# Study on the conception rate of different dairy cows under

**farming conditions in Chittagong area**



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The Author

**Abstract**

The present study was undertaken to investigate the breeds and age groups and conception rate of different dairy cows under commercial dairy farming in Chittagong, Bangladesh. Different cattle genotypes such as: Holstein-Friesian × Local, Sahiwal × Holstein-Friesian and Local breeds were found under studied farm. The data from 43 breeds were analysed. The percentage of the cows of Holstein × Local and Local was higher (50%) than the Sahiwal × Local (46.6%). The Holstein × Local breeds had more production life (up to 9 years) than Sahiwal × Local and Local breeds. The conception rate of Holstein × Local, Sahiwal × Local and Local were 60.37 3±25.68, 39.08±17.69, 86.1±19.66 respectively and differed significantly among the genotypes. The service per conception also differed significantly. The effect of age and genotypes after artificial insemination on conception rate and milk yield average was studied. Among the factors, Age and Breed had highest significant effect on conception rate. Housing system and the time interval of first heat sign to Artificial Insemination had no effect on conception rate.

Key wards: Artificial insemination, Conception rate, Age, Genotypes

**CHAPTER-I**

**1. INTRODUCTION**

Bangladesh possesses about 24.7 million cattle, out of which 6.5 million are dairy cattle (DLS, 2008). The majority of the dairy cattle producers are of smallholder farmers and the available genotypes are Local, Shahiwal, Holstein, Jersey, Holstein-Friesian crosses, Jersey crosses and Sahiwal crosses. The country has one of the highest cattle densities of 145 large ruminants per square kilometer compared with 90 for India, 30 for Ethiopia, and 20 for Brazil (***Karim, 1997***). The numbers of dairy farms are estimated to be 1.4 million with an average small herd size of 1-3 cows (***Hemme, 2008***) and dairying is part of the mixed farming systems in Bangladesh (***Saadullah, 2001***) and a predominant source of income, nutrition and jobs (***Haque, 2009***). In 2009, the contribution of livestock subsector to the GDP was 2.95%, which was estimated is about 17.32% GDP to agriculture.

Crossbred cattle population is increasing day by day with the spread of artificial insemination (AI) practices throughout the country. Temperate breed and their crossbreds produce more milk than local breeds. Artificial insemination in cattle has potential benefits in genetic improvement and cost of production. The degree of which these benefits are realized depends upon the efficiency of the system. The latter is influenced by many factors including the efficiency of estrus detection nutrition, environment, stress factors, semen quality, semen preservation and artificial insemination technique.

Artificial insemination is the most widely used tools in animal breeding. Cattle breed improvement services of DLS are executed through production of breeding bulls, crossbred heifers and semen of 6 cattle breeding farms. AI are mostly by using of frozen semen and are carried out by 23 AI centre, 490 AI sub-centre and 664 AI points at union council level. An amount of taka 30 is fixed as AI charge but taka 100 is charged from the farms for each insemination. There are about 8% crossbred cows are available in Bangladesh (2009).

In Bangladesh, at the moment, about 30% cattle are bred through AI and the rest are served through natural mating or even remain not served due to shortage of bulls. The overall conception rate through AI in cattle is ranges from 38-62%. Problem in the field related to AI services include poor awareness of farmers, unskilled technician, irregular supply of liquid nitrogen, long distance, inappropriate detection of heat and insemination at the wrong time. The early diagnosis of cyclicity and pregnancy can also improve the efficiency of AI services. The main goal in a commercial dairy operation is to optimize calf production per cow as economically as possible. 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 for natural mating or artificial insemination (***Kamal, 2010***).

Accurate measurement of fertility is an important part of any organized artificial insemination program. The major factors determining fertility in artificial breeding are: (1) The fertility of males used to produce the semen; (2) the care with which the semen is collected, processed and stored; (3) the skill of the inseminating technician; and (4) management of the females.

The dairy farm of Bangladesh consists of different breeds with different age’s of cows and the cows’ fertility/conception rate of artificial insemination varies with the ages and breeds. Therefore, the present study was conducted to investigate the efficiency of AI and to identify the factors responsible for poor conception under the commercial dairy farming condition with the following objectives:

* To know the breeds and age groups of cows under commercial dairy farm.
* To determine the conception rate of different dairy cows under commercial dairy farm.

**CHAPTER-II**

**2. REVIEW OF LITERATURE**

The review of literature of this study is presented as under the following captions.

