Progressive Agriculture 29 (2): 168-177, 2018 ISSN: 1017 - 8139

Progressive Agriculture
Journal homepage:http://www.banglajol.info/index.php/PA

Lifetime productivity and repeatability estimation of selected traits of crossbred cows in Savar Dairy Farm

MS Islam[1*], A Akhtar[1], MA Hossain[2], MF Rahman[2], SS Hossain[1]

[1]Department of Animal Breeding and Genetics; [2]Department of Animal Science, Bangladesh Agricultural University, Mymensingh 2202, Bangladesh

Abstract

The study was conducted on 244 crossbred cows of (Central Cattle Breeding and Diry Farm), Savar, Dhaka to evaluate the effect of different productive groups on their lifetime performance of various productive traits using twenty years data. Data were accumulated from a prescribed data sheet maintained by Central Cattle Breeding Station, Savar, Dhaka. Genetic groups for this experiment were Local Friesian (LF), Local Jersey (LJ), Local Hariana X Friesian (LH x F), Local Friesian X Local Friesian (LF x LF) and Local Jersey X Local Jersey (LJ x LJ). The studied parameters were age at puberty, lactation length, lactation yield, total milking days, and total milk yield in lifetime. The data were analyzed using Least-Squares Mixed Model and Maximum Likelihood Computer Program (Harvey, 1990). Analysis showed that genetic groups had a significant effect on age at puberty, lactation length and lactation yield (P<0.01), total milking days and milk yield in lifetime (P<0.001). From the result it was found that earliest age at puberty were in L x F (749.27±99.01). Lactation length and standardized lactation yield were also higher in L x F (258.69±20.04 days and 1408.80±83.60 kg respectively). Total milking days and milk yield were observed higher in (LH x F) with mean of 1468.30±198.58 days and 7340.32±1813.28 kg, respectively. The repeatability estimates of lactation length for genetic groups LF, LJ, LH x F, LF x LF and LJ x LJ were 0.24±0.09, 0.04(-ve), 0.10±0.05, 0.07±0.05 and 0.49±0.22, respectively. The same for lactation yield was 0.17±0.08, 0.27± 0.02, 0.07±0.04, 0.17±0.08 and 0.03±0.05 respectively. From analysis it was revealed that in respect of productive performances the L x F genetic group was found superior compared to other groups but interns of total lifetime productivity, LH x F ranked the highest in the given environment. It is concluded that lifetime productivity needs to be considered as an appropriate guideline for selecting genetic groups for future productivity.

Key words: Crossbred dairy cows, lactation length, lifetime milk production, productive traits, repeatability

