FACTORS AFFECTING ON THE CONCEPTION RATE OF DAIRY CATTLE AT FIRST SERVICE IN CHAR AREAS OF NORTHERN BANGLADESH

A THESIS

BY

MD. MONIRUZZAMAN
Registration No.: 1205026
Semester: January-June, 2014

MASTER OF SCIENCE (M.S.)

IN

GENETICS AND ANIMAL BREEDING

DEPARTMENT OF GENETICS AND ANIMAL BREEDING
HAJEE MOHAMMAD DANESH SCIENCE AND TECHNOLOGY UNIVERSITY
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May, 2014


DEDICATED TO
MY BELOVED PARENTS

ACKNOWLEDGEMENT

At first the author is thankful to Almighty Allah, Darood and Salam to RasulullahSallallahoAlaiheWasallam.

The author expresses his heartfelt gratitude, profound appreciation and indebtedness to his respected Supervisor Abdul Gaffar Miah, PhD, Associate Professor and Chairman, Department of Genetics and Animal Breeding, Hajee Mohammad Danesh Science and Technology University, Dinajpur for his untiring guidance, valuable suggestions, affectionate encouragement, helpful comments and continuous supervision throughout the period of the study and preparing the Thesis.

The author dreams it a proud privilege to acknowledge his boundless gratitude and best regards to his honorable Co-supervisor Ummay Salma, PhD, Associate Professor, Department of Animal Science and Nutrition,Hajee Mohammad Danesh Science and Technology University, Dinajpur for her valuable advice, constructive criticism and factual comments in upgrading the research work and the Thesis.

The author grateful to his honorable teacher Mst. MamunaSharmin, Lecturer, Department of Dairy and Poultry Science, Hajee Mohammad Danesh Science and Technology University, Dinajpur for her valuable advice, suggestions and helpful comments during the period of research work and progress of this Thesis.

The author is specially expressing his deepest sense of boundless gratitude and immensely indebted to his father, mother, wife, sister and brother who put up a high ambition about the authors higher studies and sacrificed their happiness to the cause of the author's education.

The author wishes to pay his gratefulness to Layla Yasmin and Mr. Md. ShahriorSiddique for their continuous invaluable suggestion and hearty co-operation during his higher study.

Cordial co-operation friendly collaboration, fruitful advice and guidance were received from many persons from the starting to the ending of this work. The author is immensely grateful to all of them and regrets for his inability to mention every one by name.

The Author

ABSTRACT

The study was conducted on the char areas of eight districts in namely Bogra, Sirajgonj, Pabna, Jamalpur, Kurigram, Nilphamari, Rangpur, Gaibandha, respectively. However, data was collected from January, 2012 to December, 2013 by the structured questionnaires, informal interview and group discussion. A total of 800 local, 800 Holstein-Frisian (L×HF) and 800 Red Chittagong (L×RC) crossbred cows were selected for this study. Feeding and management of the experimental animals were uniform throughout the year. Animals were vaccinated and dewormed regularly. Cows generally were grazed in the field and supplied 5–6 kg straw daily at evening. In improved feeding system cows were grazed in the field and supplied ready feed (a mixture of rice polish, wheat bran, broken rice and oil cake; @ 2–3.5 kg/d/head) with 5–6 kg straw. The cows accessed ad libitum fresh drinking water with iodized salt.

The results revealed that though first service conception rate was not significantly influenced by cows genotypes, but it was significantly influenced by bull genotypes when the RC crossbred cows inseminated naturally by local bull (73%) than the cows inseminated (AI) by the semen of L×HF crossbred bull (61%). The cows showed moderate conception rate inseminated naturally by L×RC crossbred bull (66%). The conception rate of cows is influenced by the quality and quantity of semen, it was higher in the cows inseminated by using the semen supplied by Department of Livestock Services as compared to the semen supplied by the Ejab, even though the semen of BRAC. The variations in conception rate were actually due to the ultimate variability of semen quality which were depends on bull genotype, semen collection technique, processing, preservation, heat detection, experience of AI technicians, etc. Farmers who use professional Al technicians from reputable Al organizations usually have fewer concerns about semen quality being a major cause of low conception rates. It was higher in the cows inseminated in spring season than the cows were inseminated specially in summer season. It was

significantly varied on the experience of AI technicians. The conception rate was significantly higher in the cows were 2.5−3.0 years old (68 %) than the cows were 4.5−5.0 years old (54%). Conception rates were significantly higher in the cows provided improved diet, and managed under regular vaccination and deworming practices.

