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ARTIFICIAL INSEMINATION PRACTICES AND FACTORS AFFECTING CONCEPTION RATE OF DAIRY COWS IN THE COMMERCIAL DAIRY FARMS

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Abstract: The study was conducted for a year at Chittagong Metropolitan Areas of Bangladesh to evaluate the artificial insemination scenarios and to determine the factors affecting conception rate. A total of 585 dairy cows of 4 genotypes (Holstein-Friesian, HF(0.5) × Local, L(0.5); HF(0.75) × L(0.25); HF(0.5) × Sahiwal, SL(0.5); and HF(0.5) × SL(0.25) × L(0.25) in 15 different dairy farms under different types (A, B and C) of commercial farming were studied. The cows were within 2 to 10 years old and they were inseminated artificially using the semen from district artificial insemination (AI) centre. The overall feeding and management of the cows was different because of different category of dairy farm. The sources of semen of were 97% to 100% from Department of Livestock Services (DLS) and 3% from Bangladesh Rural Advancement Committee (BRAC). The semen of five genotypes was evaluated in different stages: at AI centre and inseminator level. The sperm motility of the semen sample was good to excellent. There being 1316 to 1335 million sperms per ml of semen, 87 to 89% live sperm and 86 to 93% normal sperm cells were observed from the semen samples. And there was no significant differences found between genotypes for this sperm quality. The HF×SL×L genotype produced highest average daily milk (17.23±1.06 liter/day) in summer season in A type farm than other genotype. The HF (0.75) ×L (0.25) genotype was superior for calving interval, postpartum heat period and service per conception than other genotype. The conception rate of different genotype was ranging from 59.13 to 63.65%. The highest conception rate was found in summer and winter season in B type farm and lowest was observed in rainy season. It was found that the conception rate of the cows was dependents on semen quality, semen preservation, time of insemination, breed differences and also seasons.

Keywords: Semen sample, genotypes, semen quality, milk yield and conception rate.

Introduction

Currently artificial insemination (AI) is expanding quickly and it covers about 35 to 40% cows in Bangladesh. For improving the production potential and genetic merit of the

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nondescript indigenous cows, superior germ plasms have been introduced all over the country through AI (Sarder *et al.,* 2001). There are many factors that may affect the effectiveness of AI in field condition. Out of them semen characteristics are the major factors that influence conception rate in cattle. In Bangladesh the conception rate is 45.33% and 57.33% in cattle (Das *et at.,* 2002). The average conception rate of local non-descriptive and crossbred with Friesian, Sahiwal breed were 42.5% and 45.2% to 53.1%, respectively (Samsuddin *et al.,* 1997). The low conception rate and other fertility indices after AI can be affected by health status of the bull, semen collection, preservation, and transportation procedure and processing of semen during AI gun loading, proper heat detection and AI at correct time, insemination in friendly uterine environment and keeping the AI record. Capacity of AI technician and insemination technique is also plays a major role for poor fertility indices (Samsuddin *et al.,* 1997). Furthermore the parity, breed and age of cows inseminated also affect the conception rate after AI (Ferdousi and Khan, 2013). The decline in fertility can be explained by management changes within the dairy industry and also negative genetic correlation between milk production and reproduction (Lucy, 2007).

The number of dairy farms increased from 2490 in the year 1990–91 to 29 600 by the year 1997– 98 (DLS, 2000). Milk production increased from 1.78 million metric tons in 2001-2002 to 3.46 million metric tons in 2011-12 (DLS-2012). The farms situated in Chittagong Metropolitan Area (CMA) is suffering from variety of problems associated with management, production, reproduction and marketing of their products. These farms are varied in the breed composition, production performances (Das et al., 2011), management and feeding practices (Khan and Mazumder, 2011) record keeping and breeding practices. Few other works on productive and reproductive performances, breeding values estimation and recording system of dairy cows at Chittagong were carried out by Das *et al*.(2012), Khan and Mazumder (2011), Ghosh and Khan (2014). Almost all of these works did not cover the reproductive efficiencies and artificial insemination practices.

Therefore, the current study was aimed to evaluate the AI service scenarios along with the conception rate of different dairy cows under commercial farming at CMA and the factors those are responsible for the success AI program.

