Factors influencing conception rate after Artificial Insemination of cows in char areas of Rangpur District in Bangladesh

A THESIS
BY

SHYAMOL KUMAR SARKER
Registration No. 1305163
Session: 2013-2014
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MASTER OF SCIENCE (MS)
IN
ANIMAL SCIENCE

DEPARTMENT OF GENERAL ANIMAL SCIENCE AND NUTRITION

HAJEE MOHAMMAD DANESH SCIENCE AND TECHNOLOGY UNIVERSITY, DINAJPUR, BANGLADESH

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ABSTRACT

Artificial Insemination (AI) is being widely used as a breeding tool although there is limited access to use it in Chars areas due to remoteness. Most of the cows of Chars areas are zebu type and producing 1-2 liters of milk per day. It is intricate to get maximum return from cattle rearing without improving fertility of cows. For increasing cattle population and milk yield per cow, crossbreeding with superior bull's semen using Artificial Insemination (AI) technique as well as increasing conception and pregnancy rate of cows is essential to introduce in char areas. The profitability of cattle rearing mostly depends on a good conception rate after artificial insemination (AI). The efficiency of the AI technique and the fertility of cows depend on many factors. Any deficiency reduces fertility resulting in economic losses. Cow's fertility is commonly measured by calculating the percentage of cows that one pregnant after a single service, also known as the conception per artificial insemination (PR/ FAI). A total of 184 cows were selected two chars of Rangpur District of Bangladesh to identify the potential factors such as body weight, breed, age, body condition score (BCS), season and artificial insemination(AI) technician associated with first service conception rate. Overall, service per conception was 1.8 AI was required for each pregnancy. The highest ($P<0.05$) pregnancy rate (57.44%) was observed in local cows than other crossbred cows. Cows of 3.1-5.0 years of old revealed higher ($P<0.05$) conception rate than that of the cows of 2-3 years old. The higher ($P<0.05$) conception rate (64.10%) was in cows of BCS 3.5 than lower BCS 2.5 cows. The conception rate was higher ($P<0.05$) in cows weighing between 131-150 kg (59.10%) than the other body weight. Cows showed significantly ($P<0.05$) higher CR (60.00%) compared to other season. The less skilled AI technician had significantly ($p<0.05$) poor performance to skilled AI technician (62.50%). The conception rate is commonly measured by calculating the percentage of cows that fall pregnant after a single service, also known as the pregnancy per artificial insemination (PR/ FAI), Quintela *et al* 2004). The work on improving fertility of heifers in the *chars* areas are not well documented and are relatively unknown. Considering the above facts and circumstances, this study was designed to determine the first AI conception rate in heifers of the char's areas.

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The Author

LIST OF ACRONYMS AND ABBREVIATIONS

1st = First

2nd = Second

3rd = Third

A = Angus

AF = Africander

AI = Artificial Insemination

AW = Average Weight

B = Brahman

BR =Brangus

CFS =Calving to first service

CI =Confidence interval

et al. =And his associate

DMRT=Duncans multiple range test

F =Frisian

G =Gram

H =Hour

HF =Holstein Friesian

Kg =Kilogram

L =Local

LSD=Least significance different

MS =Microsoft

N =Number

PR/FAI =Pregnancy rate to first artificial insemination

SL =Sahiwal

SPSS =Statistical package for social science

Vs =Versus

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CHAPTER-I

INTRODUCTION

Dairy farming plays a vital role in improving the livelihood of poor and marginal people in Bangladesh. The major constraints of profitable dairying is low conception rate (CR) or pregnancy rate (PR), services per conception, calving to first service interval, days open and poor heat detection rate. Shamsuddin et al., (2001); Paul et al., (2011). Artificial Insemination (AI) is one of the tools for genetic improvement through male line. The average conception rate of local and crossbred cows (L× HF and L×SH) were 42.5 and 45.2 to 53.1%, respectively Shamsuddin et al., (1997). The productivity of cattle is low because of poor genetics Alam et al., (2001), poor nutrition (Ghosh et al., 1993), insufficient veterinary services and marketing access Shamsuddin et al., (2007). The season of insemination might be the important factors to get maximum conception rate in cows Miah et al., (2004).

In the Summer season, heat stress of dairy cattle markedly affects the pregnancy rate 25.4%, Ricardo et al., (2004). Economy of dairy farming largely depends on a good pregnancy rate achieved through AI. The low conception rate and other fertility indices after Al are affected by health status of the bull, semen collection, processing, preservation, transportation, proper heat detection, AI at correct time, insemination in friendly uterine environment and keeping of AI record. Paul et al. (2011) reported that the efficiency and skillness of AI technician play the most important role for pregnancy rate of cows. Furthermore, the parity, breed and age of the inseminated cows also found to affect the conception rate after AI. Pirgachha, Rangpur is a flood and monga (work less) affected area, but it is a densely cattle populated area. Proper management of cattle by introducing AI could be a tool for emancipation of the people from the poverty.

Department of Livestock Servics (DLS) holds about 15% share of the AI done in the Chars area and Bangladesh Rural Advancement Committee (BRAC) has the second share (85%). The work on improving fertility of heifers in the char areas are not well documented and are relatively unknown. Considering the above facts and circumstances, this study was designed to determine the first AI conception rate in heifers of the char areas and investigate the risk factors responsible for low conception rate at first AI.