**2.1 Breeds and breeding**

The cattle of Bangladesh are mainly non-descriptive (Zebu type) and their average milk production is about 0.5 to 2.5 liter milk per day ***(Hossain et al., 2002 and Khan et al. 2005****).* In addition a number of different temperate and tropical pure and crossbreds such as Holstein-Friesian, Sahiwal, Jersey and their crosses are available and their average milk production is about 5 to 10 litre of milk per cow per day **(*Khan et al., 2005, Khan 2009 and Khan et al. 2012****)*. In addition there are three improved varieties such as Red Chittagong, Pabna and White Munshi gonj cattle are available. In Bangladesh, the commercial dairy farming is increasing and the farmers rear mainly Holstein breed and its crossbreds ***(Khan et al., 2005***). Generally the cows are breeding with frozen semen of different temperate and tropical breeds through artificial insemination. However, the local cows are bred with the natural service using the available local bulls. Artificial insemination is the most widely used tools in animal breeding and from 1971 these programmes are operating in Bangladesh. The Central cattle breeding station of Department of Livestock Service (DLS) are executing this programme through the production of breeding bulls, crossbred heifers and semen of 6 cattle breeding farms. AI are mostly by using of frozen semen and are carried out by 23 AI centre, 490 AI sub-centre and 664 AI points at union council level. An amount of taka 30 is fixed as AI charge but taka 100 is charged from the farms for each insemination. There are about 8% crossbred cows are available in Bangladesh (BBS, 2006). However it can be seen that the success of AI programme is dependent on a number of factors such as: bulls breeding ability, quality of semen, stage of estrus of cows, time of insemination, cows age, nutrition, farm management and health care and overall breeding management. These factors also influence the cow’s ferity and conception rate and pregnancy rate.

**2.2 Conception rate:**

Conception rate can be defined as the percentage of mating that result in conception. The main goal of a successful dairy farm operation is to produce a calf in a year from a cow ***(Corach, 2010)***. The farm profitability is also depending on how many cows are concept and calves in a year. The conception rate are depend on many factors these are: 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. Bulls influences such as semen quality, size of testis, libido etc.

## 2.3 Number of services per conception

The number of services per conception (NSC) depends largely on the breeding system used. It is higher under uncontrolled natural breeding and low where hand-mating or artificial insemination is used. A range of values for NSC is presented in Table 1. NSC values greater than 2.0 should be regarded as poor, and some of the factors contributing to high NSC values are elaborated below.

***Choudhuri et al (1984)*** estimated the repeatability of NSC to be 19% from 2152 records for Haryana cattle. The NSC was 2.81 ±0.03 and was significantly affected by herd, season, placenta expulsion time, lactation length and milk yield. Since heritability can be broadly estimated from repeatability, this study indicates that heritability of NSC is low and most of the variation in NSC is attributable to environmental factors.

Table-2.3.1. Some estimates of the average number of services per conception (NSC)

|  |  |  |  |
| --- | --- | --- | --- |
| Breed | Location | Estimates (NSC) | Source |
| Indu Brazil | South America | 1.4-1.6 | Temblador and Sanchez (1977) |
| Nagori | India | 1.5 ±0.4 | Sharma (1983) |
| Dangi | India | 1.65 | Purbey and Sane (198 |
| Zebu | Ethiopia | 1.74-1.8 | Azage Tegegn et al (l98 |
| East African Zebu | Ethiopia | 2.0 ±1.2 | Alberro (1983) |
| Haryana | India | 2.1-2.7 | Kumar and Bhat (1979) |
| Various | India | 2.1-3.6 | Qureshi (1979) |
| Arsi | Ethiopia | 2.4-2.6 | Swensson et al (1981) |
| Haryana | India | 2.8 | Choudhuri et al (1984) |

***Sharma and Bhatnagar (1975)*** found a significant effect of parity on NSC in Sahiwal, Red Sindhi and Tharparkar cattle. The NSC was highest at the fourth lactation for F1 crosses with Brown Swiss. ***Kumar and Bhat (1979)*** noted that Haryana heifers needed more services per conception than cows.

***Azage Tegegn et al (1981),*** using 3 local Ethiopian breeds, the Barca, Horro and Boran, found that NSC was lower for animals from wet areas than for those from drier areas (1.74 ±0.6 vs 1.98 ±0.07). Crossbred cows required 0.12 and 0.14 fewer services per conception than local zebu cows in wet and dry area23s, respectively.

***El-Amin et al (1981)*** concluded that NSC did not differ significantly between Red Butana and Red Butana crosses (average 2.6) but was influenced by month of calving. NSC increased over the study period, probably due to changes in management. This is partly supported by an analysis by ***Busch and Furstenberg (1984)*** of 483 600 inseminations performed by 379 technicians on 623 farms in the USA, which showed that the 90- and 120-day non-return rate differed significantly among inseminators and the inseminator effect was greater than the farm effect. However, non-return rate did not differ among bulls.