Materials and Methods

The study was conducted for a period of one year from July, 2012 to June, 2013 at Chittagong Metropolitan Area and all laboratory analyses were performed at Animal

Biotechnology Laboratory at Chittagong Veterinary and Animal Sciences University, Bangladesh.

A total of 585 dairy cows of 4 genotype (Holstein-Friesian, HF(0.5)×Local, L(0.5); HF(0.75)×L(0.25); HF(0.5)×Sahiwal, SL(0.5); and HF(0.5)×SL(0.25) ×L(0.25) in 15 different types (A, B and C) of commercial dairy farms were studied. The cows were within 2 to 10 years old and they were inseminated artificially using the semen from district AI centre of 5 genotypes. At first baseline survey was conducted on15 dairy farms. In the survey, information on the farm, AI technician, semen used, management practices, cow inseminated and AI related services were recorded on the day of AI. All data was collected through a structured questionnaire. Factors related with cows, farm management and semen quality are also considered during data collection.

Three types of farm were selected for this study these are A type farm, B type farm and C type farm. According to DLS, A, B, C type farm consists of more than 50 cows, 31 to 50 cows and less than 30 cows respectively. Data was analyzed by using the statistical analytical software (SAS) (SAS, 2008). The following statistical model was used to estimate the mean with standard error of all the parameters. The model is given as:

$Y_{ijkl} = \mu + F_i + B_j + S_k + e_{ijkl}$

Where, Y_{ijkl} is the parameters value;

F_i is the effect of farm type;

B_j effect of breed groups/genotype;

S_k effect of seasons; and

e_{ijkl} is the random error distributed as $N(0, \sigma^2)$.

The mean differences were compared using least significant difference (LSD) (Steel *et al.,* 1997) at 5% level of significance.

Results and discussion

Artificial insemination scenario of different dairy farms

About 97% of semen from DLS and 3% semen from BRAC were used by A type farm and 100% of semen from DLS was used by B type and C type farms, respectively. The cost of AI straw of DLS is lower than BRAC straw. Therefore, farmers of CMA used AI straw of DLS rather than other sources. There were no use of natural insemination or own source semen in any studied farm.

Farm dynamics

There were four genotypes of cows are found in different studied farms in CMA. The genotype, Holstein-Friesian (HF) × Local (L) was found to be highest in type A (65.53%), type B (63.07%) and type C (69.05%) farm, respectively (Table 1). However, the genotype Holstein-Friesian(0.50 HF) × Sahiwal (0.25 SL) × Local (0.25 L) was found in lower number at type A farm (6.46%) and genotype HF (0.75) × L (0.25) in type B farm (6.25%) and type C farm (8.33%), respectively (Table 1).

Table 1: Farm dynamics under the studied area

Farm type	Genotype of cows				Total
	HF (0.5) ×L(0.5)	HF (0.75) ×L(0.25)	HF (0.5) ×SL(0.5)	HF (0.5)×SL(0.25)×L(0.25)	
A (>50 cows)	213 (65.53%)	59 (18.15%)	32 (9.85%)	21 (6.46%)	325
B (31 to 50 Cows)	111 (63.07%)	11 (6.25%)	19 (10.79%)	35 (19.89%)	176
C (<30 cows)	58 (69.05%)	7 (8.33%)	11 (13.09%)	8 (9.52%)	84

Productive and reproductive traits of different dairy cows based on farm type, genotype and season

Average Milk Yield (L/day)

Milk yield of cows of different genotypes from different dairy farms at CMA is presented in Table2. The average daily milk yield was ranging from 7.00 to 17.23±1.06 liter/day in all four genotype cows in different farm type at Chittagong region. The HF (0.5)×SL(0.25)×L(0.25) produced highest daily average milk yield (17.23±1.06 liter/day) in summer season at A type farm (Table 2) and the HF (0.5) × SL (0.5)produced lowest daily average milk yield (7.00 liter/day) in summer season at C type farm (Table 2). In the current study, the daily average milk yield are higher than the Das et al. (2009) who found that average milk yield of HF×SL×L was 6.58±0.59liter/day. The results were differed from the Islam *et al.* (1999), Amin and Nahar (2007), Miazi *et al.* (2007) who found that average milk yield of crossbred dairy cows was 6.2±0.31, 4.2±0.50 and 5.8±0.36 liter/day, respectively. In this study, higher production of milk yield in summer season might be due to different of genotypes, management, and the number of cows reared by the dairy farms in CMA. This current result indicated that crossbred dairy cows are good adapted and produced more milk in the farming conditions. Storage of feed and the interaction of poor health, housing and management system in different dairy farms could be the reasons for lower milk production.