Therefore, it may be suggested that to achieve the satisfactory conception rate in char areas, the farmers should inseminate their cows during spring season with experience AI technician by using good quality semen. They may choose to rear Red Chittagong cows or their crossbreds. They should provide concentrate feed at least a minimum amount and have to practice of regular vaccination and deworming to their cattle.

Keywords: *char areas, cattle breeding, factors, conception rate.*

Abbreviation and symbols

AI: Artificial Insemination

BBS: Bangladesh Bureau of Statistics

BQ: Black Quarter

FAO: Food And Agricultural Organization

FMD: Foot and Mouth Disease

HS: Hemorrhagic Septicemia

BRAC: Bangladesh Rural Advancement Committee

CLP:Chars Livelihoods Program

DLS: Department of Livestock Services

etc. Etcetera (and others and so forth)

et al Et alia (L) and others

FAO: Food and Agricultural Organization

GDP: Gross Domestic Product

HS: Hemorrhagic Septicemia

HF: Holstein-Friesian

Kg: Kilogram

L: Local

$L \times G^2$: Length of body × Heart Girth square

mg: Milligram

No. Number

NGOs: Non Government Organizations

Red Ctg: Red Chittagong

Sh: Shahiwal

SEM: Standard Mean Error

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CHAPTER I

INTRODUCTION

CHAPTER I
INTRODUCTION

Bangladesh is a densely populated agriculture based country with a significant number of populations still live below the poverty line. The depth and severity of poverty is worse in rural areas with 80% of the poor living there. Agricultural development is the main key to alleviate poverty from the country (BBS, 2010).More than 85% of the population engaged in agricultural activities for their sustainable livelihoods (World Bank, 2004). It is a large potential country for developing livestock farming. It has played a vital role in the developing rural farmers. The magnitude of contribution of the livestock sub-sector to the GDP is 6.5%. It generates 13% of the total foreign exchange earnings and provides fulltime employment about 20% of the rural population (BBS, 2010).

Although the growth of livestock production is the highest among all other sub-sectors of agriculture in Bangladesh (Bangladesh Economic Reviews, 2007), the production and consumption of livestock products is still much lower in comparison with other countries. In Bangladesh cattle is an inseparable and integral part of the agricultural farming and agribusiness system. Surprisingly, Bangladesh has one of the highest cattle densities: 145 large ruminants/km^2compared with 90 for India, 30 for Ethiopia, and 20 for Brazil. But most of them trace their origin to a poor genetic base (Sprott*et al.*, 2001)

About 24.5 million cattle heads are distributed throughout the country, which ranks 12th in the world and 3rd in the Asian countries (FAO, 2010). Among the total cattle population about 3.79 million is dairy cattle where 92% of them are non-descriptive indigenous and only 8% are crossbred (BBS, 2010). Milk yields are extremely low: 200−250 liter during a 10-month lactation period in contrast to 800 liter for Pakistan, 500 liter for India, and 700 liter for all of Asia (Shamsuddin*et al.*, 2001). Despite highest cattle densities in Bangladesh, the current production of milk, meat and eggs are inadequate to meet the current requirement (FAO, 2010). Low productivity of indigenous cows is the major constraint for future development of livestock sector. On the other hand, high productive exotic breeds and their crosses normally do not have adequate resistant against the prevalent diseases. They do not develop well in hot humid climatic condition of Bangladesh (Islam, 1992).

The number of crossbred cattle is increasing day by day by the grading up program with artificial insemination (Al) practices throughout the country. The reproduction of indigenous cattle is low compared to improved breeds of cattle (Rahman*et al.*, 1998). Reproductive efficiency is measured by conception rate, which is associated with a steady increase in average milk yield per cow per year (Lucy, 2001). Improving fertility is a common goal for many dairy herds or livestock owners. Getting cows pregnant in a timely manner is important in maintaining a profitable dairy business. Reproductive performance in dairy cows has declined over the last 25 years in Bangladesh, with an increased number of days open and decreased conception rate (Silvia, 1998). Conception rates are influenced by a variety of factors. Management and environmental factors account for 96% of the variation in conception rates. Herd differences in nutrition, metabolic disorders, reproductive health, heat detection, insemination practices and climate can result in significant differences in conception rates. The remaining 4% of variation in conception rates is due to genetic factors with 3% for the cow and 1% for the service bull (Kathy, 2004). These small values indicate that improvement in conception rates due to genetic selection will occur at a relatively slow rate. Nonetheless, given the significant economic importance of conception rate, some selection for improved fertility may be justified in a herd's genetic program.

