gunny bags were spread over the ventilation to protect them from rain and cold wind at night during winter season. Every day the floor and the manger were cleaned. The animals were identify by the farmer's name. The animals were attached to the dwelling. Fumigation was always done once a day in the evening by burning dry leaf and straw to control mosquitoes. Dry straw was used as bedding during winter season. The commonly used feed ingredients were rice straw, wheat bran, rice bran, oil cake, rice gruel, rice crust, pulse bran, pulse crust, molasses, flour, common salts and green grass. On an average, ration per dairy cow contained approximately 2.5 kg concentrates, 5.5 kg rice

straw and 15.0 kg green grass with *ad libitum* water. The amount of concentrate was raised to 5.0 kg for high milking of cows. The total amount of concentrate required per day were divided into parts and fed the cows twice daily. Rest of the period, the animal was maintained with rice straw and green grasses.

Insemination and medication: Artificial insemination was done by 33 trained field assistants (AI) with chilled or frozen semen of Friesian, Sahiwal bull or their cross-bred bulls. One FA (AI) was in-charge of each AI Sub-centres/Points for Artificial Insemination (AI) purpose. The farmers regularly de-wormed the cows by specific anthelmintics. All the animals received vaccination against Anthrax, Hemorrhagic septicemia, Black quarter and FMD. The treatment of diseased animal was done both by the Veterinarian and Veterinary technician.

The productive and reproductive performances of dairy cows as given below:

Birth weight: The birth weight of a newborn calf is termed as its birth weight. Birth weight was measured in kilogram (kg). Total number of observation in case of birthing dam was 313.

Age at puberty: The age at which a heifer first shows estrus sign and behavior may be defined as age at puberty. It was measured in month (m) and total number of observation was 313.

Age at first fertile service: It is defined as the age when a heifer first conceives followed by heat. In this study total records for age at fertile service were 313 and it was measured in months (m).

Age at first calving: It is defined as the age when a heifer gives a calf. It is measured in month (s).

Gestation length: It was calculated as interval from conception to parturition. The duration of gestation was expressed in terms of days and total number of observation was 790.

Post-Partum Heat Period (PPHP): It is considered as the interval between date of calving and the date of first insemination. It was calculated in days and total number of observations for these traits was also 790.

Days Open (DO): In this study days open was measured in days. Days open is referred as interval from parturition to conception of cows.

Wastage Days (WD): It is considered as the mean first service to conception interval and it was measured in terms of days.

Number of service per conception: In this study the average number of services or inseminations required for each successful conception in case of heifer and cows were used as reproductive efficiency of heifer or cows.

Milk yield per day: It is the total milk yield in lactation divided by total number of days in that lactation and was measured in liter (L) and observation number was 790.

Peak milk yield per day: The highest amount of milk yields at their subsequent lactation length and was measured in liters (L).

Lactation length: In this study the lactation length was measured in days (d). The number of days from first milking to the end of milking of cows is called lactation length.

Lactation yield: The total quantity (L) of milk produced throughout the lactation was taken as lactation yield and observation was made on 768.

Dry period: In this study the dry period was measured in days. The number of days from end of milking to next parturition of cows is called dry period.

Age at weaning: Age at which a calf leaves their mother or when a calf starts to take green or straw rather than suckling is called age at weaning. It was recorded in months and in all there were 765 records of weaning was collected.

Calving Interval (CI): The number of days between two successive calving of the same cows or the period from one calving to the next was termed as calving interval. In this study calving interval was measured in days.

Design of experiment: Both productive and reproductive traits of cows were used in this study. The collected data covered for five different genetic groups of cows. The number of animals in different AI Sub-centers/Point and groups were unequal.

Statistical procedure: Data were statistically analyzed to calculate the effect of dam genotypes productive and reproductive performance of dairy cow. Various standard statistical procedures had been adopted in this study. The

mean and standard deviation for the traits were calculated using SPSS statistical package. Mean of different traits were then tested by Duncan Multiple Range Test (DMRT) to separate the mean of different natures according to Steel and Torrie (1980).