Calving Interval (days)

Average calving interval (CI) for different dairy cows is presented in Table 2. The results revealed that the calving interval ranged from 342 to 480.33±20.67 days in all genotypes in different types of farms in Chittagong region. The highest calving interval (480.33±20.67 days) and the lowest CI (342 days) was recorded in genotype HF×L (0.75×0.25) in summer season in B type and C type farm respectively. Among the different genotypes of cows the highest value of CI in summer season in B type farm is higher than the findings of Das et al. (2009), Sarder (2006), Khan et al. (2010) who found the CI for HF×L was 460±14.20, 434.51and 414±5.65 days respectively. But the lowest value of CI in summer season in C type farm was similar with the above authors. However, the results (480.33±20.67 days) are similar with Uddin *et al.* (2004). Variations in CI of different genotypes of dairy cows in different farms might be due to genetic, environment, feeding and management.

Service per Conception (no.)

The best service per conception was observed in HF×SL×L in winter and rainy season at A type farm and both HF (0.75)×L(0.25) and HF×SL genotype in summer season in C type farm (Table 2). But worse service per conception (3.33±0.17) was found in genotype HF(0.75)×L(0.25) in summer season in B type farm (Table 2). Das et al (2009) studied the overall service per conception was 1.72±0.19, 1.73±0.18 and 1.60±0.19 for HF×L, L×SL×HF and SL×L genotypes, respectively which was higher number than the present study. Chowdhury (1995) reported that the average service per conception for HF×L and SL×HF cows were 1.72±0.88 and 2.01±1.03, respectively which differed with the current study. Ferdousi and Khan (2013) reported that the average service per conception for Holstein × Local and Sahiwal× Fresian and Local was 2.71±1.93, 3.88±1.4 and 1.83±1.18 which also differed from the present study. The service per conception may be influenced by physiological condition of the cow, number or percentage of viable sperm in semen straw, semen preservation method, AI technique, and timing of AI, skill of inseminator and also reproductive soundness of the cows.

Table 2: Mean ± SE of different productive and reproductive traits of dairy cows based on farm type, genotype and season

