Research article

Study on the conception rate of different dairy cows under farming conditions in Chittagong area

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ABSTRACT

The present study was undertaken to investigate the effect of breed groups and age of different dairy cows on conception rate under commercial dairy farming in Chittagong area. Three cattle breed groups, namely: Holstein × Local, Sahiwal × Friesian and Local were found in the farm surveyed. The percentage of the cows of Holstein × Local and Local was higher (50%) than the Sahiwal × Friesian (46.6%). The Holstein × Local had a higher productive life (up to 9 years) than Sahiwal × Friesian and Local breeds. The service per conception also differed significantly between the breed groups. The conception rate of Holstein × Local, Sahiwal × Friesian and Local was 60.37±25.68, 39.08±17.69, 86.1±19.66 percent, respectively, and differed significantly among the breed groups.

INTRODUCTION

Artificial insemination (AI) is the most widely used tool in animal breeding. Cattle breed improvement services of DLS are executed through production of breeding bulls, crossbred heifers and semen from breeding bulls. AI is mostly done by using of frozen semen and is carried out through 23 AI centres, 490 AI sub-centres and 664 AI points at union council level. Currently, there are about 8% crossbred cows available in Bangladesh (BBS, 2006), and about 30% cattle are bred through AI and the rest are served through natural mating. The overall conception rate through AI in cattle ranges from 38 to 62%. Problems in AI services include poor awareness of farmers, unskilled technicians, irregular supply of liquid nitrogen, long distance, inappropriate detection of heat and insemination at the wrong time. It is well established that maintaining a satisfactory fertility level is the fundamental aspect for successful operation of any cattle farm. In Bangladesh, around the year, a large number of animals remain barren or unproductive having exposed many times to natural mating or AI (Kamal, 2010). Conception rate can be defined as the

percentage of matings that result in conception. The farm profitability is also depends on how many cows are conceived and calved in a year. Conception rate depends on many factors: nutrition, breeds, age and weight of the cows, body condition, post-partum heat period, estrus, time of insemination, breeding season, anatomical and genetic abnormalities from both cows and bulls. The dairy farms of Bangladesh consist of different breeds with different ages of cows and the cows' conception rate after AI may vary with these factors. The study on the effects of different biological and management factors on conception rate is limited in Bangladesh. Therefore, the present study was conducted with the following objectives: (i) to know the breed groups and age groups of cows under a commercial dairy farm; and (ii) to determine the conception rate of different dairy cows under a commercial dairy farm.

MATERIALS AND METHODS

The study was conducted on different dairy cattle breed groups under a commercial dairy farm in Chittagong area during January to April, 2012.

A total of 43 cows, 4 bulls, 32 calves and 8 heifers were surveyed with a structured proto-type questionnaire. The criteria that are surveyed were (i) total cattle in each breed group; (ii) number of calves, heifers, bull calves, bulls, milking cows and dry cows etc. (iii) number of cows according to age; and (iii) other management and rearing information. Data were collected by the investigator through direct interviewing and farm visit.

In addition, some information was collected from records. The breed groups of the cows were identified from the records and also according to the phenotypes of the cows described by Khan *et al.* (2005) and Bhuiyan and Sultana (1994).

The ages of the animals were estimated as per the information shown in Table 1. The daily milk yield of a cow was calculated by adding the morning and afternoon milk yield. A cow's conception rate was estimated by the proportion of number of cows conceived with the number inseminated.

Table 1. Identification of ages of the animals surveyed, by observing the dentition[*]

Sl. No. Teeth	Age of cow
Two or more of the temporary incisor teeth	At birth to 1 month
First incisor (I_1)	1.5-2 Years
Second incisor (I_2)	2.0-2.5 Years
Third incisor (I_3)	3 Years
Fourth incisor (I_4 or C)	3.5to4 Years
The permanent pinchers are leveled, both pairs of intermediates are partially leveled, and the corner incisors show wear	5-6 Years
At 7 or 8 years the pinchers show noticeable wear, at 8 or 9 years the middle pairs show noticeable wear; and at 10 years, the corner teeth show noticeable wear	7-10 Years
After the animal passed the 6th year, the arch gradually losses it's rounded contour and becomes nearly straight by the 12th year. In the meantime, the teeth gradually become triangular in shape, distinctly separated, and 12 years show progressive wearing to stubs. These conditions become more marked with increasing age	12 Years

*Source: Johnson, 1983

The farm surveyed consisted of a separate cow shed, calf shed, heifer shed, feed store room and an office room. These sheds were maintained in tail to tail system. Generally, mash feed were fed to all the animals as per the recommended level of an animal nutritionist. Water was supplied from the deep motor then through pipeline to the animals. Usually, the cows were bred artificially by means of AI.

All the important records, such as milk yield record, cattle feed register, calf register, breeding record and financial records were maintained properly. Regular cleaning, washing and disinfection were practiced. In addition, regular deworming and vaccination against different diseases (Foot and mouth disease, black quarter, anthrax and hemorrhagic septicemia) were done. The collected

data were edited and the means of different variables were calculated by using Microsoft Excel. The differences between means of different

variables were performed using the least significant difference test (Steel *et al.*, 1997) at P ≤ 0.05.