RESULTS AND DISCUSSION

In total, 313 dairy cows were studied for the consequence of genotypes of dam's which produced from different AI Sub-centers/Point on productive and reproductive traits were investigated in these animals and results and ANOVA are presented in Table 2 and 3. Genotypes dam of cows had significant effect on birth weigh, age at puberty, age at first fertile service, post-partum heat period, days open, wastage days, S/C, milk yield, peak milk yield, lactation length, lactation yield, dry period and calving intervals (Table 2).

Birth weight: This trait was significantly ($p<0.05$) affected by genetic groups of dam (Table 2 and 3). The birth weight of calf was higher in L×F cross-bred dam than those other groups. The mean birth weight of Pabna calves is consistent with finding of Udo *et al.* (1990) and Haque *et al.* (1999) who reported 15.60 and 17.92 kg, respectively. According to Haque *et al.* (1999) the average birth weight of Sahiwal×Pabna and Pabna cows were 21.26±2.89 and 17.92±3.47 kg. This result is consistent with this present study.

Age at puberty: The present study indicated that genotype of dam of cows had significant ($p<0.05$) effect on this trait. These results are partial supported by those of Haque *et al.* (1999) who note that the age at puberty of SL×Pabna (35.10 m), F×Pabna (25.53 m) and Pabna×Pabna (39.23 m) did differ significantly. Khan and Khatun (1998) found no significant difference ($p<0.05$) among SL×Pabna (37.29 m), F×Pabna (33.57 m) and Pabna×Pabna (38.8 m) and this is higher than the present study. This result also supports those of Islam and Bhuiyan (1997) who found significant ($p<0.05$) affect on $^1/_2$SL×$^1/_2$Pabna (38.53 m) and $^3/_4$SL×$^1/_4$th Pabna (31.12 m). Majid *et al.* (1995) reported the age at puberty of SL×F cattle ranging from 606.4 days (20.2 m) to 770.31 days (25.68 month). In the present study, progeny of L×F and L×SL×F dam cows reached early age at puberty than other genetic groups of dam. Dam's milk, milk get from dam, concentrate feed, green grass and health condition whose were get available

Table 2: Effect of dam genotypes on productive and reproductive performances of dairy cows reared rural condition at greater Rajshahi district