Traits	Farm Type A																SEM Value
	HF (0.50)×L(0.50)				HF(0.75)×L(0.25)				HF(0.50)×SL(0.50)				HF(0.5)×SL(0.25)×L(0.25)				
	Winter	Summer	Rainy	Ave.	Winter	Summer	Rainy	Ave.	Winter	Summer	Rainy	Ave.	Winter	Summer	Rainy	Ave.	
MY(Lit/day)	12.7^{by}	9.9^{ay}	11.9^{by}	11.5	12.2^{by}	13.9^{abx}	10.5^{bxy}	12.2	13.4^{axy}	9.1^{axy}	11.2^{axy}	11.2	11^{ay}	17.3^{bx}	17^{bx}	15.1	1.13
CI(days)	399.5^{ax}	420.2^{ax}	424.1^{ax}	414.6	391^{ax}	396.4^{ax}	410^{ax}	399.1	376^{bx}	381^{bx}	388.1^{ax}	381.7	346.5^{ax}	440^{ax}	359.5^{ax}	382	3.82
SPC (number)	2.4^{ax}	2.5^{ax}	2.51^{ax}	2.5	1.9^{ax}	1.85^{bx}	2.2^{ax}	1.9	2^{bxy}	1.7^{bz}	1.8^{bx}	1.8	1^{ax}	2.3^{ax}	1^{bx}	1.6	0.07
PPHP (days)	124.6^{ax}	147.9^{ax}	151.5^{ax}	141.3	116.8^{ax}	122.4^{ax}	137^{ax}	125.4	98^{bx}	107^{bx}	114.6^{abx}	106.5	66.5^{ax}	167^{ax}	81.17^{ax}	116.7	4.08
CR (%)	64.7^{ay}	62.5^{ax}	64.5^{ax}	63.9	64.7^{ay}	64.5^{ax}	70^{ax}	66.4	66.2^{bx}	63^{bx}	61.1^{a}	63.4	59.33^{ax}	63.8^{axy}	66.11^{ax}	61.6	0.36
Farm Type B																	
MY(Lit/day)	8.3^{bx}	10.5^{ay}	8.4^{bx}	9.1	14^{ax}	12^{by}	12.8^{bxy}	12.9	3.2^{ax}	9.8^{aby}	13.2^{ax}	8.7	11.6^{bxy}	13.4^{bxy}	16.7^{ax}	13.9	2.04
CI(days)	465^{ax}	439.1^{bx}	440.5^{bx}	448.2	382^{bx}	480.3^{bx}	459.6^{ax}	440.6	373.2^{axy}	433.1^{abx}	432.6^{axy}	412.9	424.5^{ax}	452.7^{axy}	406.92^{ax}	428.1	9.59
SPC(no.)	2.8^{ax}	2.6^{bx}	2.6^{bx}	2.7	2^{axy}	3.3^{bx}	3^{bx}	2.7	1.4^{ax}	2.3^{bx}	2.4^{bx}	2.1	2.4^{ax}	2.71^{ax}	1.92^{ax}	2.34	0.14
PPHP (days)	196.3^{ax}	170.7^{bx}	170.5^{by}	179.1	102^{abxy}	210.3^{bx}	193.6^{bx}	168.6	95.2^{ax}	161.7^{bxy}	167.6^{bxy}	141.5	150.7^{ax}	179.7^{ax}	133^{ax}	154.4	9.23
CR (%)	59.6^{ax}	67.7^{ax}	50.8^{ay}	59.4	62.9^{axy}	58.8^{ax}	51.8^{ay}	57.8	76.4^{bx}	76.4^{bx}	60^{ax}	70.9	62.74^{bx}	64.11^{bx}	51.79^{ay}	59.5	3.0
Farm Type C																	
MY(Lit/day)	11.2^{bx}	9.6^{ay}	11.4^{bx}	10.7^{b}	14^{bxy}	9^{axy}	13^{bx}	12^{b}	15.6^{bx}	7^{axy}	13.7^{bxy}	12.1^{b}	16.2^{bxy}	15^{bx}	15^{bx}	15.4^{a}	2.24
CI(days)	469.5^{ax}	432.4^{ax}	419.7^{ax}	440.6^{a}	366.3^{bx}	342^{axy}	368^{bx}	358.7^{a}	424.8^{axy}	342^{axy}	381.7^{axy}	375.2^{a}	430.6^{bx}	380^{ax}	440^{bx}	416.8^{a}	12.6
SPC(no.)	3.1^{ax}	2.27^{bx}	2.2^{bx}	2.5^{a}	1.3^{bx}	1^{axy}	1.5^{bxy}	1.25^{a}	2.3^{ax}	1^{axy}	1.5^{axy}	1.6^{a}	2.2^{bx}	2^{bx}	3^{bx}	2.4^{ab}	6.56
PPHP (days)	195^{ax}	155.1^{abx}	144.4^{ax}	164.8^{a}	86.3^{bx}	72^{abx}	88^{bx}	82.1^{a}	148.2^{axy}	62^{ax}	109.3^{ax}	106.5^{a}	152.2^{bx}	110^{ax}	160^{bx}	140.7^{a}	5.68
CR (%)	66.2^{ax}	61.8^{ax}	75.1^{ax}	67.7^{a}	60^{bx}	58.9^{bx}	64.1^{ax}	61.1^{a}	64.4^{ay}	51.8^{bx}	51.8^{bxy}	55.9^{a}	51.8^{bx}	51.9^{bx}	51.7^{bxy}	51.7^{a}	3.4

a,b,c superscript means with different superscripts in the same row differ significantly ($p<0.05$)

Post Partum Heat Period (PPHP)

Among the different genotype of cows in different dairy farms the post partum heat period (days) ranges from 62 to 196.28±2.34 (Table 2). The highest post partum heat period (196.28±2.34 days) was found in genotype HF (0.5)×L(0.5)in winter season at B type farm and lowest (62 days) was found in genotype HF (0.5)×SL(0.5) in summer season at C type farm (Table 2). These findings were disagreed with Das *et al.* (2009), Amin and Nahar (2007), Majid *et al.* (1995) and Miazi *et al.* (2007).