CHAPTER-II
REVIEW OF LITERATURE

2.1 Conception rate

Conception rate refers to the percent of cows diagnosed pregnant out of total number of cows inseminated. In a population, the conception rate (CR) is not always found to be constant. According to Olds et al. (1978) the conception rate may decrease by about 5 percentage unit at each successive service. Foote and Hall (1979) investigated a relationship of the number of time of insemination with the CR and actual rate in the group of cows between 150-180 days non return rate (NRR). They found that 68.2% of cows receiving 1 time insemination had 65.6% CR and 57.3% calving rate, 64.6% of cows inseminated 2 times had 59.4% CR and 52.7% calving rate, 70.1% cows inseminated 3 times had 54.2% CR and 47.6% calving rate, 66.3% of cows inseminated 4 times had 33.9% CR and 41.7% calving rate, and 63.5% of cows inseminated 5 times had 33.3% CR and 31.2% calving rate. Balachandran (1975) recorded an average CR of 53% of first insemination. Freer (1981) recorded a CR of 89% for cows inseminated by natural service and 43% and 76% for cows inseminated artificially one and twice in a cycle, respectively. Lee and Hinks (1986) reported an average of 10% lower CR than the NR. He reported that CR decreased in relation to number of insemination (e.g. 26.2% and 28.1 % to second insemination, and 19.0% and 13.7% to third insemination).

2.2 Factors affecting the conception rate

2.2.1 Breed of the cow

One of the few studies reporting extensively on the effect of breed on fertility in Africa (Thorpe and Cruickshank 1980) for conception rate (averaging 82.5, 78.1 and 75.4% among 675 Angoni, 731 Barotse and 815 Boran cows, respectively) although conception rate was higher in Angoni and Barotse cows when mated to bulls of their own breed. Evidence for dam breeds was also not conclusive. Among the Barotse, dry heifers had higher conception rates than lactating cows, whereas lactating percentage of motile sperm after freezing and thawing, and the percentage of morphologically normal sperm at the time of collection were lowered in aged bull than young bulls. Nevertheless, many older bulls that are kept after clinical and Angoni and Beran cows had higher conception rates than dry cows. Perhaps the most significant observation among the Angoni and Barotsc (but not the Beran} was that cows that calved early in the calving season were more likely to conceive during the following mating season than cows that calved late. This was consistent with observations by Trail et al. (1971) on Ankolc and Boran cows in Uganda.

2.2.2 Age of cow

The effects of age on the fertility of cows and bulls arc difficult to assess. Since they arc complicated by many factors. Environmental factors such as season of the year. management practices and nutritional status frequently affect one age group more markedly than other. A number of studies regarding the effects age on fertility has been Nebel et al . (2004) reported from their study of 12621 cows and heifers bred by artificial insemination. That fertility increase up to 2 years of age leveled on until 6 years of age and then gradually declined. Herman (1956) surveyed a larger sample of cattle bred by artificial insemination and con finned the earlier reports Spalding et al. (1974) reponed a slight increase in the fertility of cows lip to 3 to 4 years of age and a decline after 8 years of age. The)' found a marked decline in fertility in the cow over 7 years of age. Schiling and England (1968) studied the effect of age on fertility in beef cows and reported that fertility is highest in cows between 4 and 9 years of age and decline alter 10 years of age. Dohoo (1983) staled that there is a decline in fertility with advancing age and a decrease in ovulation rate due to lack of gonadotrophin release from the pituitary. A deterioration in the quality of eggs ovulated with subsequent fertilization, resulting in embryonic or fetal loss or uterine failure due to hormonal imbalance or deficiency may occur in advanced age. Gwesdawskas et al. (1975) found that CR declined with age as follows: heifers 47.6%, young cows 42.7%, and older cows 31.9%. The fertility of' the bulls decline with advancing age even though spermatogenesis is continuous (Bishop 1970). Tenable and Salisbury (1946) found that the fertility of bulls used in artificial insemination reached a peak at 3 to 4 years of age and then gradually declined Bishop (1970) did not find a routinely measured semen characteristic related effect on fertility in relation to age but Hahn et al.

(1969) reponed that sperm output the andrological examination in artificial insemination centers are as fertile as younger bulls. Kim et al. (1983) found a significant effect of age on sperm concentration and motility. Rao and Bane (1985) stated that there was a marked correlation existed between the age of the bulls and the incidence of abnormal sperm heads in the ejaculates of young, middle aged and old bulls. The corresponding figures for proximal cytoplasmic droplets were 0.8%, 1.9% and 4.3%, respectively. The authors found a highly significant ($P<0.01$) differences for normal heads and significant ($P<0.05$) differences for proximal cytoplasmic droplets between young and old bulls. Similar trend was observed by them between the incidence of abnormal sperm tail and age. Tomar et al. (1985) reported that ejaculate volume, mass activity and live percentage of spermatozoa increased with growing age of the bulls while live abnormal percentage of spermatozoa decreased simultaneously.