Productive and reproductive parameters	Genotypes of dam					
	L×F cross	L×SL cross	L	L×SL×F cross	L×S×SL cross	Overall
Birth weight (kg)	19.3±2.0^a	18.8±2.6^{ab}	18.2±2.3^{bc}	18.0±1.7^c	18.6±2.5^{bc}	18.8±2.3
	n = 117	n = 91	n = 104	n = 47	n = 65	n = 313
Age at puberty (m)	26.8±6.9^{ab}	29.1±6.5^{ab}	29.3±6.4^a	26.2±4.3^b	27.6±3.6^{ab}	27.9±6.3
	n = 117	n = 38	n = 104	n = 26	n = 28	n = 313
Age at first fertile service (m)	28.1±6.6^{ab}	30.1±6.7^{ab}	30.6±6.8^a	27.3±4.7^b	29.2±3.8^{ab}	29.2±6.4
	n = 117	n = 38	n = 104	n = 26	n = 28	n = 313
Age at first calving (m)	37.4±6.9	39.5±6.6	40.4±8.3	37.3±5.2	38.2±4.2	38.7±7.1
	n = 117	n = 38	n = 104	n = 26	n = 28	n = 313
Gestation length (d)	278.2±4.7	279.5±3.8	279.7±5.42	279.6±5.6	278.8±5.02	278.7±5.0
	n = 304	n = 80	n = 270	n = 59	n = 77	n = 790
Post-partum heat period (d)	133±44^{bc}	142±42^{abc}	147±57^a	129±29	144±33^{ab}	139±47
	n = 303	n = 81	n = 270	n = 59^c	n = 77	n = 790
Days open (d)	153±48^b	167±41^a	166±56^{ab}	145±32^c	169±36^a	160±49
	n = 303	n = 80	n = 270	n = 59	n = 77	n = 789
Wastage days (d)	19.8±19^{bc}	26.0±21^a	18.6±23^c	16.2±14^c	25.5±21^{ab}	20.3±21
	n = 303	n = 80	n = 270	n = 59	n = 77	n = 789
Service/conception (S/C)	1.61±0.6^{ab}	1.61±0.61^{ab}	1.63±0.61^{ab}	1.49±0.57^b	1.78±0.60^a	1.62±0.63
	n = 303	n = 83	n = 50	n = 59	n = 77	n = 788
Milk production/day (L)	6.03±1.78^a	5.11±1.06^b	4.62±1.07^c	4.16±0.81^d	4.14±0.85^d	5.13±1.55
	n = 304	n = 82	n = 268	n = 59	n = 77	n = 790
Peak milk production/day (L)	11.63±2.9^a	11.19±2.7^a	9.42±2.4^b	9.1±1.7^b	9.51±2.0^b	10.45±2.81
	n = 304	n = 82	n = 268	n = 59	n = 77	n = 790
Lactation lengths (d)	285±47^{ab}	286±47^{ab}	275±40^b	277±43^b	294±36^a	282±42
	n = 293	n = 76	n = 265	n = 57	n = 77	n = 768
Lactation yield (L)	1715±659^a	1149±409^b	1274±354^c	1150±289^c	1218±250^c	1445±535
	n = 293	n = 76	n = 265	n = 57	n = 77	n = 768
Dry period (d)	141±32^{bc}	144±24^{abc}	153±82^{ab}	134±26^c	157±19^a	146±54
	n = 293	n = 75	n = 258	n = 57	n = 77	n = 759
Weaning period (m)	10.5±1.5	10.62±1.3	10.7±1.6	10.9±1.4	10.54±0.9	10.65±1.5
	n = 292	n = 76	n = 263	n = 57	n = 77	n = 765
Calving intervals (d)	430±49^b	445±40^a	444±57^a	423±32^b	447±37^a	438±49
	n = 302	n = 78	n = 269	n = 59	n = 77	n = 785

Values are mean±SD; n = No. of observation, a, b, c and d values are differ from each others ($p<0.05$); SL = Sahiwal, S = Sindhi, F = Friesian L = Local

Table 3: Analysis of variance for the productive and reproductive performances of dairy cows of different genotypes of dam under rural condition in Bangladesh