***Corresponding Author:** kbd_saiful_islam@yahoo.com

Introduction

Dairy cattle have become established part of the livestock industry with Friesian-Sahiwal crossbreed, imported from Australia and New Zealand with heredity of 62.5% Friesian 37.5% Sahiwal and 50% Friesian 50% Sahiwal, respectively (Boniface et al., 2010). Crossbreeding not only improve milk yield of the indigenous cattle, but it also produces calves of heavier birth weight and animals with potential for faster weight gain and more beef production under the tropical condition (Boneface et al., 2010). Dairying is a biological efficient system that converts large quantities of inedible roughage to milk, the most nutritious food known to man (Hossain et al., 2016). Milk is renowned as an "almost complete" as well as natural nutritious food for all mammals including human being (Debnath *et al*. 2014). It is a more efficient and intensive system in terms of nutrient and protein production for human. Livestock Department's available statistics show that the domestic production of milk and meat are 9.28, and 7.15, million tons in the fiscal year 2017 against the demand of 14.865 and 7.154, million tons in 2016-17 fiscal year, respectively (DLS, 2017). The resistance to diseases and climatic stress exhibited by particular breed are important consideration but only when the major constraints to productivity have been overcome. The genetic potential for milk production is important (Khan, 1999). The reasons behind included the demand for milk and milk products, means of generating ready income for small farmers, efficiency of protein and energy conversion, entry point to stimulate rural development of cooperatives, improvement in the level of human nutrition, quality the life of rural poor and means of intensifying crop-animal systems in small farmers (FAO, 1982). *Bos taurus* types cattle usually fail to produce adequately and often even to survive, in the face of the multiple challenge of climatic stress, new diseases, parasites and nutritional insufficiency. In order to improve production potentials, the breeders have two alternatives, either by introducing high performing *Bos taurus* cattle from the temperate zones or by introducing exotic germplasm to low performing *Bos indicus* stock. During this century innumerable attempts have been made in order to improve milk production potentialities of Zebu cattle through crossbreeding with *Bos taurus* breeds (Peterson, 1981). Scientific cattle breeding program was undertaken by the Lord Linlithgow (British Viceroy for India) since 1935 - 1936 to upgrade small sized Zebu cattle of the undivided Bengal with Hariana bulls (Ali *et al.,* 1998). From that time there were commendable upgrading programs undertaken using various exotic breeds with the same objective to improve the productivity of the Local cattle (Hoque *et al.,* 1999). For ranking best genotypes, it obviously necessitated to determine the length of total productive life of an individual. The productive adaptability (gene environment interaction) to a given environmental condition and the level of fertility mainly influence the length of productive live. So, it is important to evaluate lifetime productivity for ranking suitable genotypes best adapted to our environment. The most ideal lactation length is 305 days. Milk production per lactation will increase until the fourth lactation or at the age of six years old, when the cow calved (first lactation) at the age of two. When the cow reaches the age of eight, milk production tends to drop. Some suggest that the highest milk production per lactation is at the age of seven (Boneface et al., 2010). Improvement of dairy cattle by genetic principle is the single factor for developing cattle population in general. The total phenotypic variance of a trait may be partitioned into two main components: the genetic and the environmental effect. Phenotypic variation refers to the measurable; differences among the individuals within a population for a particular trait (Lasley, 1978). Causes of phenotypic variation in farm animals are the heredity, environment and the joint effect between heredity and environment. The term "repeatability" introduced by (Lush, 1945) is to signify correlation among repeated expressions of a given trait for the same individual. Repeatability may be regarded as the fraction of the variance that is attributable to permanent differences between individuals and useful for those traits which are expressed several times during an animal's lifetime (Mahadevan, 1958). The amount of progress that could be made in selection is partially limited by the repeatability because it gives the upper limits of heritability. When length of productive life and repeatability of relevant traits are known, a prediction could be made on the productivity of herd individual at the early stage of production. This could have a significant bearing on the choosing of best genotype (s) for a particular trait in a given environment. Production performance of the crossbred cattle was evaluated in different times by many investigators (Islam, *et al.,* 1997) in part; but their lifetime productivity has not yet been worked out in spite of its eminent necessity in making future breeding plan. Such experiments have not been undertaken in this country to a large extent or have been done very little. Considering above facts the study was undertaken to find out superior animals suitable for future use of lifetime productivity, lifetime potential in different genetic groups and to estimate repeatability in some traits of dairy cattle of Bangladesh.

Materials and Methods

Data pertinent to this research work were collected from the prescribed data sheet as maintained at Central Cattle Breeding Station (CCBS), Savar, Dhaka. Records on a total of 244 cows were picked up and the cows were maintained on usual ration and identical management in the farm of years 20 (Table 1). The animals under study constituted five crossbred genetic groups such as Local x Friesian =L x F, Local x Jersey= (L x J), (Local x Hariana) x Friesian (L x H) x F), [(Local x Friesian) x (Local x Friesian) (L x F) x (L x F)] and (Local x Jersey) x (Local x Jersey) (LJ x LJ). The cows from each genetic group with reasonably sufficiently long productive life were considered rationally in this study. Milking animals at CCBS were usually culled when they are no longer able to produce calves because of senility. Therefore, length of productive lives of the cows in this study was supposed to be "Lifetime production" for each individual. This data collection and analytical procedure considered as materials and methods for this research work. Traits Considered for present study were age at puberty (AAP), lactation of length (LL), lactation yield (LY), total milking days in lifetime (TMDL) and total milk yield in lifetime (TMYL) and repeatability were Lactation length and Lactation yield.