Though cattle rearing and management on the mainland is comparatively easy to char areas of Northern Bangladesh due to the availability of necessary resources and facilities such as feeds, housing, treatment, etc. However, it is very difficult in the char (remote, riverine sand islands) areas that are affected by erosion and flood annually. At the char areas in Bangladesh, small and large-scale dairy farms have been increasing day by day.

In these areas, Red Chittagong (RC) cattle were the firstpreference to the farmers and the second was Holstein-Friesian (L×HF) and Shahiwal (L×Sh) crossbreds. At char areas in Bangladesh cows are kept mainly in the stall with limited grazing on the embankment slope; fallow land and paddy straw are their staple food.

Husbandry practices and health care of these animals are very poor with reproductive performance (Jabbar and Raha, 1997). Although more than 50% of the cattle farmer at char areas in Bangladesh contribute significantly to dairy production in the country, their involvement in livestock program is generally faced some constrain (Lucy, 2001). Farmers tend to be small-scale, have little education and with limited access to the resources that could improve productivity. Most of the cows of char areas are indigenous and crossbred with high levels of genetic dilution (Rahman*et al.*, 1998; Alam, 2001), poor nutrition (Alam, 2006) weak herd health and poor marketing access. As a result, farmers in char areas are unable to maximize the returns from rearing indigenous cattle. So, improving the fertility of their cows would be an important step in increasing the returns from cattle breeding program. Crossbreeding with superior bull by using AI technique also offers potential increasing the cattle population and milk yield per cow in char areas. Different national and international NGOs have taken initiatives to develop their livelihood by small-scale dairy farming in char areas by providing some necessary inputs with veterinary services. They gave the emphasis on the improvement of fertility of the cattle available in char areas with farmers' limited resources.

Profit for both dairy and beef depends upon successful breeding. Neither milk nor meat can be produced without good conception rate. Thus numerous approaches have been developed to increase the likelihood and opportunities for successful breeding of cows in heat. But there was no systemic study with systemic breeding program to success their visions and missions. However, a great paucity of appropriate research activities was created due to unavoidable situations in char areas.

Moreover, there was no study with variable conception rate in char areas of Northern Bangladesh. Therefore, the study was designed with the following objectives:

(i) To identify the factors associated with variable conception rate of dairy cattle

(ii) To investigate the effects of the conception rate of dairy cattle in char areas of Northern Bangladesh.

CHAPTER II

REVIEW OF LITERATURE

CHAPTER II

REVIEW OF LITERATURE

This chapter presents the review of relevant literature, this include the conceptual and theoretical frame works of the study, which consist of the importance of conception rate of cattle in Bangladesh. Conception rate refers to the percentage of the cows are conceived (pregnant) out of total number of cows inseminated. Shamsuddin*et al.* (2001) reported an average conception rate of local cows was 62.2% in Mymensingh District of Bangladesh. The author suggested that the nutritional condition of the cow at calving and thereafter, weaning age of calves, frequency of suckling, cattle rearing system, accuracy of estrus detection, interval between estrus and AI, the estrus signs and semen quality were the important determinants of conception rate. They also said that the skill of AI technicians and breeding seasons were very important factors in evaluating conception rate. Capital conception rate depends mainly on body weight, skill of inseminator, estrus detection of cows, quality and quantity of spermatozoa in semen, proper thawing procedure of semen, placement of semen in the uterus, calving to service interval and herd size (Hodel*et al.*, 1996; Jainudeen and Hafez, 1993; Talukder*et al.*, 2001; Shamsuddin*et al.*, 2001). Conception rate was higher in cows with marked vulvar swelling (63%) than those with slight or imperceptible swelling (48%) (Shamsuddin*et al.*, 2001). Cows with clear genital discharge had higher conception rate (61%) than those with turbid (43%) and purulent or no genital discharge (37%) (Shamsuddin*et al.*, 2001).

