Introduction

Being an agricultural country Bangladesh hinges on livestock sector to a greater extent and the sector is also being developed overtime (Trisha et al., 2020). The government statistics revealed that the production of milk, meat and egg was 9.9 million metric ton (MMT), 7.5 MMT and 1711 crores (DLS, 2019). The livestock sector shares total 24.2 million cattle population where the presumable amount of beef consumption per capita in 2020 is 0.83 kilograms per person annually (DLS, 2019; Mollo Moore, 2020). It is also a matter of concern that 65000 tons powdered milk is imported in Bangladesh per year (DLS, 2019). So, it is being proved that demand of this sector is gradually increased and being significant to revamp the sector. The success of dairying depends on reproduction performance of the herds maintain by a sound management in the farm. Environmental factors also impact on the reproductive traits immensely (Weigel and Rekaya, 2000). For optimum milk production the most related biological factors such as age at puberty, early 1st calving, number of parity and shorter calving interval (Islam et al., 2006). It should be targeted that the age of first calving of a cow should be around 2 years of age while calving interval should not be exceeding 12-13 months for the best outcome from a dairy farm (Wiltbank, 1970; Sardar, 2001). Likewise, Mee et al., (2002) stated that 365 days should be the average interval between successive calvings which vacates 85 days to get the cow pregnant and left 280 days as gestation period. In Bangladesh, the average calving interval ranged from 365 to 536 days and average post-partum service period ranged from 103 to 161 days among the indigenous and crossbred cattle which is not so satisfactory (Rahman et al., 2009). According to Shamsuddin et al. (2006), the gestation period of exotic crossbred was 278.7 ± 5 days. Alam et al. (2008) stated that the gestation period of Desi × Friesian crossbred was 278.3 ± 4.2 days. These parameters are associated with each other. Gestation period is largely influenced by calving age and parity number of the dam (Norman et al., 2009), season and temperature (Mclintock et al., 2003), calf sex (Anderson and Plum, 1965), genetic milk line (Hageman et al., 1991), milk yield (Silva et al., 1992), type of breed (Brakel et al., 1952), dystocia and stillbirth (Philipsson, 1976). It is found that calving age and parity both effect on gestation period in parallel way that

the gestation period is longer (≤1 d) in heifer than the cow (Gregory et al., 1978). King et al., (1985) disclosed their own findings of embryo transfer pregnancies that 2.7 days shorter gestation period was marked in 4-years old young recipients than the older recipients which indicates that gestation period is shorter in young cows.

There is a significant relation of parity with milk yield as well as milk components. Yoon et al., (2003) stated that milk production remained lower in 1st parity which gradually increase up to 4thand 5th parity again it increased. According to Epaphras et al., (2004) the milk production was comparably higher in 3rd lactation than that of others and started to decrease from 4th lactation. A study on 661 Shahiwal cows ensued that the lactation length decreased from 1st to 4th parity which increased nearing to 8th parity (Bajwa et al., 2004). Calving interval increased with increasing parities which found in the study of Evans et al., (2005) demonstrating age of 1st calving at <24 months increasing the calving intervals from second calving across all the level Holstein percentage cows with the age of 1st calving 25-26 months having shortest subsequent calving intervals. According to Seiber et al. (1989), calf birth weight highly correlated with the calving assistance with the first parity than the all parities. Female calves were weighted 7-8% higher from second to greater parity while male calves are 8% heavier than the female calves (Kertz et al., 1997). The objective of this cross-sectional study was therefore to determine the effect of different parity on gestation period, lactation period, milk production per day, calves birth weight, calving interval and the relation among the parities.

Materials and methods

The relevant data of this cross sectional study were collected from Central Cattle Breeding and Dairy Farm (CCBDF), Savar, Dhaka. Environed by flatland and greenery the farm is located at 30km northwest side from Dhaka city, near to the Dhaka Aricha highway (Hossain et al., 2012). Under supervision of Ministry of Livestock and Fisheries, Bangladesh, CCBDF is doing excellent improvement in cattle breeding (Hossain et al. 2002).

A 12-year (2008-2019) record of 77 cows of same crossbred genetic group Local × Holstein Friesian (L×HF) reared in ideal and sustaining management was selected for advanced study. During data collection, the spotlighted findings were about the animals' reproductive parameters such as, gestation period (GP), lactation (LP), milk production per day (MPPD), birth weight of calves (BWT) and calving interval (CI).