Conception Rate (CR)

The percentage of CR was ranges from 50.84 to 76.42% in the studied farms. The highest CR (76.42%) was found in genotype HF×SL both in winter and summer season in B type farm (Table 2). The lowest CR (50.84%) was found in HF×L in rainy season in B type farm (Table-4).The higher CR was disagreed with Bhatnagar *et al.* (1978), Nair (1975), Prokash and Saini (1987), Gosh (1995). Ferdousi *et al.* (2013) reported that the CR of Holstein× Local and Sahiwal × Fresian and Local was 60.37±25.68, 39.08±17.69 and 86±19.66 percent, respectively, which also differed from the present study. There are some common factors involved in CR like age, level of milk production, heat detection, timing of service, thawing period, temperament of animal during AI, site of insemination and health disorder of cows. The variation of CR with breeds may vary with the variation of ages and with the variation of breeds as well. Similar factors were reported by Corach (2010).

Semen Quality

This result showed that the percentage of normal spermatozoa ranges from 82.06±1.34% to 95.56±.47% and the percentage of live spermatozoa ranged from 86.15±.89% to 92.60±.79% all five genotype of semen (Table 3). There are no significant differences found between AI centre and AI inseminator even in different seasons. The percentage of semen concentration (million/ml) ranges from 1286.00±30.59 (million/ml) to 1438.49±24.51 (million/ml) in all five genotype of semen. All values are remain in normal range meaning that AI straw or semen used in different farms in Chittagong Metropolitan areas were in good quality. This finding also indicates that the AI centre and AI inseminator maintain the cool chain system during transport and storage of AI straw throughout the year.