2.1 Genotype of cows

Miah *et al.* (2004) observed the highest conception rate was in indigenous local cows (46.14%) and lowest (35.39%) in L×HF, but they did not observed significant ($P>0.05$) differences in conception rate among the different genotypes of cows. Gosh (1995) found almost similar results that had no significant difference in first service conception rate for different genotypes of cows (L×HF, 50.00%; L×Sh,

43.75% and L×J, 43.75%). Gwazdauskas*et al.* (1975) also reported that they found no significant difference in conception rate due to genotypic variation of cows. But Rao*et al.* (1992) observed higher conception rate of indigenous cows than other genotypic groups. Besides this, Marongiu*et al.* (2002) reported that conception rate was significantly ($P<0.01$) higher in Sarda cows (95%) than Charolasis×Sarda cows (57%). Miah *et al.* (2004) observed no significant difference in conception rate due to the genotypes of the cows.

2.2 Effect of bull genotypes

Bull fertility is an important factor that influences conception rate. The fertility of bulls may vary due to different known and unknown factors. Miah *et al.* (2004) observed no significant difference in first service conception rate among the cows inseminated by the semen collected from different genotypes of the bull. The conception rate of cows is influenced by the quality and quantity of semen which vary according to different breeds of bulls as well as their feeding, management, etc. Different genetic groups of bull have significant effect on sperm motility, sperm concentration and normal spermatozoa percentage, whereas non- significant effects were found on the traits like volume, live-dead and pH of the spermatozoa (Akhter*et al.*, 2013).

2.3 Effect of semen quality

Conception rate also depends on the quantity and quality of semen. To achieve the high rate of conception, insemination should be done by high quality semen. The quality of semen depends on storage condition, thawing procedure and handling (Randy *et al.*, 2004). When semen is purchased from reputable AI organizations, quality of semen must be assured by strict quality control procedures.

There are many factors associated with the quantity and quality of semen output of which normal sperm morphology is one of the most important considerations. The quality of semen in relation to fertility is determined by the morphological features

of spermatozoa, percentage of live spermatozoa concentration and motility of spermatozoa and the ejaculated volume.

The length and breadth of sperm cell add to the quality in respect of fertilizing capacity. According to Kumar *et al.* (1977), conception rate was significantly co-related with sperm head shape. Amann and Linde-Forsberg (1974) reported that total sperm per ejaculate increased with age of the bull up to 7.5 years and then decreased. The normal sperm of farm animals are about 50-60μ long and are similar in appearance and size (Hafez, 1970). The study on measurement of spermatozoa also may help in selecting males for breeding purposes by observing the spermatozoa shape, size, etc.

2.4 Effect of season

Stress associated with high temperatures in combination with high humidity is known to decrease conception rate in cows (Sprott*et al.*, 2001). Ingraham *et al.*(1974) showed that the conception rate of dairy cows declined from 55 to 10% when the temperature-humidity index increased from 70 to 84. Heat stress delayed puberty in heifers, caused anestrous in cows, depressed estrous activity, induced abortions, and increased prenatal mortality. This infertility is potentially caused by elevated body temperature that influences ovarian function, expression of estrus, oocyte health, and embryonic development (Lucy, 2001). Dunlap and Vincent (1971) reported 0% conception in beef cows that had an average body temperature of 40°C and conception rates of 82, 67, and 55% for cows with body temperatures of 38.9, 39.2, and 39.8°C, respectively. Other reasons for impaired reproductive performance in cows during hot weather may include decreased intensity of estrus, failure to ovulate, lack of implantation, embryo disintegration, and fetal abortion (West, 2002).

2.5 Efficiency of AI technicians

Faulty insemination technique is a major factor causing low conception rate in many herds. Correct semen placement is critical. Minnesota Research Institutes indicates

that the major difference between Al technicians with high conception rates and those with low rates was semen placement.