2.2.3 Season of the year

There are a number of conf1icting reports in the literature concerning the fertility of cattle at different seasons and the months of the years. Salisbury et al. (1978) reviewed the seasonal variation of fertility. They reported that the fertility is high in spring and low in summer. They also stated that the seasonal variation of fertility could be due to possible changes in nutrition from season to season. The lowest fertility was recorded ill winter in areas where extreme ill day light occurred (Sweetmann, 1950). Mercier and Salisbury (1947a) stated that the conception rate (CR) was significantly correlated with monthly average length of day light, with a lag of 1 to 2 months from the longest days to the maximum fertility. Gonzalez (1981) reported highest conception rate (65.8%) for cows mated in January to March, gradually decreased in April to June (59.9%) and July to September (58.7%) and the lowest (55.4%) in October to December. Ron et al. (1'984) reported largest differences in CR among insemination' months (23.5 to 5l.5%). Nuidu (2000) found that most calving occur in winter (November to February), followed by summe (March to May), and the monsoon (June to October). Rognoni and Visrnara (1962) found a highly significant difference in CR among months of the year varying from 47% in February to 59.5% in November. They assumed that the variations attributed to climatic and nutritional factors.

Mia et al. (1963) observed a significant: difference in CR. They reported highest CR in April to May (61.5%) and December to January (60.9%) and lowest in June to July (45.5%) and August to September (47.5%). They concluded that there is a seasonal influence on fertility which is probably related to nutrition and environmental temperature. A significant effect of season on the frequency of calving was observed by Mukherjee (1973). He reported more calving during the period from December to April (47.5%) than during May to November (37.4%). Agarwal (1974) analysed 6 years data on sexual activity of heifers of Kankrej breed and found 50.5% of the total number of the heifers manifested oestrus in monsoon, 38.5% in summer and 11 % in winter and the respective CR were 49%, 32.7% and 18.3%, respectively. Anfir et al. (1982) stated higher CR ill cows inseminated in winter (January to March, 472 to 56.7%) than in cows inseminated in summer (July to September; 30.8%, to 48%) regardless of the season or semen collection and storage duration. Balachandran et al. (1983) found similar result of seasonal variation. Ali et al.(1983)

reported that summer insemination results significantly lower fertility rate than insemination in other seasons. Vergas et al. (1981) demonstrated that the conception of cows mated or inseminated in April to June was higher than that of cows bred in August to October. Bedot (1985) reported highest conception rate in February (46%) and lowest in November. Martinez et al. (1985) recorded a CR ranging from 53.3% to 78.3% for cows inseminated in January. They found a CR of 69.7% and 67.5% for cows inseminated in the rainy and dry season respectively. Dutta et al, (1982) indicated a significant ($P<0.05$) and a highly significant (P<0.0l) effects of months and seasons of insemination on CR, respectively. Rao et al. (1992) reported 58.6%, 55.6% and 55.0% CR during summer, winter and rainy season, respectively. Alam and Ghosh (1988) reported that there is no tendency of seasonality in Bangladeshi cows, but the frequency and oestrus and calving varied greatly in different months of the year. Variable observations arc also reported concerning the effect of season on the fertility of bulls. Mercier and Salisbury (1947b) found that fertility of bulls was lowest in winter, improved gradually in spring and reached a high in summer and fall. The effect of season on male reproductive efficiency has been reviewed by Lodge and Salisbury (1970). Salisbury (1968) reported that the fertility of semen collected in August and September was lower and embryonic mortality was higher than any other month. The author also found that the semen collected in the warm summer months did not maintain fertility during storage as well as semen collected in the cooler months. Sullivan and Elliot (1968) reported similar findings for seasonal effect on bulls. Everett and Bean (1982) stated that December is the best month for total sperm production even though June and July are the months for most volume of seminal fluid production. Doho et al. (1983) reported a marked seasonal variation of reproductive functions of bulls. He found lowest ejaculate volume (3.0ml) in summer. He also reported that season counted for 24.5%, 16.2%, 13.2%, and 3.0% of total variation in ejaculate volume, sperm concentration, sperm motility and semen pH, respectively. Libido of bulls is highest in spring. Sexena and Tripathi (1986) found significant effect of seasons on semen characteristics of bulls. The authors stated that in the rainy, autumn, spring and summer seasons, semen volume ranged from 2.8 to 4.3ml, progressive sperm motility (scale 0-5) from 3.6 to 4.3, sperm motility from 70.3% to 77.5%, sperm concentration (X106/ml) from 650 to 1310, number of spermatozoa per ejaculate (X 106/ml) from 2585 to 3352, live spermatozoa from 78.4% to 92.0% total sperm abnormalities from 9.4% to 15.1% sperm head abnormalities from 1.8 to 5.08% and methylene blue reduction time from 248.3 to. 547.3 second. Kim et al. (1983) indicated a significant effect of months on sperm concentration. lbrahim et a1. (1983) observed a significant seasonal effect on ejaculate volume, mass activity, (P<0.05) progressive motility and heat resistance of spermatozoa (P<0.01). They found the ejaculate volumes and motility were superior in spring, and sperm concentration and number of spermatozoa in autumn. Tomar et a1. (1985) reported a poor mass activity during winter and a less spermatozoa concentration during summer season.

2.2.4 Body weight of cows

Sarder et al. (1997) reported that the cross-bred cows weighed more (264-400 kg) than the local nondescript cows (178). Holstein-Friesian (HF) cross-breed cows yielded 2.5 kg more milk daily than that of local cows. Regarding the onset of post partum estrus the local cows required the longer time (149 days) and the HF cross-bred cows required the shortest interval (119). Consequently, the local cows remained open for the longest period (158).