Table 3: Evaluation of Semen

Semen Evaluation	AI Centre				Inseminator Level			
	HF (0.50)×L(0.50), HF(0.75)×L(0.25), HF(0.50)×SL(0.50), HF(0.5)×SL(0.25)×L(0.25)				HF (0.50)×L(0.50), HF(0.75)×L(0.25), HF(0.50)×SL(0.50),HF(0.5)×SL(0.25)×L(0.25)			
	Winter	**Summer**	**Rainy**	**Average**	**Winter**	**Summer**	**Rainy**	**Average**
Normal sperm	$92.03^{by}\pm.41$	$91.88^{aby}\pm.40$	$92.68^{by}\pm.34$	$92.19^{b}\pm0.38$	$92.55^{aby}\pm.32$	$91.88^{by}\pm.40$	$92.38^{ay}\pm.34$	$92.27^{b}\pm0.35$
Live sperm	$88.52^{by}\pm.39$	$88.73^{ay}\pm.41$	$87.75^{aby}\pm.28$	$88.33^{b}\pm0.36$	$88.52^{by}\pm.34$	$89.18^{ay}\pm.42$	$88.33^{by}\pm.31$	$88.68^{b}\pm0.36$
Semen Conc.	$1375.06^{ax}\pm13.53$	$1398.85^{ax}\pm11.99$	$1323.52^{ay}\pm13.27$	$1365.81^{b}\pm12.93$	$1326.04^{ax}\pm12.39$	$1368.4^{ax}\pm13.12$	$1316.8^{by}\pm12.87$	$1337.1^{b}\pm12.79$
Normal sperm	$86.78^{ay}\pm1.03$	$90.13^{ax}\pm.79$	$92.58^{ay}\pm.48$	$89.79^{b}\pm0.77$	$87.52^{ay}\pm1.10$	$92.29^{bx}\pm.69$	$93.06^{ay}\pm.51$	$90.96^{b}\pm0.77$
Live sperm	$89.17^{y}\pm.54$	$87.58^{by}\pm.63$	$88.37^{bx}\pm.49$	$88.37^{b}\pm0.55$	$89.04^{by}\pm.49$	$88.08^{by}\pm.62$	$87.37^{ax}\pm.44$	$88.16^{b}\pm0.52$
Semen Conc.	$1434.00^{ax}\pm27.86$	$1382.38^{aby}\pm18.77$	$1333.50^{ay}\pm19.22$	$1383.29^{b}\pm21.95$	$1425.00^{ax}\pm43.35$	$1383.6^{ay}\pm18.97$	$1336.25^{ay}\pm20.24$	$1381.6^{b}\pm27.52$
Normal sperm	$86.15^{aby}\pm.89$	$89.94^{aby}\pm1.09$	$91.12^{ax}\pm.79$	$89.07^{b}\pm0.92$	$86.15^{aby}\pm.94$	$89.91^{aby}\pm21.11$	$87.78^{bx}\pm.99$	$87.95^{b}\pm7.68$
Live sperm	$87.86^{ay}\pm.54$	$88.12^{by}\pm.55$	$87.64^{by}\pm.59$	$87.87^{b}\pm0.56$	$87.52^{aby}\pm.57$	$88.74^{by}\pm.65$	$88.02^{by}\pm.56$	$88.09^{b}\pm0.59$
Semen Conc.	$1425.46^{ay}\pm24.61$	$1351.82^{by}\pm22.29$	$1349.09^{ay}\pm22.89$	$1375.46^{b}\pm23.26$	$1438.49^{ay}\pm24.51$	$1352.7^{ay}\pm23.6$	$1418.49^{by}\pm26.62$	$1403.3^{b}\pm24.91$
Normal sperm	$82.06^{ax}\pm1.34$	$86.81^{by}\pm.98$	$88.31^{aby}\pm43.72$	$85.73^{ab}\pm15.35$	$86.25^{ax}\pm1.16$	$88.11^{ay}\pm1.11$	$91.19^{ay}\pm.67$	$88.52^{ab}\pm0.98$
Live sperm	$89.76^{by}\pm.81$	$89.79^{by}\pm.81$	$89.75^{bx}\pm.66$	$89.77^{a}\pm0.76$	$89.98^{by}\pm.83$	$90.19^{ay}\pm.61$	$91.69^{abx}\pm.67$	$63.29^{a}\pm0.70$
Semen Conc.	$1368.7^{aby}\pm18.41$	$1378.75^{abx}\pm21.92$	$1400.63^{by}\pm27.95$	$1382.71^{b}\pm22.76$	$1385.63^{by}\pm26.24$	$1350^{bx}\pm21.81$	$1378.13^{by}\pm25.84$	$1371.3^{b}\pm24.63$
Normal sperm	$95.56^{ax}\pm.47$	$91.76^{ax}\pm.42$	$93.30^{abx}\pm.74$	$93.54^{a}\pm0.54$	$90.66^{a}\pm.63$	$84.80^{ax}\pm.66$	$90.20^{bx}\pm.74$	$88.55^{a}\pm0.68$
Live sperm	$86.32^{abx}\pm.32$	$87.50^{ay}\pm.72$	$92.60^{ax}\pm.79$	$88.81^{b}\pm0.61$	$90.70^{ax}\pm.65$	$87.40^{ay}\pm.78$	$90.34^{bx}\pm.68$	$89.48^{b}\pm0.70$
Semen Conc.	$1398^{aby}\pm73.58$	$1286.00^{ab}\pm30.59$	$1342^{abx}\pm26.91$	$1342^{b}\pm43.69$	$1394.00^{by}\pm18.06$	$1390^{bx}\pm39.21$	$1368.00^{by}\pm62.72$	$1384^{b}\pm39.99$

Legends: Semen Conc.= Semen Concentration

a,b,x, y superscript means with different superscripts in the same row differ significantly ($p<0.05$)