Table 2. Percentage of different categories of animals in different breed groups under a commercial dairy farm in Chittagong

Breed group	Total	Types of animal			
		Cows (%)	Calves (%)	Heifer (%)	Bull (%)
H × L	20	50 (10)	35 (7)	10 (2)	5 (1)
S × H	15	46.6 (7)	40 (6)	6.6 (1)	6.6(1)
L	8	50 (4)	37.5 (3)	12.5 (1)	-

Here, H = Holstein, S = Sahiwal and L= Local; Parenthesis indicates the number of animals

Table 3. Percentage of different breed groups under different ages in a commercial dairy farm

Breed group	Total	Age structure					
		4	5	6	7	8	9
H × L	20	-	-	40 (4)	30 (3)	10 (1)	20 (2)
S × H	15	28.5 (2)	14.8 (1)	-	14.2 (1)	42.8 (3)	-
L	8	-	50 (2)	25 (1)	25 (1)	-	-

Here, Legends: H = Holstein, S = Sahiwal and L= Local; Parenthesis indicates the number of animals

RESULTS AND DISCUSSION

Breed composition and the percentages of different breed groups of cows under the surveyed farm are shown in Table 2, and the percentages of different breed groups under different ages of cows are in Table 3. The highest percentage of cows with Holstein × Local and the local was found than Sahiwal × Friesian in the studied farm (Table 2). It might be due to the higher productivity and adaptability of this breed group under the farming conditions. Similar findings were reported in some other studies (Azam, 2012; Khan, 2009). The number of live calves was higher in Sahiwal × Friesian than Local and Holstein crosses. For heifers, the percentage was higher in Local than Sahiwal cross. It might be due to perinatal mortality, death of young stock, failure to conceive or abortion. Data presented in Table 3 shows that a higher proportion of Holstein × Local cows was reared for a longer time (up to 9 years) compared with other breed groups. It might be due to their higher production of milk from this group, in agreement with Azam (2012). Holstein cross had a higher productive life (up to 9 years) under farming conditions (Table 4). It might be due to their higher production potential. Khan (2009) reported that percentage of milking cows was higher in Sahiwal × Friesian and lower in Jersey × Pabna cross. Within the Local and Holstein × Local groups, the service per conception rate was

worse in the 6th year of age (4±3.16) and better in the 9th year of age (1.5±0.5) (Table 5). In Sahiwal and Holstein cross, the worse service per conception rate was in the 7th year of age (6±00) and good in the 5th year of age (3 ± 00). The average service per conception for Holstein × Local and Sahiwal × Friesian and Local was 2.71±1.93, 3.88 ± 1.4 and 1.83±1.18, respectively. These variations of service per conception could be due to the breed and management effects. Similar factors were reported by Khan and Khatun (1998) and Majid *et al*. (1994) and they observed lower service per conception rate for both crossbreds and local cows. The average conception rate of Holstein × Local, Sahiwal × Friesian and Local was 60.37±25.68, 39.08±17.69 and 39.08±17.69 percent, respectively. Within Holstein × Local cows, the conception rate was higher in the 9th year of age (75±12.5) and lower in the 6th years of age (45.63±39.71). Within the Sahiwal × Local, the conception rate was higher in the 8th years of age (71.4±49.54) and lower in the 5th years of age (33.3±00). Within the Local breed, the conception rate was lower in the 5th year of age (58.3±58.97) and was 100% in the next conceptions. The variation of conception rate with breeds may vary with the variation of ages and with the variation of breeds as well. Similar factors were reported by Corach (2010).

Table 4. Average ± standard deviation of daily milk yield for different age groups of cows in the different breed groups

Breed group	Total	Age of cows						Level of significance
		4	5	6	7	8	9	
H × L	20	-	-	16.75^b ±3.59	17.5^b±2.89	15.0	19±1.0	NS
S × H	15	15.5±0.5	20.00^b	-	18.00^b	18.33±5.77	-	NS
L	8	-	12.5^{ab} ±3.54	8^a	9.00^a	-	-	*
Level of significance		-	*	**	**	NS	-	

Here, Legends: H = Holstein, S = Sahiwal and L= Local; *P<0.05 and **P<0.01

Table 5. Effects of ages and breeds on conception rates (CR) and service per conception (S/C)

Breed group	Age	CR (%)	Breed average CR%	S/C	Breed average S/C
H × L	6	45.63±39.71	60.37^{ab}±25.68	4±3.16	2.71^{ab}±1.93
	7	70.83±50.52		3.33±4.04	
	8	50±00		2±00	
	9	75±12.5		1.5±0.5	
S × H	4	35±21.22	39.08^a±17.69	3.5±2.12	3.88^b±1.4
	5	33.3±00		3±00	
	7	16.6±00		6±00	
	8	71.4±49.54		3±3.46	
L	5	58.3±58.97	86.1^b±19.66	3.5±3.53	1.83^a±1.18
	6	100±00		1±00	
	7	100±00		1±00	

Here, H = Holstein, S = Sahiwal and L= Local; Letters with different superscript differed at 5% (P<0.05) level of significance

CONCLUSIONS

From this study, it can be seen that in the studied farm, the proportion of the Holstein × Local group was higher than other breed groups. Holstein group had a higher conception rate and required intermediate AI service per conception. Because this breed had a higher productive life, it can be a good source for upgrading the local breeds. The main limitation of this study was that the sample sizes of animals and farms surveyed were poor. An intensive further study encompassing higher sample sizes are recommended to draw better and authentic conclusions.

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