After preparing the raw data sheet entering the numerical figures of the parameters in MS Excel 2010, the data were sundered in keeping with identical parity number and the atypical figures were omitted. After scrutiny, the data obtained were imported to Statistical Package for the Social Sciences 16versionfor descriptive statistical analysis. The value below 0.05 was considered as level of significance.

Results and discussion

The effect of different parity on GP, LP, MPPD, BWT, CI of the crossbred (L × F) are presented in Table 1.

Gestation period:

The means of gestation periods of parity 1, parity 2, parity 3, parity 4, parity 5 and parity 6 of L × F were obtained 276.33±1.40, 273.02±1.64, 276.24±1.68, 277.33±0.98, 277.18±1.20 and 269.56±5.75 (days) (Table 1). The findings match with the earlier report of Silva et al. (1922); Knott, (1932); ABMT et al. (2017); Wondossen et al. (2018). A relation obtained in between parity 4 and parity 6 on gestation period estimating p-value 0.05 in both cases in Table 1. The findings of this study showed a significant effect of parity on gestation period. Gestation period increased with the increasing parity number that is also matched up with the findings of Hoka et al. (2019) and Norman et al. (2009).

Table 1:Means with standard errors of different reproductive traits according to different parity number including the presence relationship among the parities of Local and Friesian crossbred of Central Cattle Breeding and Dairy Farm, Savar, Dhaka (data from 2008-2019)

Trait **Parity**	**GP (days)** Mean ± SE	**LP (days)** Mean ± SE	**MPPD (L/day)** Mean ± SE	**BWT (kg)** Mean ± SE	**CI (days)** Mean ± SE
1	276.33ab±1.40	382.35a±20.04	5.12ag±0.22	22.61a±0.35	581.48a±25.76
2	273.02ab±1.64	351.29f±16.63	6.12be±0.29	23.10d±0.41	563.02e±21.84
3	276.24ab±1.68	298.14bg±20.19	6.42ce±0.38	24.51beg±0.46	540.11i±28.09
4	277.33a±0.98	281.42ch±20.58	6.58de±0.52	25.21cfi±0.75	449.04bfj±28.89
5	277.18ab±1.20	294.73d±31.38	7.22f±0.77	26.55g±1.42	448.18cg±18.16
6	269.56b±5.75	248.22ei±38.68	9.44ebcdh±1.10	28.44hj±1.44	398.56dhk±26.46

**The mean difference is significant at the value of 0.05 level*

Lactation period:

The means of lactation periods of parity 1, parity 2, parity 3, parity 4, parity 5 and parity 6 of L × F were 382.35 ± 20.04, 351.29 ± 16.63, 298.14 ± 20.10, 281.42 ± 20.58, 294.73 ± 31.38, 248.22 ± 38.68 (days) (Table 1). Tadesse and Dessie (2003) reported on their study, the means lactation periods 364±10, 353±10, 343±11, 333±12, 317± 14, 316± 16of parity 1, parity 2, parity 3, parity 4, parity 5, parity 6 or more respectively which is in line with the current study findings. By the influence of parity, the lactation period was decreased which is identified in both study. Bajwa et al. (2004) studied Shahiwal cattle observing the drop of lactation periods in higher parity similarly to present findings. Koc (2011) also stated similar findings. Besides, table 1 reflected that, parity 1 had large significant effect on parity 3, parity 4 and parity 6 to reduce the lactation period, p values are 0.002, 0.001 and 0.003 respectively. Additionally less of parity 1 on parity 5 was found (p value 0.042). Differently, parity 2 showed the significant effect on parity 3, parity 4 and parity 5 having p value less than 0.05.

Milk production per day:

The mean values of milk production per day were acquired 5.12 ± 0.22, 6.12 ± 0.29, 6.42 ± 0.38, 6.58 ± 0.52, 7.22 ±0.77, 9.44 ± 1.10 (L/day) for parity 1, parity 2, parity 3, parity 4, parity 5 and parity 6, respectively. Daily milk yield is influenced by different factors such as, types of breed, season, temperature, parity, management of the farm as well as nutritional factors (Laben et al., 1982; Murphy et al., 1983; Urdaz et al., 2006; Tadesse et al., 2010). The current study revealed that amount of milk production per day increased with the increasing parity number. The highest milk production per day (9.44 ± 1.1 litres) was recorded at parity 6. Daily milk yield increased by following increased parity number agreeing with the current study (Mohamed et al., 2017). Wondifraw et al. (2013) found the mean values of milk production per day 5.25 ± 0.08, 5.38 ± 0.07, 5.75 ± 0.08, 5.97 ± 0.08, 5.99 ± 0.09 and 5.87 ± 0.09 of parity 1, parity 2, parity 3, parity 4, parity 5 and parity 6, respectively which is also supported by current study. It is due to development udder and mammary gland tissue proliferation (Teke and Murat, 2013). There is a significant

effect of parity 1 on parity 2, parity 3, parity 4 and parity 5 available in Table 1, to increase milk production per day having p value 0.023, 0.008, 0.009, 0.005, respectively.