Reproductive and productive traits	Sources of variation	df	Sum of square	Mean of square	F-value
Birth weight (kg)	Between dam Genotypes	4	185.019	46.255	9.006**
	Within dam Genotypes	689	3538.719	5.136	
	Total	693	3723.738		
Age at puberty (m)	Between dam Genotypes	4	462.724	115.681	2.919*
	Within dam Genotypes	308	12207.230	39.634	
	Total	312	12669.954		
Age at first service (m)	Between dam Genotypes	4	458.134	114.533	2.794*
	Within dam Genotypes	308	12625.215	40.991	
	Total	312	13083.349		
Age at first calving (m)	Between dam Genotypes	4	557.587	139.397	2.766
	Within dam Genotypes	308	15522.934	50.399	
	Total	312	16080.520		
Gestation length (d)	Between dam Genotypes	4	179.042	44.760	1.781
	Within dam Genotypes	785	19731.257	25.135	
	Total	789	19910.299		
Post-partum heat period (d)	Between dam Genotypes	4	38813.916	9703.479	4.341**
	Within dam Genotypes	785	1754811.918	2235.429	
	Total	789	1793625.834		
Days open (d)	Between dam Genotypes	4	50133.482	12533.370	5.276**
	Within dam Genotypes	784	1862478.764	2375.611	
	Total	788	1912612.246		
Wastage days (d)	Between dam Genotypes	4	6541.039	1635.260	3.639*
	Within dam Genotypes	784	352315.883	449.383	
	Total	788	358856.923		
Service per conception	Between dam Genotypes	4	2.990	0.748	1.900
	Within dam Genotypes	783	308.069	0.393	
	Total	787	311.060		
Milk production per day (L)	Between dam Genotypes	4	448.566	112.141	60.483***
	Within dam Genotypes	785	1455.474	1.854	
	Total	789	1904.040		
Peak milk production/day (L)	Between dam Genotypes	4	915.791	228.948	33.621***
	Within dam Genotypes	785	5345.580	6.810	
	Total	789	6261.371		
Lactation length (d)	Between dam Genotypes	4	27760.124	6940.031	3.831*
	Within dam Genotypes	763	1382056.364	1811.345	
	Total	767	1409816.488		
Lactation yield (L)	Between dam Genotypes	4	37977922.967	9494480.742	39.775***
	Within dam Genotypes	763	182129942.512	238702.415	
	Total	767	220107865.479		
Dry period (d)	Between dam Genotypes	4	40066.128	10016.532	3.467*
	Within dam Genotypes	754	2178406.766	2889.134	
	Total	758	2218472.893		
Weaning period (m)	Between dam Genotypes	4	14.922	3.731	1.644
	Within dam Genotypes	760	1724.963	2.270	
	Total	764	1739.885		
Calving interval (d)	Between dam Genotypes	4	51287.087	12821.772	5.243**
	Within dam Genotypes	780	1907397.848	2445.382	
	Total	784	1958684.935		

*** = $p<0.001$; ** = $p<0.01$; * = $p<0.05$

those progenies age at puberty earlier than those other management. Environmental condition, nutrition, care and management may also affect this trait. Finally, genetic make up is the main factor, which influences this trait remarkable.

Age at first fertile service: Analysis of variance showed that age at first fertile service was significantly affected by genotype of dam (Table 3). In the present study, the overall age at first service was 29.2±6.4 months. Majid *et al.* (1995) observed that the age at first service of Local, 50%L×50%F and 50%SL×50%F was 32.2±50.9, 26.3±22.5 and 25.6±39.9 months, respectively which are close to this present study. Sarder (2001) reported that age at first service was found to be 30.3±7.0 months for the indigenous cows which is close agreement in the present study. Friesian cross progenies showed early age at first fertile service than other genetic groups of dam whereas Rahman *et al.* (1993) reported that average age at first service 47.3±0.5 months. Factors 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). The earlier in heifer if greater Rajshahi district dairy farmer could have been over come by the above-mentioned factor either individually or in combination.

Age at first calving: Analysis of variance showed that age at first calving was significantly affected by genotype of dam (Table 3). Wilson (1985) reported that tropical indigenous cattle normally calved for the first time between the age of 36-42 months. Sarder (2001) also reported that average age at first calving was found 39.7±7.0 months in indigenous cows. The finding of this present study fall within this range. Majid *et al.* (1995) also obtained age at first calving was 42.3 months. There are reports showing that under improve management and heath care and in optimum nutritional status, seasonal stress can be minimized to obtain first calving at about 3.5 years (Oyedipe *et al.*, 1982).

Gestation length: The genotypes of dam had significant influence on the gestation length of dairy cows. Khan and Khatun (1998), Sultana (1995) and Rahman *et al.* (1993) reported that gestation length was not significant in between genetic. Islam and Bhuiyan (1997) who found the gestation length was corresponding figures for 1/2SL×1/2Pabna and 3/4SL×¼th Pabna genetic groups to be 282.35 and 282.94 day, respectively. Khan and Khatun (1998) reported the gestation length of SL×Pabna group to be 285.61 days which differs a little with 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 length of the two genetic groups was 282.75 and 286.20 days, respectively. The effect of sire and dam on gestation length was significant, because it the species characteristic which is fixed genetically and variation may occur due to maternal and fetat and as well as seasonal influenced.