2.2.5 Body Condition Score (BCS)

Body condition score at calving has the greatest effect on conception rate during a controlled breeding season Lalman et al., (1997). The feeding practices of animals are reflected by the BCS of the animals. Providing adequate quantity of balanced diet to animals will help to gain good BCS resulting in satisfactory conception rate. Higher conception rate in cows with good BCS than that in cows with poor BCS has been documented by Shamsuddin et al., (2001) in Bangladesh. The main cause of poor reproductive performance could be due to poor health management, incorrect nutrition during and after calving (Dziuk and Bellows, 1983). Inadequate dietary intake and decreased utilization of some nutrient may result in delayed onset of ovarian activity by preventing release of gonadotropin from the pituitary Nolan et al.,(1988); Randel, (1990); Osawa et al., (1996). Balanced nutrition with better management help to maintain general health condition of the cow that stimulate the endocrine system through the activation of the cow that stimulate the endocrine system through the activation of the hypothalamo-pituitary-ovarian axis to work properly and thereby improved reproductive performance Morrow, (1980); Fitzpatrick, (1994).

Feeding programmes at pre and post calving period helped in initiating the earlier post-partum onset of ovarian cyclicity Broaster, (1998). Poor energy deficient diet in the late pregnancy and early lactation is associated with reduced ovarian function Lalman et al., (1997). Accordingly the interval between calving to first post-partum service varies between the cows with or without supplementation of concentrates Shamsuddin et al., (1997). It is well established that cows in early lactation cannot consume enough energy yielding nutrients to meet the demand of production and maintenance. Energy balance (EB) is the difference between net energy consumed minus the net energy required for maintenance and production Butler and Smith, (1989).Energy restriction influences reproductive function through depression of GnRH release in hypothalamic centers in the brain Butler and Smith, (1989); Schillow, (1992). GnRH simulates release of Luteinizing hormone (LH) from the pituitary. LH stimulates ovulation and help in the maintenance of luteal function in the ovary. The importance of nutrition and energy balance with respect to post-partum ovarian activity has been reported elsewhere Sasser et al., (1988); Britt, (1995); Ferguson, (1996).Energy availability has been considered to regulate gonadal activity by modulating the release of GnRH, LH at various reproductive phases. It was found that reduced nutrition decreases energy intake to inhibit gonadal function through the suppression of GnRH/LH secretion in ruminants Ohkura et al., (2000). Experimental models with Sheep have demonstrated that fasting or glucose deprivation suppresses pulsatile LH release. From those experiments, the information on energy deficiency is considered to be detected by specific central sensors and conveyed to the hypothalamus to regulate by specific central sensors and conveyed to the hypothalamus to regulate LH release as well as food intake Maeda et al., (2003). It is not surprising that post-partum ovarian activity was more closely associated with milk production than with total digestible nutrient intake Whitemore et al., (1974). Thus, it seems logical that the interval to first estrus is related to energy balance. But supplying sufficient energy to avoid body weight loss and to support optimum reproduction is a huge challenge with high producing taurine breed cows. However, managing feeding to minimize the negative effects of an energy deficit can help improve reproductive performance. Crude fiber is listed as a nutrient since ruminants have a specific need for a minimum amount of fiber in order to maintain good rumen health and to prevent certain other metabolic disorders that may influence reproduction. Post-partum cows deficient in dietary crude protein had reduced pituitary responsiveness to a GnRH challenge and thus delay the onset of post-partum ovarian cyclicity Nolan et al., (1988).

2.2.6 Effect of AI technicians on conception rate

Hassan (2003) stated that the number of cows inseminated by inseminator number 1 and those by inseminator number 2 were 155 and 221 cows, respectively. That shows that inter estrous interval was not affected by inseminator ($P>0.05$) although it was above average for both groups (> 34 days); ideally, this interval should have been below 30 days, and as mentioned earlier, many factors might have been responsible for this extending the average inter estrous interval. Optimum conception rate occurs when inseminators detect heat early and accurately, handle semen correctly and deposit the semen in the proper site in the genital tract at the right time. That is why the inseminator performance is of great importance when compared to other variables such as herd nutrition, season and semen quality. It is critical to monitor conception rate for each inseminator on a monthly basis, so that poor performance can be identified and corrected. The difference in overall conception rate for each inseminator in the present study was limited ($p = 0.2$), although conception rate tended to be lower for inseminator 1 (69%) vs. inseminator 2, (75%). As a whole, conception rate after three or more inseminations for both inseminators was low since many cows were inseminated more than three times. The average number of services per conception was the same (2.5 AI conception rate) for both inseminators, indicating that both inseminators were of similar qualification and experience. However, average days open for pregnant cows was significantly higher for cows inseminated by inseminator 1 (86.7 ± 3.3) than those inseminated by inseminator 2 (77.4 ± 1.8). As mentioned earlier, there is a high correlation between average days open and heat detection rate, and poor heat detection leads to increased calving interval.

CHAPTER-III

MATERIALS AND METHODS

3.1 Study area:

This study was conducted from July, 2014 to June 2015 in the two chars (Shibdeb and Sawla) of Pirgachha Upazilla under Rangpur District.