Birth weight of calf:

The mean values of obtained birth weight of calves from this study were 22.61 ±0.35, 23.10 ± 0.41, 24.51 ± 0.46, 25.21 ± 0.75, 26.55 ± 1.42, 28.44 ± 1.44 (days) of parity 1, parity 2, parity 3, parity 4, parity 5 and parity 6, respectively. Selvan et al. (2018) found birth weight of calves 26.10 ± 0.31, 27.42 ± 0.32, 28.84 ± 0.34, 29.36 ± 0.39, 29.05 ± 0.43, 28.58 ± 0.52 of parity 1, parity 2, parity 3, parity 4, parity 5, parity 6, respectively which is almost similar with the current study result. The previous studies observed increasing birth weight of calves by parity (Sivarajasingam et al., 2018; Kaygisiz et al., 2011; Aksakal and Bayram, 2009; Bakir et al., 2004) which were consistent with the present study. It is also exposed in Table 1 that, parity 1 put significant effect on other parities like parity 3, parity 4 with estimated p value 0.008 and 0.002 respectively to increase the calf birth weight by increasing parity number. Separately parity 2 influenced parity 3, parity 4, parity 5 significantly (p value 0.039, 008, 0.001 respectively), which also denoted the increasing calf birth weight by parity (Table 1) whereas parity 4 and parity 6 also interrelated significantly to increase the calf birth weight.

Calving interval:

The means of calving intervals from this study were 581.48 ± 25.76 days, 563.02 ± 21.84 days, 540.11 ± 28.09, 449.04 ± 28.89 days, 448.18 ± 18.16 days and 398.56 ± 26.46 days of parity 1, parity 2, parity 3, parity 4, parity 5 and parity 6, respectively. Kabir and Kisku (2013) obtained calving interval of Australian Friesian Sahiwal (AFS) (478.6 ± 8.52), Sahiwal × Friesian (SL×F) (542 ± 9.87), Local × Friesian (L×F) (436.07 ± 9.87), Local × Friesian × Friesian (LF1×F) (530.4 ± 16.19) and Local × Friesian × Friesian × Friesian (LF2×F) (508 ± 12.01) exposing consent with the current study. Parity puts significant influence on calving interval (Kim et al., 2009). The findings of Hammoud et al. (2010) also agree with the present study result which showed decreasing calving interval by increasing parity in Friesian

cattle. Several researchers (Tadesse et al., 2010; Uddin et al., 2004; Silva et al., 1992) also found the similar findings. Table 1 revealed that parity 1 had effect on parity 4, parity 5 and parity 6 significantly (p value 0.001, 0.013 and 0.002 respectively) to decrease the length of calving interval. Consequently, parity 2 influenced parity 4, parity 5 and parity 6 significantly (p value 0.004, 0.029 and 0.004) and parity 3 influenced parity 4 and parity 6 (p value 0.03 and 0.01).

Conclusion and Recommendation

Parity order influences the reproductive and productive performance of dairy cattle most. The result showed that though the GP increased by parity but lower length of gestation obtained at parity 6. From the previous reports it has been cleared that LP should be increased by parity due to gradual development of mammary gland of dairy cow which is an indicator of a profitable farm, but it is not seen in this study. Very much fluctuations of LP were exposed out from this study which may be due to deviation of sample number. My study also revealed that daily milk production was increased by parity signing a good vibe of the farm management. Birth weight was found to be increased by parity which matched up with past research findings and also a good indicator of a good dairy farm. Lastly, the calving interval decreased by parity got out from the current study denoting CCBDF a good dairy farm. Overall, more research studies regarding reproductive and production performance of the cattle of CCBDF should be performed. The exact reason of fluctuated gestation period and lower lactation period that were identified in my study should be identified and establish more advanced and sustainable management of the herd sheds.

Limitations

1. If the sample size could have been larger, the standard error would have been more moderate.
2. The obtained data for this study were so much different, selection of same type of breed with similar blood percentage was so difficult to perform.
3. There was lack of previous research studies regarding the present study, so it was little bit difficult to prove with the findings of past studies.

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Biography

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