Statistical Analysis: Data were analyzed using Least-Squares Mixed Model and Maximum Likelihood Computer Program (Harvey, 1990). Analysis of variance (ANOVA) one-way is used to interpret the data. ANOVA test is used to compare the data for age at puberty; lactation length, lactation yield, total milk yield in lifetime, number of lactations completed in lifetime and number of milk days in lifetime. The level of significant is $P < 0.05$. This analysis is done by using SPSS version 13.0 for Windows program software.

Table 1. Number of observations on different traits in different genetic groups

Trait	Genetic group					Total
	L x F	L x J	LH x F	LF x LF	LJ x LJ	
Age at puberty	54	36	59	52	43	244
Lactation length	233	87	282	176	99	877
Lactation yield	233	87	282	176	99	877
Total milking days in lifetime	54	36	59	52	43	244
Total milk yield in lifetime	54	36	59	52	43	244
Repeatability						
Lactation length	232	76	279	173	81	841
Lactation yield	232	76	279	173	81	841

L x F = Local x Friesian; L x J = Local x Jersey; LH x F = (Local x Hariana) x Friesian; LF x LF = (Local x Frirsian) x (Local x Friesian); LJ x LJ = (Local x Jersey) x (Local x Jersey).

Results and Discussion

***Age at puberty*:** Puberty is influenced by age, weight and breed. It reveals that age at puberty (days) followed the order (1011.78±102.47)> (967.89±104.39)> 953.61±101.36)> (878.09±97.66)> (794.27±99.01) for genetic groups (LxF) x (LxF), (LxJ) x (LxJ), (LxH) x F, LxJ and LxF (Table 2). The present study showed that genetic group significantly (P<0.05) affected age at puberty (Table 3). A study agrees with the present findings (Hoque *et al.* 1999), the 5 genetic groups were Sahiwal (SL), Friesian (F), Local (L), $^1/_2$ L x $^1/2$ F and $^1/_2$ SL x $^1/2$ F and the respective age at first service was 1124.25±26.43, 659.33±34.01, 977.86±50.9, 790.49±22.59 and 770.31±39.39 days. Wangdi et al., ((2014) reported that age at puberty in different dairy cattle and their crossbreds in Bhutan to be 25.3 months which was agreed with the genetic group 1 of present findings. Estimates of age at puberty in *Bos indicus* cattle in the tropics and subtropics range between 480 and 1200 days (Boyles, 2007). *Bos indicus* cattle reach puberty later than *Bos taurus* x *Bos indicus* crossbreds or purebred taurine cattle (Boyles, 2007). This is due to genetic and environmental factors, including nutrition, disease, temperature and season of birth.

***Lactation Length*:** From Table 2 lactation length was shortest in genetic group (LJ x LJ) (93.26±22.38 days) and longest was in genetic group (L x F) (258.69±20.04days) while it was 188.26±22.94, 236.41 ±18.49, and 222.85±20.68 days for other genetic groups like (L x J), (LH x F) and (LF x LF) respectively whereas the overall mean for lactation length was 199.90±18.75 days. Lactation length is directly associated with lactation yield which influence the lifetime milk yield. The least square mean with standard error for lactation length in different genetic groups and parities were shown in Table 4. A standard lactation length of 305 days is generally considered as optimum for dairy cows. The mean for cow milked per lactation is 278 days of length and the mean for total milk yield per lactation is 2489 liters (Boneface et al., (2010). Wangdi et al., (2014) found 303 days of lactation length of dairy cattle and their crossbreds in Bhutan. The LSANOVA reveals that genetic group significantly (P<0.05) affected lactation length. The highest lactation length (259 days) was observed in genetic group (L x F) and lowest (93 days) was observed in genetic group (LJ x LJ). Similar results were reported by Hoque *et al.* (1999) and Sharma *et al.* (1996). According to Sultana (1995) in 7 genetic groups of cows in CCBS, Savar, Dhaka lactation length was highest (293 days) for Sahiwal and lowest (241 days) for local. Phangchung and Roden (1996) estimated that mean lactation length was 284, 288 and 308 days for Siri, Jatsham, and Yangkum, respectively. From the above discussion it is clear that incorporation of exotic (Friesian, Jersey) blood had a significant effect on lactation length. Least Significant Difference (LSD) test reveals that genetic group (L x F), (L x J) and (LJ x LJ) differ significantly (P<0.05) with each other; while genetic group (LH x F) and (LJ x LJ) did not differ significantly (P>0.05).