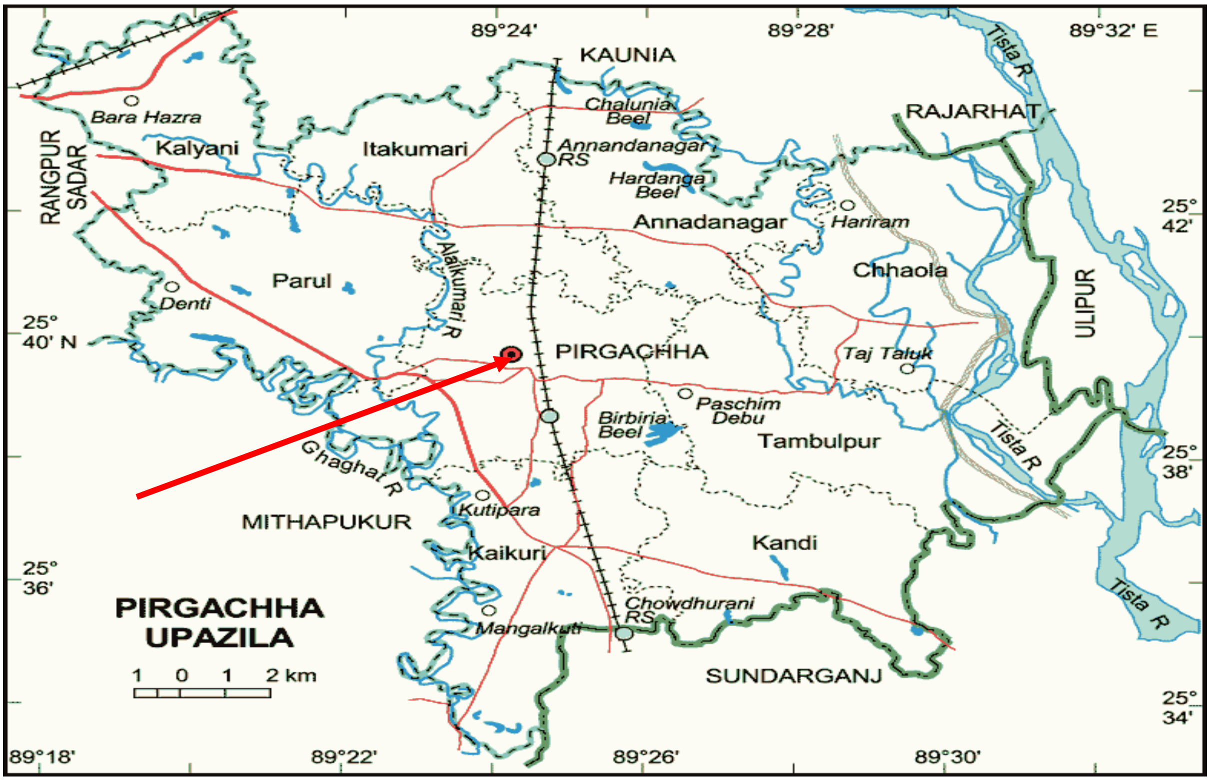

Figure: Map of the study area in Pirgacha Upazila

3.2 Preparation of a Format for Data Entry

For collection of information, a format was used for keeping the data. The format contained following information.

a. Date of data collection.
b. Name and address of farmers.
c. Breed, age, body weight and BCS of cows.
d. Date and time of estrus.
e. Date and time of AI.
f. Name of AI technician.
g. Breed of used semen.

h. Result of pregnancy diagnosis.
i. Humidity.
j. Temperature etc.

3.3 Animal selection and management

A total of 184 cows of different breeds, age, body weight, BCS were selected at Shibdeb n=100, Sawla n=84 under Pirgachha Upazilla, Rangpur. Animals were vaccinated against Foot and Mouth Disease, Anthrax, Hemorrhagic Septicemia. All animals were dewormed orally using bolus containing tetramisole hydrochloride (2.0/g) and oxyclozanide (1.2/g) per 100-150 kg body weight.

Animals were grazed from early morning up to noon (mid day) and fed 4-6 kg green grasses mixed with 2-3 kg straw daily as evening meal. Few farmers were able to supply 150/g mixed concentrate (rice polish, wheat bran, broken rice and oil cake) per animal.

3.4 Grouping of animal

3.4.1 Breed of cows: Three breeds were selected as follows:

(i) Local (Indigenous cow)
(ii) Local × Holstein Friesian
(iii) Local × Shahiwal

3.4.2 Age of animal

The age of cows was determined by observation of teeth eruption. The age of cows were divided into the following three groups:

(i) 2-3 years
(ii) 3.1-5.0 years
(iii) > 5years

3.4.3. Body weight

Body weight of cows were determined using measuring tape (Changhai, Chaina). The cows were divided in to the following groups:

(i) Up to 130 kg
(ii) 131- 150 kg
(iii) 151-180 kg

3.4.4 Determination of BCS of Animals

The BCS of the cows/ heifers was determined by eye estimation. The BCS was measured by 1-5 scale. The BCS of inseminated cows were divided into the following four groups.