Post-Partum Heat Period (PPHP): The analysis of variance showed that the genotypes of dam have significant effect on these traits. Islam and Bhuiyan (1997) found no significant ($p>0.05$) difference between the genetic groups of 1/2SL×½ Pabna (4.33 month or 121 days) and 3/4SL×1/4 Pabna (4.38 month or 131.4 days) where as Majid *et al.* (1995) found a little variations in PPHP between different genetic groups which was not statistically significant. They reported that PPHP for $^{1}/_{2}$Local×$_{½}$ Friesian cows was 117.24±7.20 days. All these result are in agreement with the present study. The present findings is differ with other reporters may be due to genetic, environmental and magemental factors.

Days open (d): Analysis of variance was done and it shows a significant difference between genotypes of dam (Table 3). The significantly lowest days open in L×F cross-breed (156±51 days) and the highest in L×S×SL cross-bred (175±64 days) of the genetic groups of cow. Sarder *et al.* (1997) reported that calving to conception interval in Holstein-Friesian cross for 148±82, Sahiwal cross for 139±83, Sindhi cross 141±123, Jersey cross for 101±74 and Local for 116±41 days, respectively. The days open was relatively higher in the present investigation, which may be due to breed, sire, dam, nutrition, semen type, lactation length and frequency, poor heat detection and extension of post partum waiting period etc.

Wastage Days (WD): Analysis of variance shows that wastage day had significant between genotypes of dam (Table 3). In the present investigation, the lowest wastage days were required for successful conception in genotype of L×F (18.9 days) than other groups. Wastage days may depend on following factors-semen quality, inseminator skillness, free from reproductive diseases of cows, proper heat detection and management.

Service per conception (S/C): Service per conception in heifer was not significantly affected by either genetic or non-genetic factors. Chaudhury *et al.* (1994) also found services per conception of F1, F2, F3 and F4 belonging to Holstein-Friesian, Sahiwal heifer and Sahiwal as 1.6±0.6, 2.2±1.3, 2.2±1.0, 2.5±1.2 and 1.5±1.0. This trait was not significantly affected by genetic factors. Bhuiyan and Sultana (1994) found that service per conception was 1.68±0.15 for F-L cross-bred which coincides with 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, timing of AI, skillness of the Inseminators and also reproductive soundness of the cows.

Milk yield per day (L): L×F breed of dam was suitable for highest milk yield per day. The significant effect of genetic group on daily milk yield was also found by Khan and Khatun (1998), Bhuiyan and Sultana (1994), Nahar *et al.* (1992) and Rahman *et al.* (1993). Khan and Khatun (1998) observed that daily milk yield was 8.10, 9.74 and 7.35 L for SL×Pabna, F×Pabna and Pabna×Pabna genetic groups, respectively. This result is higher to the present study. The daily milk yield of Pabna cows in this study differs with Ali (1994) who found the average of 2.450 litres per day. In the present finding daily milk yield for L×F, L×SL×F, L×SL, L×S×SL, L×F×S×SL were 5.80±1064, 4.77±1.01, 4.01±0.66, 4.13±.88 and 3.86±0.61 (L), respectively. Islam and Bhuiyan (1997) noted the corresponding yield for the same trait to be 8.37 and 7.49 L in ½ SL×½ Pabna and 3/4SL×1/4 Pabna graded cattle, respectively. Sarder *et al.* (1997) reported that the

average milk yield (L/day) for Holstein-Friesian cross, Sahiwal cross, Sindhi cross, Jersey cross and Local cows was 7.2±2.6, 5.8±2.2, 6.4±2.76, 6.9±2.7 and 4.0±1.5, respectively. The daily milk yield variation possibly occurred due to following factors-genetic, biological phenomenon, hormonal influence, feeding system, quality and quantity of feed, irresponsible care-taker and severe intensive sun light.