***Standardized Lactation Yield (SLY)*:** The standardized lactation yield was also observed highest (1408.80±83.60 kg) in genetic group (L x F) and lowest (874.13±93.37 kg) in genetic group (LJ x LJ). Mean of the trait in genetic group (L x J), (LH x F) and (LF x LF) was 1141.54±95.68, 1251.63±77.13 and 1092.16±86.25 kg respectively. The mean for cow milked per lactation is 278 days of length and the mean for total milk yield per lactation is 2489 liters (Boniface et al., 2010). The cows were milked over variable period of time and it was difficult to rank them in a standard scale. Therefore, actual individual lactation yield was converted linearly into 305-day lactation yield. Boneface et al., (2010) found highest milk yield of Shahiwal and Friesian was 4535 and 12350 liters respectively. The Least-Squares means with standard errors for standardized lactation yield are shown in Table 5. It showed that standardized lactation yield (kg) followed the chain of order as genetic group (L x F) (1408.80) > (LH x F) (1251.63) > (L x J) (1141.54) > (LJ *x* LJ) (1047.16) > (LF *x* LF) (874.13). Least-Squares analysis of variance reveals that genetic group had significant (P<0.05) effect on SLY. Sharma *et al.* (1996) found SLY in Holstein x Hariana cows as 1500.37 kg. Syed *et al.* (1996) reported highest (2289 kg) in crossbred's cow milk yield in 305-day lactation in Sahiwal and their grades; while cows with 50 or 75 percent Holstein inheritance had a significantly higher (P<0.05) milk yield per day of productive life than pure Sahiwal.

Table 2. Effect of different genetic groups on important productive traits of dairy cows

Traits	Genetic group				
	L x F	**L x J**	**LH x F**	**LF x LF**	**LJ x LJ**
Age at puberty (day)	794.27^{b}±99.01	878.09^{b}±97.66	953.61^{a}±101.36	1011.78^{a}±102.47	967.89^{a}±104.39
Lactation length (days)	258.69^{a}±20.04	188.26^{b}± 22.94	236.41^{ab}±18.49	222.85 ^{ab}±20.68	93.26^{c}±22.38
Standardized Lactation yield (kg)	1408.80^{a}±83.60	1141.54^{b}±95.68	1251.63^{b}±77.13	1097.16^{c}±86.25	874.13^{d}±93.37
Total milk days in lifetime (days)	1427.97^{a}±193.98	643.27^{c}±191.33	1468.30^{a}±198.58	1001.43^{b}±200.74	404.56^{c}±204.51
Total milk yield in lifetime (kg)	7152.90^{a}±1717.29	2363.70^{c}±1747.15	7340.32^{a}±1813.28	4988.12^{b}±1833.05	946.59^{c}±867.43

Means with same letter in the same row for each trait are not significantly different (P>0.05); L x F = Local x Friesian; L x J = Local x Jersey; LH x F = (Local x Hariana) x Friesian; LF x LF = (Local x Frirsian) x (Local x Friesian); LJ x LJ = (Local x Jersey) x (Local x Jersey).

It goes with saying that increasing exotic (Friesian, Jersey, and Brown Swiss) blood inheritance in the natives simultaneously increases standardized lactation yield.