(i) 2.5

(ii) 3.0

(iii) 3.5

(iv) 4.0

3.4.5 Artificial insemination (AI) technician

The trained AI technician was considered. The animals were divided into following four groups according to their name and their skilled to AI.

(i) Mr. Mizanur Rahman (4 years)

(ii) Mr. Morshedul Islam (6 years)

(iii) Mr. Sanaulla (1 year)

(iv) Mr. Rustom Ali (5 years)

3.4.6 Season of year of Artificial Insemination

Seasons of artificial insemination were divided into following four groups.

(i) Summer season (May - July)

(ii) Rainy season (August - October)

(iii) Winter (November - February) and

(iv) Spring (March - April)

3.5. Estrus detection and timing of AI

The estrus of cows was detected by observing following signs:

(i) Dorling of mucous from vagina

(ii) Bellowing and

(iii) Excitement

(iv) Frequent Micturition

(v) Jumping to other animal

(vi) Inappetence

The instruments were washed with tube well water and the metal instruments were treated with boiling water before use. It was checked, and adjusted the water temperature in the thawing flask within a range of 35°-38°C. The straw was placed in the thawing water as quickly as possible and leaved it there for a minimum of 12 seconds. Approximately 20 cm of paper was tearing off. By using fingers the straw were removed from the thawing flask and dried it with a paper towel. The straw was held by the manufacturer's end after drying completed. The insemination gun was removed from the clips on the inside of the kit box lid. The plunger of the gun was pulled back about 120-180 mm. The straws were hold by the end the manufacturer's end was thread into the gun as far as it would gun. It was prepared to cut-off the laboratory end of the straw by thoroughly cleaned and dried scissors. The loaded gun was hold vertically at eye level and clean sharp scissors a horizontal cut was made 10 cm above the gun to remove the crimped end. A sheath was placed over the barrel of the gun. The sheath was pushed through the leveled centre hole of the locking ring and twisted it down on the conical seat of the gun. The loaded AI gun was held in mouth. Plastic disposable gloves were used. A small quantity of glove lubricant was applied. The vulva was thoroughly cleaned of dung and dirt by wiping it with the piece of paper used on the tail. A cone was formed with the gloved fingers and inserted hand into the rectum. The lips of the vulva were parted. The gun was inserted cleanly betweens the lips of the vulva into the vagina. The semen was pushed to the body of uterus. The gun was removed slowly from the vagina. The arm was withdrawn slowly from the rectum of the cow.

Fig.:1.1 Liquid Nitrogen Tank with Vacuum Insulation

Fig.:1.2 Artificial Insemination Gun

Fig.:1.3 Straw Loading with Semen

3.6 Pregnancy Diagnosis by rectal palpation

All inseminated animals were subjected to pregnancy diagnosis by per rectum examination after 60-80 days post AI. The result of pregnancy diagnosis was recorded.

Fig.:1.4 Pregnancy Diagnosis by rectal palpation

3.7 Statistical analyses

The data generated from this study were entered in Microsoft Excel Worksheet and descriptive statistics were performed. The conception rate in different analysis was expressed as percentage. Statistics was performed to calculate the mean, standard deviation/error percentages of total conception rate. The data were analyzed by DMRT using SPSS soft ware version 17. The variation in conception rates was considered significant when the P value was < 0.05.

CHAPTER-IV
RESULTS

A total of 184 cows were inseminated with frozen semen by different AI technicians. The inseminated local cows were larger in number than others breeds than crossbred cows.

4.1 Effects of Breeds on Conception rate:

Effects of breeds on conception rate of inseminated cows are presented in Table 1. There was a significant (P<0.05) breed effect on conception rate, the conception rate was higher in local cows (57.44%).

Table1. Effects of breeds on conception rate in cows

Breeds	No. of cows inseminated	No. of cows pregnant	Conception rate (%)
Local	141	81	57.44 a
Local× Holstein Friesian	33	16	48.48 b
Local× Sahiwal	10	04	40.00 c
Total	184	101	54.90

Values bearing different letters within a column differ significantly (P< 0.05)

4.2 Effects of Age on Conception rate

Effects of age of cows on conception rates are presented in Table 2. The conception rate with respect to different ages ranged from 51.00 to 58.75. The conception rate in cows at 3 to 5 years age was higher than that of others age groups.

Table 2. Effects of age on conception rate in cows.

Age group (years)	No. of cows inseminated	No. of cows pregnant	Conception rate (%)
2-3 years	49	25	51.00 c
3.1-5 years	80	47	58.75 a
>5 years	55	29	52.72 b
Total	184	101	54.89

Values bearing different letters within a column differ significantly (P< 0.05).

4.3 Effects of Body Weight on conception rate:

Effects of body weight on conception rates of cows are presented in Table 3. The conception rate with respect to different body weight ranged from 38 to 59.1%. The conception rate in cows ranged from body weight 151 kg to 180 kg, which was higher (59.1%) than that of others. The difference was significant (P<0.05).

Table 3. Effects of body weight on conception rates in cows.