Only 30% of low conception technicians deposit semen in the body of the uterus due to lack of proper training and experience. Eighty-six percent of the technicians with high conception rates deposit semen correctly. Majority percentage of AI workers can't detect estrous properly. Because progesterone levels are always low for 5−6 days around the day they are in estrus (heat). Cows are never in true estrus when progesterone is high. Thus, when progesterone levels are high in milk samples obtained on the day of breeding, the cow is not in estrus. An estrous detection error has been made and the cow has no chance of conceiving since ovulation will not occur. Over 30% of the cows were not in estrus on the day they were bred. This obviously was the major cause of low conception rate. Estrous detection errors were a problem in 30% of467 Northeast herds that recently participated in a Cornell study. From 10 to 50% of the cows bred in these herds were not in estrus. Estrous detection errors are an individual herd problem and should always be considered as a possible cause of low conception rates (Randy *et al.*, 2004). Hasan (2003) stated that conception rate was depended on AI technicians. They also observed that AI technicians did not affect the estrous interval. It was more than 34 days in both groups though this interval should be less than 30 days. However, many factors might have been responsible for this extending the average estrous interval.

2.6 Age of cows

The age of the female can influence first service and overall conception rates. It has been documented in research studies that first service and overall conception rates may tend to be higher in yearling heifers than in cows, provided the heifers have reached puberty and are cycling. Heifers do not have the added stress or production trauma of nursing a calf. When heifers calve as two year olds, studies have indicated that first service conception rates and overall conception rates can be considerably lower, compared to mature cows. Also extremely old cows nearing the end of their production life may have lower conception rates.

2.7 Effect of feeding

About 86.75% of total land in Bangladesh is using for crop cultivation and rest 13.25% is non-cultivated area. Only negligible portions (0.01% of total crop land) are used for feed production (BBS, 2010). More than 90% of the feed consumed by the ruminants at northern char areas in Bangladesh is rice straw as the major feed. Concentrate such as rice polish, wheat bran, different pules bran, oil cakes, fish meal and molasses contribute 6.8% dry matter available for ruminants (Akbar, 1991).

Dairy cows require feed nutrients for maintenance, growth and lactation, and reproduction. The nutrient demands for maintenance (or survival) and lactation have a higher priority of absorbed nutrients than reproductive functions. Therefore, feeding programscan affect the reproductive performance of herd. Dairy cattle can tolerate a fairly wide range of nutrient intakes for a short time without suffering poor reproduction. Serious deficiencies of individual nutrients for an extended period can impair reproduction. Nutrition is an important component of a sound reproduction program. Feeding programs can't correct poor reproductive performance caused by poor management (Randy *et al.*, 2004).

2.8 Effect of deworming

Internal parasites can cause significant production losses in cattle, resulting in substantial economic losses for owners. Often, parasite losses are subclinical and unnoticed but severe infestations can cause disease and even death. Subclinical production losses caused by internal parasites include reduced milk production, reduced weaning weights, delayed puberty and decreased fertility in replacement heifers, reduced pregnancy rates in mature cows, and reduced feed intake, reduced feed efficiency and immune suppression in all classes of cattle. A parasitic relationship exists when one organism (the parasite) benefits at the expense of another organism (the host). The parasite may cause harm to the host -- enough to kill it if not properly controlled.

Parasites can damage and irritate stomach and intestinal linings or mucosae, resulting in reduced digestion and absorption of nutrients from the intestine as well as bleeding and protein loss from the gut. Parasites are normally host-specific, and cattle serve as hosts for a variety of parasites. The major threat to cattle health and performance comes from internal parasitic nematodes (worms), especially those found in the stomach and intestines (gastrointestinal parasites). Pasture management is a critical component of effective parasite control. Cattle production relies on the efficient use of grazing for cost-effective weight gains; however, grazing exposes young cattle to large numbers of parasite larvae if pasture parasite contamination isn't controlled. Most of the internal parasites of cattle are found in the abomasum (true stomach) or small intestine (James, 2012).

The effects of an eight-week strategic fenbendazole deworming program performed by Intervet (Schering Plough Animal Health) on 539 heifers showed that the heifers treated with fenbendazole increased weight by 107 pounds and reached breeding size 68 days earlier compared to the control group. Heifers with a lower parasite burden deliver a better return on investment. They are able to better maximize their feed intake which allows them to enter the milk stream 68 days earlier which means a savings of $2 to $3 per head, per day. Lower parasite burden also means better conception rates so cattle are more productive.

2.9 Effect of vaccination

Maintaining an effective animal health program is an essential part of a successful dairy enterprise. Good animal health is vital for maximum production since cattle must be healthy to reach their performance potential. Studies show that two out of three cows are culled from dairy herds for reasons other than low production. Since each dairy operation is unique, each owner should work with his/her veterinarian to create a herd health plan. Accurate records, including information on medications, vaccinations, wormers, injuries, production, breeding and culling, should be kept on each animal. This information should be used to plan a herd health program. A vaccination program is only a portion of a herd health plan.