Table 3. Level of significance of various traits in contrast to genetic groups

Trait	**Genetic group**	**Group x parity**
Age at puberty	**	-
Lactation length	**	NS
Standardized lactation yield	**	NS
Total milk days in lifetime	***	-
Total milk yield in lifetime	***	-

*** P<0.001 ** P<0.01 * P<0.05 NS = Non-significant (P>0.05)

Table 6 represents the LSM along with their standard errors for total milking days in lifetime. It reveals that total milking days in lifetime was highest (1468.30 days) in genetic group (LH x F) followed by genetic group (L x F) (1427.97 days), (LF x LF) (1001.43 days), (L x J) (643.27 days) and (LF x LF) (404.56 days). In the present study genetic group had significant (P<0.05) effect on total milking days in lifetime. Pundir and Raheja (1997) reported 1198 lactation records of 352 Sahiwal cows and 1819 lactation records of 469 Hariana cows saying that total milk days in lifetime were 1771±101.4 and 4192±123.7 days respectively. Lopez-Villalobos et al., (2005) found of 3074 kg total milk yield in 256 milking days of crossbred grazing dairy cattle This result was higher to the present study.

***Total Milking Days in Lifetime*:** Total milking days in lifetime was observed highest

(1468.30±198.58) in genetic group (LH x F) and lowest (404.56±204.51) in genetic group (LJ x LJ) and other value in descending order were 1427.97± 193.98, 1001.43±200.74 and 643.27±191.33 for genetic group (L x F), (LF x LF) and (L x J), respectively (Table 2). Both genetic and non-genetic factors influenced the total milking days in lifetime of a cow. Total milking days in lifetime are positively correlated with herd life and lifetime milk production (Pundir and Raheja, 1997).

Table 4. Least squares mean with standard errors for lactation length (LL) in different genetic groups and parities of dairy cow

Parity	Genetic group					Overall mean
	L x F	**L x J**	**LH x F**	**LF x LF**	**LJ x LJ**	
P1	344.92± 30.09	235.00±79.61	351.21± 23.47	327.75± 56.29	393.00± 79.61	330.37±26.30
P2	294.93± 29.06	303.00± 79.61	317.13± 23.47	196.25± 56.29	454.50± 79.61	13.16±26.26
P3	299.42± 30.09	351.00± 79.60	342.86± 3.47	274.25± 56.29	206.50± 79.61	294.80±26.30
P4	320.57± 30.09	202.00± 79.61	311.91± 23.47	263.50± 56.29	371.50± 79.61	293.89± 26.30
P5	277.92± 30.09	298.50± 79.61	301.60± 23.47	381.00± 56.29	348.50± 79.61	321.50±26.30
P6	258.78± 30.09	273.50± 79.61	266.04± 23.47	321.25± 56.29	295.50± 79.61	275.01±26.30

P_1= 1st parity, P_2= 2nd parity, P_3= 3rd parity, P_4= 4th parity, P_5= 5th parity and P_6= 6th parity; L x F = Local x Friesian; L x J = Local x Jersey; LH x F = (Local x Hariana) x Friesian; LF x LF = (Local x Frirsian) x (Local x Friesian); LJ x LJ = (Local x Jersey) x (Local x Jersey).

Table 5. Least squares mean with standard errors for standardized lactation yield (SLY) in different genetic groups and parities of dairy cows

Parity	Genetic group					Overall mean
	L x F	**L x J**	**LH x F**	**LF x LF**	**LJ x LJ**	
P_1	1377.88±141.04	1294.10±373.16	1298.74±110.04	1227.40±263.86	1172.40±373.16	1274.10±123.31
P2	1461.68±136.26	1662.45±373.16	1669.19±110.04	1452.27±263.86	1083.55±373.16	1465.83±123.09
P_3	1723.60±141.04	1559.45± 373.16	1720.76±110.04	1584.12±263.86	722.45± 373.16	1462.08±123.31
P_4	1855.32±141.04	769.10±373.16	1804.30±110.04	1728.27±263.86	1525.05±373.16	1536.41±123.31
P_5	1692.75±141.04	1404.30±373.16	1749.58±110.04	1468.30±263.86	1789.70±373.16	1620.92±123.31
P_6	1365.37±141.04	1337.00±373.16	1462.44±110.04	1433.35±263.86	1842.65±373.16	1488.16±123.31

P_1= 1st parity, P_2= 2nd parity, P_3= 3rd parity, P_4= 4th parity, P_5= 5th parity and P_6= 6th parity; L x F = Local x Friesian; L x J = Local x Jersey; LH x F = (Local x Hariana) x Friesian; LF x LF = (Local x Frirsian) x (Local x Friesian); LJ x LJ = (Local x Jersey) x (Local x Jersey).