Body weight	No. of cows inseminated	No. of cows pregnant	Conception rate (%)
Up to 130 kg	21	08	38.00 c
131to 150 kg	115	68	59.10 a
151 to 180 kg	48	25	52.10 b
Total	184	101	54.90

Values bearing different letters within a column differ significantly (P< 0.05)

4.4 Effects of Body Condition Score (BCS) on conception rate:

Effects of BCS on conception rates of cows are presented in Table 4. The conception rate with respect to cows having different BCS ranged from 35.48 to 64.10. The highest conception rate was observed in BCS group 3.5. The significantly lowest conception rate (P<0.05, 35.48%) was observed in cows having lower BCS (2.5) compared with other groups having BCS 3 to 4.

Table 4. Effects of BCS on conception rates in cows.

BCS	No. of cows inseminated	No. of cows pregnant	Conception rate (%)
2.5	31	11	35.48 d
3.0	55	30	54.5 b
3.5	78	50	64.10 a
4.0	20	10	40.00 c
Total	184	101	54.90

Values bearing different letters within a column differ significantly (P< 0.05)

4.5 Effects of AI Technician on conception rate:

Effects of AI Technician on conception rate of cows are presented in Table 5. The conception rate with respect to AI Technician ranged from 51.11 to 62.50%.The conception rate in cows inseminated by Mr. Rustom was higher (62.50%) than that of others.

Table 5. Effects of AI Technician on conception rate in cows.

Name	No. of cows inseminated	No. of cows pregnant	Conception rate (%)
Mr. Mizanur Rahman	45	23	51.11 d
Mr. Morshedul Islam	63	33	52.38 c
Mr. Sanaulla	36	20	55.6 b
Mr. Rustom Ali	40	25	62.5 a
Total	184	101	54.90

Values bearing different letters within a column differ significantly (P< 0.05).

4.6 Effect of season on conception rate in cows:

Effects of season on conception rates of cows are presented in Table 6. The conception rate with respect to cows in different season ranged from 45.00 to 59.60%. The highest conception rate was observed in winter season. The significantly lower conception rate (P<0.05, 45.50%) was observed in cows in rainy season.

Table 6: Effects of season on conception rate in cows.

Seasons	No. of cows inseminated	No. of cows inseminated	Conception rate (%)
Seasons Summer (May-Jul)	48	26	54.10 c
Rainy (Aug-Oct)	45	22	48.80 d
Winter (Nov-Feb)	55	33	60.00 a
Spring (Mar-Apr)	36	20	55.60 b
Total	184	101	54.90

Values bearing different letters within a column differ significantly (P< 0.05)

CHAPTER-V
DISCUSSION

The overall conception rate in cattle using frozen semen was 54.9% which is in agreement with Shamsuddin et at. (2001). This rate was, however, similar to Biochard et al. (1994) and Fcngxum (1997). Bach (1983) reported that highest (79%) and lowest (61.8%) conception rate may be obtained when cows were inseminated at strong or weak estrus signs, respectively. Insemination with increased proportion of abnormal spermatozoa beyond the normal limit may induce lower fertility (Iarson, 1988). Other factor which may increase or decrease the conception rate may be of sexual health status of the female reproductive organs. Proper maintenance of the liquid nitrogen level in the container and faulty technique of using frozen semen in AI practice. Present study reveals overall conception rate in artificially inseminated cows was 56.8%, which partially agrees with khan et al. (2008). This is in agreement with the previous study done by Khan (2008) who found 59.30% conception rate in cows. This is also similar with Paul (2010) and Mullah (2011), they found overall conception rate 57.30 and 57.70%, respectively using frozen semen. The conception rate due to 1^{st} service in the present study is partially similar with other studies using frozen semen in cows (Mullah, 2011 and Shamsuddin et al., 2001). Conversely, Freer (1981) recorded a conception rate of 43% and 76% for cows AI using frozen semen at first and second cycle, respectively. The variation in conception rate using frozen semen among studies might be due to variation in management of cows and agro-climate conditions in different studies. The first service conception rates in different breeds of cows were Local (57.44%), L×HF (48.48%), L×SW (40.00%). The association between breeds of cows and PR/FAI was significant (P<0.05). It is supported by Gwazdauskas et al. (1975), they observed a conception rate of 33.8, 34.6, 37.0, 35.5 and 48.4% for Ayrshire, Brown Swiss, Guernsey, Holstein-Friesian and Jersey respectively. This is supported partially by Japri et al. (1997) and Rao et al. (1992).The conception rate in cows 2-3 years, 3.1-50 years, and 5.1-7.0 years of age was 51, 58.75, and 52.72%, respectively. It shows that the first service conception rate of 3-5 years and 5-7 years of old was higher (58.75% and 52.72%) than that of 2-3 years (51%). The association between age of cows and PR/FAI was significant (P<0.05) .This is supported by Spalding et al. (1975) who reported that a slightly increase in the fertility of cows up to 3 to 4 years of age and decline after 4 years of age and marked decline in fertility in the cow over 7 years of age. The reason for low conception rate in young cows in the present study may be explained by the fact that these cows may have suffered more from negative energy balance than middle aged grown cows. Moreover, the older cows might have more chance to get subclinical uterine infection resulting in lower conception rate. The conception rate at different body weight of cows up to 130kg, 131-150 kg and 151-180 kg groups were 38.00, 59.10, and 52.10% respectively. The conception rate in cows from 131 kg to 150 kg body weight was higher (59.10%) than that of others. This is disagrees with the previous study done by Saacke et al. (1991) .They reported that the reproductive performance of heavier cows more than lighter counterparts. The reason for high conception rate in cows from 151 kg to 250 kg body weight in the present study may be explained by the fact that in these group most of the cows are indigenous. Sarder et al., (1997) reported that the overall fertility was better in local nondescript cows than in Holstein-Friesian cross-bred animals. However, statistically the effect of different body weights of cows on conception rate was significant ($P<0.05$).The conception rate in cows having BCS-2.5, BCS-3.0, BCS-3.5 and BCS-4.0 were 35.48, 54.50, 64.10 and 40.00% respectively. The conception rate in cows having BCS 3.5 was higher (64.10%) than that of others. Cows having BCS 2.5 were showed lowest conception rate (35%). The association between BCS of cows and PR/FAI was significant ($P<0.05$). Providing adequate quantity of balanced diet to animals will help to gain good BCS resulting in satisfactory conception rate. Higher conception rate in cows with good BCS than that in cows with poor BCS has been documented by Shamsuddin et al. (2001) in Bangladesh. It was found in a number of studies that nutrition manipulation can result in changes in gonadotrophin secretion. The cows (BCS 3) deficient in adequate quantity of balanced feed had reduced pituitary responsiveness to a GnRH challenge (Nolan et al., 1988). Four AI technicians were involved in conducting AI in cows. The experience of AI technicians was different. The experience of was 4, 6, 1 and 5 years, respectively. The performances on AI technicians Mr. Mizanur, Mr. Morshedul, Mr. Sanaulla and Mr. Rustom Ali on conception rate to first service was 51.10, 52.38, 55.60 and 63.60% respectively. The association between AI technicians and PR/FAI was significant .This finding is agreement with the report of Hassan (2003) and Shamsuddin et al. (2001).The study was divided into four seasons of a year such as summer (May - July), rainy (August-October), winter (November - February) and spring (March - April) and the conception rate in different seasons were 54.10, 48.80, 60.00 and 55.60% respectively. The PR/FAI of summer (May - July) season (55.60%) was higher than rainy (August - October) season (48.80%).