Conclusion and Recommendation

From the present study, it may be concluded that about 97% of semen from DLS and 3% semen from BRAC were used by A type farm and 100% of semen from DLS was used by B type and C type farms in studied area. The HF(0.50)×SL(0.25)×L(0.25) genotype produced highest daily average milk yield (17.23±1.06 liter/day) in summer season at A type farm and the genotype HF×SL produced lowest daily average milk yield (7.00 liter/day) at C type farm. The HF (0.75) × L (0.25) genotype was superior for calving interval (342 days) in summer season in B type. The lowest service per conception was observed in HF (0.50)×SL(0.25)×L(0.25) genotype in winter and rainy season at A type farm and both HF (0.5) ×L (0.5) and HF (0.5) ×SL (0.5)genotype in summer season in C type farm. The highest service per conception (3.33±0.17) was found in genotype HF (0.5)× L (0.5) in summer season in B type farm. The highest post partum heat period (196.28±2.34 days) was found in genotype HF (0.5) ×L (0.5) in winter season at B type farm and lowest (62 days) was found in genotype HF (0.5) ×SL (0.5) in summer season at C type farm. The highest conception rate (76.42%) was found in genotype HF (0.5) ×SL (0.5) both in winter and summer season in B type farm. The sperm motility of the semen sample was good to excellent. There being 1316 to 1335 million sperms per ml, 87 to 89% live sperm and 86 to 93% normal sperm cells were observed from the semen samples. There were no significant differences found between genotypes for this sperm quality. For increasing the conception rate, we have to take proper initiatives such as proper heat detection, supply of high quality semen, accurate record keeping, good husbandry practices, supply of proper nutrition, trained and skilled AI technicians in field level. This research will be beneficial for policy maker, researchers and farmers.

References

[1] Al-Amin, M. and Nahar, A. (2007). Productive and reproductive performance of non-descriptive (local) and crossbred dairy cows in coastal area of Bangladesh. *Asian Journal of Animal and Veterinary Advances*, **2**:46-49.

[2] Alam, M.G.S. and Ghosh, A. (1988). Reproductive performance in cows: its relation to parity and season. *Bangladesh Veterinary Journal*, **22**: 51–61.

[3] Bhatnagar, D.S., Sharma, R.C. and Rao, M.V.N. (1978). Conception rate amongst Brown Swiss, Sahiwal cross breed. Science. *Indian Journal of Dairy science* **31**: 90.

[4] Chowdhury, A.R. (1995). Influence of season, age, parity, service per conception and conception rate in local and crossbred cattle. M.Sc. Thesis, Dept. of Dairy Science, BAU, Mymensingh.

[5] DLS, 2000. Department of livestock services - An overview, Department of livestock services, Bangladesh, Dhaka (2000). DLS, 1998. *Annual Report of Directorate of Livestock Services* (DLS),Bangladesh, Dhaka.

[6] Das, A., Gupta, M.D., Khan, M.K.I. and Miah, G. (2011). Effect of non-genetic factors on productive and reproductive traits of Friesian crossbred dairy cows. *Wayamba Journal of Animal Science*. Pp: 42-45. http://wayambajournal.com/papers/1297506172.php

[7] Das, A. (2010). Estimation of the genetic parameters for crossbred dairy cows. *Ms Thesis*, Submitted to the Department of Genetics and Animal Breeding, Chittagong Veterinary and Animal Sciences University, Khulshi Chittagong

[8] Das, A., Ullah, S.M., Akter, M.M. and Kanengo, S. (2009). Comparative study on productive and reproductive performance of three crossbred dairy genotypes in Chittagong metropolitan area. *Eco-Friendy Agriculture Journal,* **2**:757-760.

[9] Das, A.K., Ali, M. Y., Islam, M.A., Hira, A.K. and S.Z. Ali.(2002). Fertility of cow in using Locally Produced Chilled and Imported Frozen Semen. *Pakistan Journal of Biological Science* **5**(2): 215-217.

[10] Ferdousi, J. and Khan, M.K.I. (2013). Study on the conception rate of different dairy cows under farming conditions in Chittagong area. *Bangladesh Journal of Veterinary and Animal Sciences* **2**(1&2):38-42.