It reveals that total milk days in lifetime was highest (1468.30 days) in genetic group (LH x F) followed by genetic group (L x F) (1427.97 days), (LF x LF) (1001.43 days), (L x J) (643.27 days) and (LF x LF) (404.56 days) in order. In the present study genetic group had significant ($P<0.05$) effect on total milking days in lifetime. Pundir and Raheja (1997) reported 1198 lactation records of 352

Sahiwal cows and 1819 lactation records of 469 Hariana cows saying that total milking days in lifetime were 1771±101.4 and 4192±123.7 days respectively. Litwinyczuk et al., (2016) showed that total milking days were 1132 which agreed with 1001±200.74 genetic group (L x F) x (L x F) of the present study.

Table 6. Repeatability estimates of important productive traits of different genetic groups of dairy cows

Trait	Genetic group				
	L x F	**L x J**	**LH x F**	**LF x LF**	**LJ x LJ**
Lactation length	0.24 ± 0.09	0.04 (-ve)	0.10 ± 0.05	0.07 ± 0.05	0.49 ± 0.22
Lactation yield	0.17 ± 0.08	0.27 ± 0.02	0.07 ± 0.04	0.17 ± 0.08	0.03 ± 0.05

L x F = Local x Friesian; L x J = Local x Jersey; LH x F = (Local x Hariana) x Friesian; LF x LF = (Local x Frirsian) x (Local x Friesian); LJ x LJ = (Local x Jersey) x (Local x Jersey).

***Lifetime Milk Production*:** Lifetime milk production of a cow depends on number of lactations, lactation length and daily milk yield in different lactations and it reflects how economical a cow would be in terms of cost of maintenance and returns from milk production during its lifespan (Bhattacharyya and Gandhi, 1998). Total milk yield in lifetime was also observed lowest (946.59±867.43kg) in genetic group (LJ x LJ) and highest (7340.32±1813.28 kg) in genetic group (LH x F) and the remaining lifetime yields in genetic groups were 7152.90±1717.29, 4988.12±1833.05 and 2363.70± 1747.15 kg for genetic group (L x F), (LF x LF) and (L x J), respectively. Standard errors for Lifetime milk production. It represents that Lifetime milk production (kg) followed in order the genetic group (LH x F) (7340.32) > (L x F) (7152.90) > (LF x LF) (4988.12) > (L x J) (2363.70)> (LJ x LJ) (946.59). Goshu (2005) reported that lifetime milk yield was 12749 kg of Friesian-Boran crossbred cows of Ethiopia. These findings were higher than the present study. The Least Squares analysis of variance (LSANOVA) showed that genetic group had significant (P>0.05) effect on lifetime milk production. The present result agreed with the results of Raheja (1997). The lifetime milk yield per day of herd life were 3.71±0.13 for Austalian origin and 2.59±0.0 9 kg in Denmark origin Jersey reported by Thiruvenkadan (2012) in Tamilnadu. Litwinyczuk et al., (2016) showed the length of life, productive life total milk yield were 2080, 1277 and 1132 days, respectively. The highest lifetime milk yield for cows over 30kg at the peak of lactation, ranging from 25717kg to 27627 kg. Raheja (1997) observed lifetime milk production of Friesian x Sahiwal (FS) and Friesian x Hariana (FH) F_1 was 20453±318 and 5637±403 kg respectively and in general FS F, cows were superior to FH cows. Lifetime productivity can be improved by placing efficient reproduction, feeding and health management at the farm (Goshu, 2005).