It is important to implement a sound herd health program before a disease outbreak occurs. Recommended dairy cattle vaccination programs depend upon the type of operation.

According to the Merck Veterinary Manual (2005), livestock are vaccinated to reduce the economic losses associated with disease. It is usually less expensive to prevent than treat a disease. Many effects of diseases are obvious, such as abortion, diarrhea and respiratory disease. Most diseases can be subtle, showing no outward signs, but can significantly reduce efficiency of production. Vaccination stimulates the animal's immune system to produce protective antibodies that will help combat the invading disease organisms in the animal's body.

CHAPTER III

MATERIALS AND METHODS

CHAPTER III

METHODOS AND MATERIALS

3.1 Study area

The study was conducted under eight districts in Rajshahi, Dhaka and Rangpur Division namely Bogra, Sirajgonj, Pabna, Jamalpur, Kurigram, Nilphamari, Rangpur, Gaibandha, respectively. These areas were selected for this present study considering the following points:

i) Crossbred cattle were available in these areas

ii) Data collection was easier for the researcher, because maximum farmers were under CLP (Chars Livelihoods Program) project

iii) Farmers' cooperatives were available

3.2 Data collection

We collected data by three main methods like frequently field visit and observe the cow of the farmers, individual interview of respondents and record keeping by respondents. Among these methods, the individual interview of respondent method is comparatively fitted well to achieve the objectives of the study. Because dairy cattle farmers at char areas in Northern Bangladesh do not usually maintain records and accounts of their farm operation accurately. The data collection instruments were structured questionnaires, informal interview and group discussion.

Photo 1: The common scenarios of char area areas

3.3 Study period

The project (CLP) activities were started since 2008 where the author was actively involved as a Project Manager. However, data was collected from January, 2012 to December, 2013 by frequent field visits were made by the author. During the period of data collection, the author stayed at the char areas so that the farmers could give information at their convenient time.

3.4 Genotype of cows

There are three genotypes were selected: local (indigenous) cows, local × RC and local × HF crossbred cows where the RC crossbred cows were emphasized for this study.

3.5 Age of the cows

The age of the cows was determined by using teeth formula. The cows were divided into following three groups on the basis of the age category:

i. 2.0–2.4 years

ii. 2.5–3.0 years

iii. 4.5–5.0 years

3.6 Major factors were studied which are associated with conception rate

i) Genotypes of cow

ii) Genotypes of bull

iii) Semen quality

iv) Breeding season

v) Efficiency of AI technician

vi) AI technician trained up from different institute

vii) Age of cows

viii) Feeding system

ix) Deworming and

x) Vaccination

3.7 Animal selection and management

A total of 800 local, 800 L× HF and 800 L×RC crossbred cows were selected for this study. Feeding and management of the experimental animals were uniform throughout the year. The body weight (kg) of the cows was determined by$(L\times G^2)/300$ using measuring tape and divided into three groups, 121−150, 151−180 and 181−200 kg. Animals were vaccinated from project facilities against anthrax, foot and mouth disease (FMD), black quarter (BQ) and hemorrhagic septicemia (HS). All of them were also administrated deworming drug orally using bolus containing Tetramisole hydrochloride (2000 mg) and Oxyclozanide (1200 mg) per 100−150 kg body weight. In traditional feeding system cows were grazed in the field and supplied 5−6 kg straw daily at evening. In improved feeding system cows were grazed in the field and supplied ready feed (a mixture of rice polish, wheat bran, broken rice and oil cake; @ 2–3.5 kg/d/head) with 5−6 kg straw. The cows accessed *ad libitum* fresh drinking water with iodized salt.

Photo 2: Cattle grazing with traditional and improve feeding

Photo 3: Insemination by AI technique

Photo 4: Deworming and vaccination of cattle

Photo 5: Data collection by informal individual interview

Photo 6: Data collection in char areas by women group discussion

3.8 Insemination of the cows and determination of the conception rate

Cows were inseminated using AI technique by trained AI technicians only for one time (considered as first service). In my study area most of the cows in char areas are zebu type, and typically produce 1–2 liters of milk per day. To determine the first service conception rate, the pregnancy diagnosis was done between 60 to 90 days after insemination by rectal palpation at the farmer's house. Then first service conception rate for particular group was determined by the number of heifers or cows given first service multiplied by 100.

$$Conception\ rate\ (\%) = \frac{Number\ of\ pregnant\ cows}{Total\ number\ of\ cows\ inseminated} \times 100$$

3.9 Data analysis

The data collected under this study were analyzed and presented to analytical software MSTAT (version 10.0) for descriptive analysis performed to know the conception rate considering different factors. Chi-square test was also performed to determine the significant level in the percentage values. The values were expressed as mean ± SEM. Differences were considered as significant at $P<0.05$.