[12] Ghosh, S. (2011). Development of suitable milk recording system for small-holder dairy farming in Bangladesh. *Ms Thesis*, Submitted to the Department of Genetics and Animal Breeding, Chittagong Veterinary and Animal Sciences University, Khulshi Chittagong

[13] Ghosh, D.K. (1995). Economic traits of crossbred cattle in small dairy enterprise of Gazipur District. *M.Sc. Thesis*. Department of Physiology. Bangladesh Agricultural University, Mymensingh.

[14] Islam, A., Wadud, A., Rabbani, M.G. and Hossain, B. (1999). Rearing practices and milk production of dairy cattle in Thankurgaon. *Journal of Animal Science,* 27.

[15] Khan, M.K.I. and Mazumder, J. (2011). Economic selection index using different milk production traits of Holstein and its crossbreds. *Turkish Journal of Veterinary and Animal Sciences,***35**(4): 255-261

[16] Khan, M.K.I., Miah, G., Khatun, M.J. and Das, A. (2010). Economic values for different economic traits of Red Chittagong Cow's. *Indian Journal of Animal Sciences, **80***: 1138-1140.

[17] Lucy, M.C. (2007). Fertility in high producing dairy cows: reasons for decline and corrective strategies for sustainable improvement. SOC report of fertility supplementation. 64:237-254.

[18] Majid, M.M., Nahar, T.N., Talukder, A.I. and Rahman, M.A. (1995). Reproductive performance of pure breed, F_1, F_2 and F_3 cows related at Savar Dairy Farm, Bangladesh. *International Journal of Livestock Research,* **2**: 53-62.

[19] Miazi, O.F., Hossain, M.E. and Hassan, M.M. (2007). Productive and reproductive performance of crossbred and indigenous dairy cows under rural conditions in Comilla. *University Journal of Zoology*, Rajshahi University, **26**:67-70.

[20] Nair, B.R.K. (1975). A study of the conception rate in cattle due to insemination with deep frozen semen. *Animal Breeding Abstract,* **43**: 5166.

[21] Prakash, B. and Saini, A.L. (1987). Fertility result of deep frozen semen of cattle and buffaloes under field condition. *Indian Veterinary Journal,* **64**: 799-800.

[22] Samsuddin, M., Bhuian, M.M.U., Chanda, P.C., Alam, M.G.S. and Abedin, J. (1997). Fertility related factors at artificial insemination in cattle in Bangladesh. Proceed. Third Animal Scientific Conference, Bangaldesh Society for Veterinary Education and Research, Mymensingh, Bangladesh, 21-33.

[23] SAS® . (2000). User Guide. Statistics. 8th edn. Cary (NC): SAS Institute Inc.

[24] Sarder, M.J.U., Joarder, O.I. and Ali, M.S. (2001). Semen production in relation to the age and season of Friesian cross and Sahiwal bulls for artificial insemination. *Journal of Biosciences*, **9**: 39-46.

[25] Sarder, M.J.U. (2006). A comparative study on reproductive performance of cross-bred dairy cows at greater Rajshahi district. *Journal of Animal and Veterinary Advances*, **5** (8): 679-685.

[26] Steel, R.G.D., Torrie, J.H. and Dickey, D.A. (1997). Principal and procedure of statistics- A biometrical approach. McGraw-Hill Co.Inc., NewYork and London,pp.39-177

[27] Than, U.H.L.A., Aungmyatt, U., Daw, S.U. and Yehtun, U.W.I.N. (2001). Improvement of cattle production in Myanmar through the use of progesterone RIA to increase efficiency and quality of Artificial Insemination services. In Radioimmunoassay and related techniques to improve AI program for cattle reared under tropical and subtropical condition. Proceedings

of a final research coordination meeting organized by the joint FAO, IAEA Division of Nuclear Technique in Food and Agriculture and Held in Upsala, Sweden, 10-14 May 1999.

[28] Uddin, M.M., Islam, M.N., Hossain, M.N., Ahmed, S. (2004). Reproductive performance of different genetic groups of dairy cows under ideal management condition. *Journal of Bangladesh Agricultural University,* **2**: 99-102.

[29] Windig, J.J., Calus, M.P.L., Veerkamp, R.F. (2005). Influence of herd environment on health and fertility and their relationship with milk production. *Journal of Dairy Science,* **88**: 33347.