***Repeatability*:** The causes of variation in milk yield and other characters of economic importance in dairy cattle are partitioned into two main components- genetic cause and environments. Repeatability of lactation length in this study was 0.24, -0.04, 0.01, 0.07 and 0.49 for (L x F), (L x J), (LH x F), (LF x LF) and (LJ x LJ) crossbreds, respectively (Table 6). Similar results were reported by Souza *et al.* (1995). Souza *et al.* (1995) observed in addition the repeatability of lactation length as 0.18 and 0.22 for purebreds and crossbreds respectively. Singh *et al.* (1994) found repeatability of lactation length in Jersey cows to be 0.05. The repeatability estimates of lactation yield were 0.17±0.09 for (L x F) crossbred, 0.27±0.02 for (L x J), 0.07±0.04 for (LH x F), 0.17±0.08 for (LF x LF) and 0.03±0.05

for (LJ x LJ) crossbred. Roman et al., (2000) found of repeatability of milk yield of Jersey cattle were ranged from 0.20 - 0.35. Jalbani (1999) found of repeatability of lactation length and milk yield were 0.140±0.047 and 0.396±0.051, respectively. Atay *et al.* (1997) observed repeatability of lactation yields as 0.25 to 0.33. Souza *et al.* (1995) calculated repeatability of lactation yield was 0.31 to 0.38 for crossbred cattle. Singh *et al.* (1994) reported that repeatability of lactation yield in Jersey cattle as 0.27. Most of the value of repeatability calculated in the present study was low and, in some cases, it was even negative. Low repeatability estimation indicates that traits are mostly influenced by environment and management practices rather than genotype and permanent environmental influences.

Conclusions

From the compilation and analysis of data on various parameters, it is revealed that productive performances the L x F genetic group was found superior compared to other groups. But in terms of total lifetime productivity, LH x F ranked the highest given environment. It is concluded that lifetime productivity needs to be considered as an appropriate guideline for selecting genetic groups for the future productivity.

Acknowledgement

Continuous cooperation and assistance of the Central Cattle Breeding Station (CCBS), Savar, Dhaka and Department of Animal Breeding and Genetics (BAU), Mymensingh are highly appreciated.

References

Ali SZ, Islam ABMM, Amin MR, Hoque HA (1998). Cattle Breeding: Bangladesh perspective. First National Workshop Organizing Committee, Bangladesh Agricultural University, Mymensingh.

Atay OSM, Yener BG, Kaygisis A (1997). Estimation of genetic and phenotypic parameters for milk production traits of Holstein at the Ankara Atarak Forestry Farm. Animal Breeding Abstracts, 65 (9): 663.

Boyles S (2007). The cattle site, Heifer development: Puberty, OSU Extension Beef Team.

Bhattacharya S, Gandh H (1998). Improving milk production by crossbred dairy cattle at Haringhata. Paper presented at Seminar on Animal Breeding, Calcutta, 11 December.

Boneface B, Silip JJ, Hamid A, Ahmad AH (2010). Dairy cattle management: survey on dairy cattle lactation trend in Sabah University Malaysia Sabah, University Malaysia Sabah, University Malayasia Sabah online at http://mpra.ub.uni. muenchen.de/23781/MPRA Paper No. 23781 posted 23 August, 2010 02:22 UTC.

DLS (2017). Department of Livestock Services. GOB, Dhaka, Bangladesh.

Debnath GK, Kober AK, Chanda GC, Chanda T, Barious A (2014). Comparative study on Quality of available brand and non brand fluid milk consumed by people Chittagong city of Bangladesh. International Journal of Natural Sciences, 4(1): 16-20.

FAO (Food and Agriculture Organization of the United Nations) 1982. Production Year Books. Rome, Italy.

Ghoshu G (2005). Breeding efficiency, lifetime lactation and calving performance of Friesian-Boran crossbred cows at Cheffa farm, Ethiopia. Livestock research for Rural Development, 17(7).

Hoque MA, Amin MR, Hussen MS (1999). Dairy potential of Patina cows and crossbreds with Sahiwal and Friesian and within - and between breed sire effects. Asian Australian Journal of Animal Sciences, 12 (2): 161-164.

Hossain MA, Hashem MA, khan MAS (2016). A basic study on production performance of local cows under a typical village condition of Mymensingh District. Journal of Environmental Science and

Natural Resources, 9(2): 115-120.