The association between seasons of AI and PR/FAI was significant ($P<0.05$). In the summer season, heat stress (29°C) of dairy cattle is markedly affecting the conception rate (25.40%)

of dairy cattle (Ricardo et al., 2004). The green grass is available in winter (November-February) and Spring (March-April) and more scarcity of grass is in the rainy season (August-October). The season of insemination might be the important factors to get maximum conception rate in cows (Miah et al., 2004).This finding is agreed with Quintela et al. (2004) who stated Calving season was a significant factor for low PR/FAI. The results showed that autum calving predispose to lower conception rates than other calving season (Quintela et al. 2004). It is reported that small ovarian follicles are susceptible to heat stress (Badinga et al., 1993; Wolfenson et al., 1995) and that takes above 40-50 days for small antral follicles to develop into large dominant follicle (Lussier et al., 1987). Ahmed et al., (1992) studied the seasonal effect on conception rate of cows in Bangladesh and recorded the highest conception rate (62.10%) in spring followed by summer (51.60%), winter (47.80%) and rainy (41.50%). The author suggested that the spring (February to march) may be the best season for good fertility of cows and heifers in Bangladesh.

CHAPTER-VI
SUMMARY AND CONCLUSION

The present study was conducted for a period of one year in two chars of Pirgacha upazilla under Rangpur District of Bangladesh with 184 cattle to evaluate the effects of genetic and environmental factors on first service conception rate. The data were recorded from the examinations performed on cows and interviewing the farmers confirming cow's pregnancy at farmer's residence/farm. Conception rate considered as sole trait which was defined as whether a cow conceived or not following after 60 to 90 days of insemination as confirmed by rectal palpation Ball, (1980). In the present research, considered contributing factors were cow genotype, age of cow, body weight, Body condition, Season, AI technician, Data were analyzed by Least-squares procedure Snedecor and Cochran, (1980) using a computer program Harvey, (1990) to find out the effect of each factor upon the trait under study. Moreover, depending on their relative contribution to conception rate, suggestions regarding fertility improvement of cow in the AI services of Bangladesh were put forward.

From this study, it was observed that conception rate of the cows were significantly affected by the breed of cattle ($P<0.05$), body weight cattle ($P<0.05$), Season of AI ($P<0.05$), AI technician ($P<0.05$), body condition of the cattle ($P<0.05$). The highest conception rate was observed in the cows which were Indigenous local cows (57.40%) of 3-5 years of age having 3.5 body condition score and (64.10%), not draught (53.62%), milking (45.32%) and which were inseminated by Local × Holstein Friesian (F3) bull (47.00%) at the site of deep cervix (58.43%) by inseminator 1 (54.26%) at 10-13 h after onset of estrus (52.34%). It was concluded that the factors, site of insemination and inseminator are the most important factors to get maximum conception rate of the cows.

The age of cow, milking or not, use in draught or not will be difficult to control from the stand point of small farmers economy and biology of cow. Whereas, the site of insemination and inseminator's skill remained the factors to give top emphasis in order to achieve desire cow conception rate. So, it may be suggested for the farmers that to achieve the desire rate of conception, they should inseminated their cows at the site of deep cervix by technically sound and skill inseminator.

CHAPTER-VII
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