CHAPTER IV

RESULTS AND DISCUSSION

CHAPTER IV

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4.1 Effect of cow genotypes on conception rate

The Effect of cow genotypes on first service conception rate is shown in Figure 1. First service conception rate was not significantly (P>0.05) differed among the cows of different genotypes. Miah *et al.* (2004) also observed no significant (P>0.05) difference in conception rate among the different genotypes of cows. Gosh (1995) found almost similar results that there were no significant differences in first service conception rate for different genotypes of cows (L×HF = 50 %, L×SL = 44 % and L×J = 44 %). Gwazdauskas*et al.* (1975) also found no significant difference in conception rate due to genotypic variation of cows. However, the conception rate was higher in L×RC crossbred cows (66%) than that of L×HF crossbred cows (63%), where the conception rate was 65% in local cows (Figure 1). But, Rao*et al.* (1992) observed higher conception rate of indigenous cows than other genotypic groups. Besides this, Marongiu*et al.* (2002) reported that conception rate was significantly (P<0.01) higher in Sarda cows (95%) than Charolasis×Sarda cows (57%). In practices, it is difficult to find out the effect of cow's genotype on their fertility. Environmental and management conditions those might have more influence on fertility.

4.2 Effect of bull genotypes on conception rate in RC crossbred cows

The Effect of bull genotypes on first service conception rate is in RC crossbred cows are shown in Figure 2. Conception rate was significantly (P<0.05) higher in the cows inseminated naturally by local bull (73%) than the cows inseminated (AI) by the semen of L×HF crossbred bull (61%). The cows showed moderate conception rate inseminated naturally by L×RC crossbred bull (66%). However, Miah *et al.* (2004) observed no significant difference in first service conception rate among the cows inseminated by the semen collected from the bull of different genotypes.

Irramain and Owasoyo (1980), Hardin *et al.* (1982), Raju and Rao (1982), Bujarbaruah*et al.* (1982) and Djimde and Weniger (1984) also reported that genotypes of bull did not have significant effect on the conception rate of cows. The conception rate of cows is influenced by the quality and quantity of semen, which vary according to different breeds of bulls as well as their feeding, management, etc. (Akhter*et al.*, 2013) reported that different genetic groups of bull have significant effect on sperm motility, sperm concentration and normal spermatozoa percentage, whereas non- significant effects were found on the traits like volume, live-dead spermatozoa and pH of the semen.

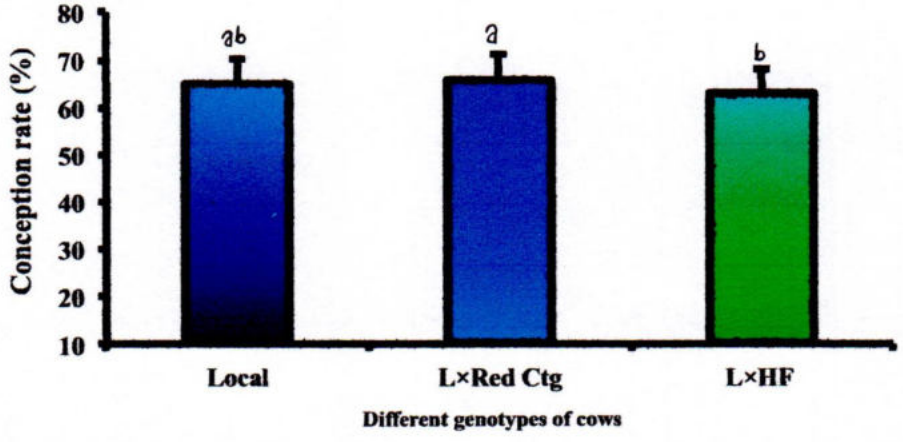

Figure 1: Effect of cow genotypes on conception rate. Each bar with error bar represents Mean ± SEM value. Differences were not significant (P>0.05) among the groups.