Peak milk yield per day (L): Analysis of variance showed that genetic group of dam of cows had a significant effect on peak milk yield (Table 2). Breed, management and environmental factors are major causes for the variation of peak milk yield per day.

Lactation lengths: Genotypes of dam had a significant effect on lactation length (Table 2 and 3). Sultana (1995) also found a highly significant effect of genetic groups on lactation length and she reported that the longest lactation period was in Sahiwal cows (293 days) over eight genetic groups, which was close agreement the present study. In the present investigations the lactation length of L×F cross, L×SL×F cross, L×SL, L×S×SL cross and L×F×S×SL were 283±44, 283±43, 267±42, 276±51 and 291±18 days, respectively. The overall lactation length was 282±42 days. Sultana (1995) also found similar result and she concluded that genotype and year of calving had significant ($p>0.001$) effect on lactation length. Ashraf (1998) reported that overall lactation length was 271.16±43.57 days which closely related to the present study (282±42 days). Breed, managemental and environmental differences are the major causes for the variation of lactation length.

Lactation yield (L): The genetic group wise of dam for lactation yield are given in Table 2. Genotype of dam had significant effect on lactation yield (Table 2 and 3). In present investigation, L×F cross, L×SL×F, L×SL, L×S×SL and L×F×S×SL cross-breds of cows were 1637±319, 1343±364, 1072±268, 1146±319, 1125±192 litres milk, respectively. Nahar *et al.* (1992) also reported lactation yield of 1702.8±44.2 kg in F-L cross breeds which is very close in the present study.

Dry period: The average dry period of dairy cows under village condition at greater Rajshahi district are presented in Table 2. Genotypes of dam had significant effect on dry period. It was observed that the dry period of L×F, L×SL×F, L×SL, L×S×SL and L×F×S×SL cross-bred cows were 142±33, 146±87, 148±19, 168±53, 156±20 days, respectively. Gajbhiye and Dhanda (1987) also found same result the length of dry period ranging 131±11.2 to 162±7.9 days for Gir cattle.

Age at weaning: Age at weaning for L×F cross, L×SL×F, L×SL, L×S×SL and L×F×S×SL crosses were 10.6±1.5, 10.7±1.4, 10.3±1.3, 11.0±1.9 and 10.3±1.0 months, respectively. Dam of cow had no significant effect on age at weaning. A number of factors main influences the age at weaning (Table 3). Management is the main factor, which influences this trait remarkably.

Calving intervals: ANOVA showed significant difference of calving interval among the genetic groups of dam at 5% level of significant (Table 3). Calving interval for L×F, L×SL×F, L×SL, L×S×SL and L×F×S×SL was 434±51, 437±48, 443±28, 454±64 and 447±39 days, respectively. Majid *et al.* (1995) also reported that average calving interval range from 434±51 to 454±64 days. Calving interval is the best economic index of any dairy enterprises, which is ideally expected to be not more than 13 months. Being one of the major component of calving interval, parturition to conception interval, significantly influence the productivity of the dairy cows. In this study the average calving interval was found higher than expected standard. Most of the factors responsible for reducing calving interval are lack of nutrition, season of the service, poor heat detection, environmental determinant, little rainfall, high ambient temperature, suckling and post calving infection on female reproductive traits.

The birth weight of progeny calf, milk production per day, peak milk yield per day were higher in L×F cross-bred dams of cows than those other dam's breed. The shorter post-partum heat period (129±29 days), days open (145±32 days) and average wastage days (16.2±14.9 days) were found in L×SL×F cross-bred dam. Milk yield/day (4.16±0.81 L), peak milk production/day (9.1 L), lactation yield (1150±289 L), dry period (134±26 days) and calving interval 9423±32 days) were found in dam's breed of L×SL×F cross.

It was concluded that L×F and L×SL the genotypes of dam's of cows showed a better performance under rural condition at greater Rajshahi district in Bangladesh and poor performance were recorded in L and L×S×SL genotypes of dam.

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