**CHAPTER-III**

**3. MATERIALS AND METHOD**

**3.1 Study population and study period**

The study was conducted on different dairy cattle breeds under a commercial dairy farm (Liza dairy farm) in Chittagong district. During January to May, 2012 (during my veterinary undergraduate internship placement tenure) a total of 21cows, 2 bulls, 16 calves, 4 heifers were surveyed with a structured design questionnaire.

**3.2 Survey and data collection:**

Data were collected by me from the selected farm (Liza dairy farm) by direct interviewing through farm visit. Some information was collected from records and some were from direct interviews of the farm owner and also physical observation. The farm management practices were also observed. The questionnaire was also designed to collect the relevant information of Artificial Insemination and conception rate of different dairy cattle breeds.

**3.3 Age estimation**

The age of the animals were estimated as per the following table 3.1

Table 3.1: The age of the animals were estimated by observing the dentition of the animals as are shown below:

|  |  |
| --- | --- |
| Sl. No. Teeth | Age of cow |
| Two or more of the temporary incisor teeth | At birth to 1 month |
| First incisor(I1) | 1.5-2 Years |
| Second incisor(I2) | 2.0-2.5 Years |
| Third incisor(I3) | 3 Years |
| Fourth incisor(I4 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 its rounded contour and becomes nearly straight by the 12th year. In the mean time, 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 |

**(*Johnson, 1983)***

**3.4 Farm management practices:**

For management were investigated with the following findings:

There were 3 sheds and 2 rooms consisting of cow shed (120/40 ft), calf shed (10’×15’), heifer shed, feed store room and office room. The cows were arranged in tail to tail system. Floor type: concrete without bedding.. They used mash feed.. The water was supplied from the deep motor then supplied through pipeline water. The ration was formulated by the nutritionist.In that farm breeding was done by artificial insemination. The semen used was liquid semen which was collected from A. I. centre. The important records they kept are Milk yield record, Cattle feed register, Calf register, Breeding record, Financial record. The sanitary condition was good. Cleaning of floor is done by washing in the morning by running tap water using disinfectant. There are no serious diseases in cattle. Sometimes FMD and reproductive diseases were found occasionally. The farmer deworm the animals every 3 months interval If there any problem the farmer called for veterinarian and they gave vaccine to the healthy animal.

Table-3.4.1: Vaccination schedule:

Bacterial vaccine:

|  |  |  |  |
| --- | --- | --- | --- |
| Vaccines | Preservation | Dose and Route | Booster |
| Anthrax live spore vaccine | 3-6 month | 1 ml s/c ly | Yearly |
| Black quarter killed | 6 month | 5ml s/c ly | Every 6 month |
| Haemorrhagic septicemia(oil adjuvant killed) | 6 month | 2ml s/c ly | Yearly |

Viral vaccine used:

|  |  |
| --- | --- |
| FMD Vaccine | Monovalent 3 ml s/c ly every 6 month  Bivalent 6 ml s/c ly  Trivalent 9 ml s/c ly |
| Rinderpest | Dissolved in 100 ml distilled water and administered 1 ml/animal of 6 months old |
| Antirabies | Calf(>30 lb): 10 ml daily for 7 days  Heifer: 20 ml for 14days  Cattle: 30 ml for 14 days |

**CHAPTER-IV**

**4. RESULT AND DISCUSSION**

Breed composition of surveyed farm, percentages of different genotypes of cows and the different age groups under commercial dairy farm in Chittagong are shown in the Table 1 and Table 2, respectively. From these tables it can be seen that the herds under commercial dairying in Chittagong are consisting of different genotypes (Holstein-Friesian × Local, Sahiwal × Holstein-Friesian, Local).

Table-4.1. Percentage of different categories of animals in different genotypes under commercial dairy farm in Chittagong

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

Legends: L×H =Local × Holstein; S × H=Sahiwal × Holstein.

The highest percentage of cows with Holstein genetics and the local cows percentage was lower in the studied farm (Table 1). It may be due to the higher productivity and adaptability of Holstein genetics. Khan (2009) and Azam, (2012) reported that the Holstein genetics number was higher than other genotypes in the commercial farms in Bangladesh. Similar results were also reported in the other studies (***Das et al., 2011; and Rahman et al., 2007).*** The no. of alive calves were higher in Sahiwal and Holstein crosses (40%) and more or less similar in Local and Holstein × Local crosses. In case of bull the percentage was almost similar in both Sahiwal X Holstein and Holstein × Local crosses. In case of Heifer, the percentage was higher in Local than Holstein × Local cross and Sahiwal × Local crosses. It may be due to poor conception rate, perinatal mortality, death as young stock, failure to conceive or abortion. The farm owner wants to maintain their cow in production up to maximum level. So they try to keep the best genotypes those are more productive.