Harvey WR (1990). Mixed Model Least-squares and maximum likelihood computer program, PS-2 version, Mimeograph Ohio State University, Ohio, USA.

Lopez-villalobos. Spelman NRJ, Harris BL, Stanley G, Harcourt S (2005). Estimation of lactation persistency in crossbred grazing dairy cattle. Proceedings of the New Zealand Society of Animal Production, 2005, vol. 65.

Islam MJU, Shamsuddin M, Bhuiyan MMU, Rahman MA (1997). Individual cow as determinant of the fertility and productivity in mini dairy farms. Bangladesh Veterinary Journal, 3 (34): 91-98.

Jalbani AH (1999). Repeatability estimates of calving interval, lactation length and milk yield in a herd Bhagnari cattle. http://www.parc.gov.pk/NaRC/narc.html.

Khan MAS (1999). Effect of urea molasses multi nutrient blocks on the performance of indigenous cows under the zero grazing village condition of Bangladesh. VI International Rangeland Congress Townsville, Queensland, Australia, 19-23 July,

Litwinyczuk Z, Zolkiewski P, Chabuz W, Jankowski, P. 2016. Length of life and milk production efficiency in cows with varying lactation persistency. Ann. Animal Science, 16(3): 851-862.

Lasley, J. F. 1978. Genetics of Livestock Improvement, Prentice - Hall Inc. Englewood Cliffs, New Jersey. 07632. p. 145.

Lush JF (1945). Animal Breeding Plan. The Iowa State College Press, Ames, Iowa. p. 172-179

Mahadevan P (1958). Dairy cattle breeding in the tropics. Commonwealth Agricultural Bureaux Farnham Royal, Bucks, England. pp.47.

Peterson PS (1981). Problem and prospects of dairy cattle breeding in Bangladesh. Proceedings of the workshop on Livestock development in Bangladesh, 16-19 July, 58-65.

Phangchung and Roden (1996). Chracterization of the Siri breeds and the Mithun Siri in Bhutan, Animal Genetics Resource Information (AGRI), 20: 27-34.

Pundir RK, Raheja KL (1997). Genetic parameters estimation for first lactation and lifetime traits in Sahiwal and Hariana using multitrait Maximum Likelihood. Indian Journal of Dairy Science, 50 (5): 359366.

Raheja KL (1997). Factors affecting first lactation of lifetime production traits in Sahiwal and Hariana half breds. Indian Journal of Dairy Science, 50 (2): 152-155.

Roman RM, Wilcox CJ, Martin FG (2000). Estimates of repeatability and heritability of productive and reproductive traits in a herd of Jersey cattle. Genetics and Molecular Biology, 23(1), Sao Paulo Mar. 2000.

Sharma RC, Arora VK, Singh BP (1996). Effect of peak yield on the rate of decline of milk yield in crossbred cows. Indian Veterinary Journal, 73 (9): 1006-1007.

Singh S, Katoch S, Manuja NK, Thakur YP, Gupta K (1994). Repeatability of some reproductive and production traits in Jersey cattle. Indian Veterinary Journal, 71 (2): 137-138.

Sultana R (1995). Quantitative analysis of reproductive performance of purebred and their crosses in the Savar Dairy Farm. M. Sc. Thesis Department of Animal Breeding and Genetics, BAU, Mymensingh.

Souza EMDE, Milagres JC, Martinez ML, Regazzi AJ and Silva MDEAE (1995). Effects of genetic and environmental factors on lactation length in Gir dairy herds. Zootecnia, 24 (1): 150-162.

Syed M, Rehman A, Farooq M, Ali M (1996). Productive performance of Sahiwal and various grades of crossbred cattle. Sarhad Journal of Agriculture, 12 (6): 601-610.

Thiruvenkadan Ak (2012). Lifetime performance of importedand farm breeds Jersey cows under tropical environmental conditions of Tamilnadu.

Indian Veterinary Journal, 89(9): 39-42.
Wangdi JM, Bhujel P, Karma, Wangchuk (2014). Productive and reproductive performance of dairy cattle and their crossbreds in Bhutan. Livestock Research for Rural Development 26(10). 2014.