Table-4.2. Percentage of different breed groups under different ages in commercial dairy farm

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

Legends: L×H =Local × Holstein; S × H=Sahiwal × Holstein.

Table-2 shows that the proportion of Holstein genetics were reared more time (up to 9 years) than all other genotypes. It may be due to their higher production of milk. Similar causes was identified by (Azam 2012).

Table-4.3. Average ± standard deviation of daily milk yield for different age of cows in different breeds

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Genotypes | Total | Age structure | | | | | | Level of significance |
| 4 | 5 | 6 | 7 | 8 | 9 |
| L×H | 10 | - | - | 16.75b ± 3.59 | 17.5b±2.89 | 15.0 | 19±1.00 | NS |
| S×H | 7 | 15.5 ±0.5 | 20.00b ± 00 | - | 18.00b | 18.33±5.77 | - | NS |
| Local | 4 | - | 12.5ab ± 3.54 | 8a | 9.00a | - | - | \* |
| Level of significance |  | - | \* | \*\* | \*\* | NS |  |  |

Legends: L×H =Local × Holstein; S × H = Sahiwal × Holstein

\*P<0.05 and \*\*P<0.01

From the table-3, it was seen that Holstein crosses had higher productive life (up to 9 years) under farming conditions. It may be due to their optimum production. On the other hand, Local breed had lower productive life. The cause may be due to their genetics. Khan (2009) reported percentage of milking cows was higher in Sahiwal × Friesian cross and lower in Jersey × Pabna crosses. Local × Holstein and Sahiwal × Holstein possessed high average ± standard deviation 20±00 and 19±1.0.

Table-4. Effect of age and breeds on conception rate & Service per conception

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Breed | Age | Conception rate(%) | Breed average | Service per conception | Breed average for service/conception |
| L×H | 6 | 45.63±39.71 | 60.37±25.68 | 4±3.16 | 2.71ab±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±17.69 | 3.5±2.12 | 3.88b±1.4 |
| 5 | 33.3±00 | 3±00 |
| 7 | 16.6±00 | 6±00 |
| 8 | 71.4±49.54 | 3±3.46 |
| Local | 5 | 58.3±58.97 | 86.1±19.66 | 3.5±3.53 | 1.83a±1.18 |
| 6 | 100±00 | 1±00 |
| 7 | 100±00 | 1±00 |

Legends: L×H = Local × Holstein; S × H = Sahiwal × Holstein

In Table-4, it was observed that within the Local and Holstein cross the service per conception rate was higher in 6th year 4±3.16 and lower in 9th year 1.5±0.5. In Sahiwal and Holstein cross the higher service per conception rate was in 7th year 6±00 and lower in 5th year 3 ± 00. The average service per conception rate was 2.71±1.93 in Local and Holstein cross, 3.88 ± 1.4 in Sahiwal and Holstein cross and 1.83 ± 1.18 in Local breeds. ***Azage Tegegn et al (1981)*** found that Crossbred cows required 0.12 and 0.14 fewer services per conception than local zebu cows in wet and dry areas, respectively.

Again the average conception rate of Local and Holstein cross was 60.37±25.68, Sahiwal and Holstein cross was 39.08±17.69 and Local breeds were 39.08±17.69. Within Local and Holstein cross breed the conception rate was higher in 9th years (75±12.5) and lower in 6th years (45.63±39.71). Within Sahiwal and Holstein cross breed the conception rate was higher in 8th years (71.4±49.54) and lower in 5th years (33.3±00). Within Local breeds the conception rate was lower in5th years (58.3±58.97) and was 100% in next conceptions. The variation of conception rate with breeds may vary with the variation of ages and with the different breeds. Similar factors were reported by Corach, (2010).

**Conclusion**

From the present study, it was found that the Holstein cows reared in higher proportion than other genotypes under farming conditions in Chittagong area. Holstein genetics had more conception rate, lactation length as well as higher service per conception rate when Artificial insemination was practiced. As they had higher productive live and a good source of upgrading the local breeds the farmer kept Holstein-Friesian × Local crossbred calves more in number. Findings of this study indicated that selection of appropriate genotypes for Artificial Insemination would increase the conception rate and also permits upgrading of deshi cattle to upgraded milk yield as well as in crossbred cows in farming condition in the Chittagong area of Bangladesh.

**Limitations**

The main limitation of the report was that only one farm studied. The numbers of data of per genotype and the period of study were less and the associated factors that affected the result of the study.

**Recommendation**

Further intensive study on conception rate after introducing Artificial Insemination practices of different genotypes under farming condition is needed for making final commands.

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