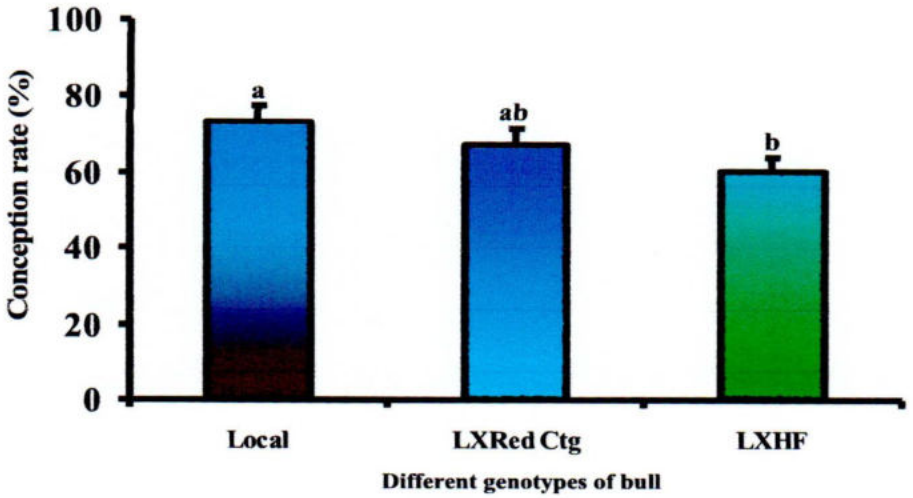

Figure 2: Effect of bull genotypes on conception rate in RC crossbred (L×RC) cows. Each bar with error bar represents Mean ± SEM value. Without a common lower case letter on error bars indicate significant differences ($P<0.05$) among the groups

4.3 Effect of semen quality on conception rate

Effect of bull semen supplied by different institutions on first service conception rate in RC crossbred (L×RC) cows is shown in Figure 3. First service conception rate was higher in the cows inseminated by using the semen supplied by DLS as compared to the semen supplied by Ejab ($P<0.05$), even though the semen of BRAC ($P>0.05$). The variations in conception rate were actually due to the ultimate variability of semen quality which were depends on bull genotype, semen collection technique, processing, preservation, heat detection, experience of AI technicians, etc. (Randy *et al.*, 2004). When semen is purchased from reputable AI organizations, quality of semen must be assured by strict quality control procedures. There are many factors associated with the quantity and quality of semen output of which normal sperm morphology is one of the most important considerations (Kumar *et al.,* 1977). Throughout the world, AI is widely used as a breeding tool.

AI raises productivity of cattle through improving their genetic potentiality, which increases both milk production and weight gain as a result of increased capacity of feed utilization.

4.4 Effect of breeding season on conception rate in RC crossbred cows

Effects of breeding season on conception rate of cows are presented in Figure 9. The first service conception rate was affected by season of breeding the cows. The first service conception rate was 45, 51, 59 and 66% in the cows were inseminated in the summer, rainy, winter and spring season, respectively. Conception rate was higher in the cows inseminated in spring season than the cows were inseminated specially in summer season ($P<0.05$) as well as in rainy and winter seasons ($P>0.05$). Lowest conception rate was in the cows were inseminated in summer season. This result is agreement with the report of Miah *et al.* (2004), they observed higher (53.07%) conception rate in the cows which were inseminated in spring than the cows were inseminated in summer (37.89%) and winter (39.42%). Alam and Ghosh (1988) reported that conception rate of the cows significantly differed in different seasons. The seasonal variations in conception rate of cattle are not only due to the effect of seasons alone but many other factors including influence of bulls (Sexena and Tripathi, 1986) may be involved. Seasonal variation in conception rate might be due to possible changes in nutrition, environmental temperature, and climate and photoperiod. The conception rate of cows markedly reduced when a higher temperature prevails for two days before insemination to 4-6 days after insemination (Gwazdauskas*et al.,* 1975). Higher temperature and relative humidity (Zakari*et al.,* 1981) and poor management affect the fertility of cattle. Therefore, on the basis of all consideration, it may be concluded that spring is the best season for highest conception rate of cows having suitable ambient temperature and humidity in Bangladesh with satisfactory level of available feedstuffs.

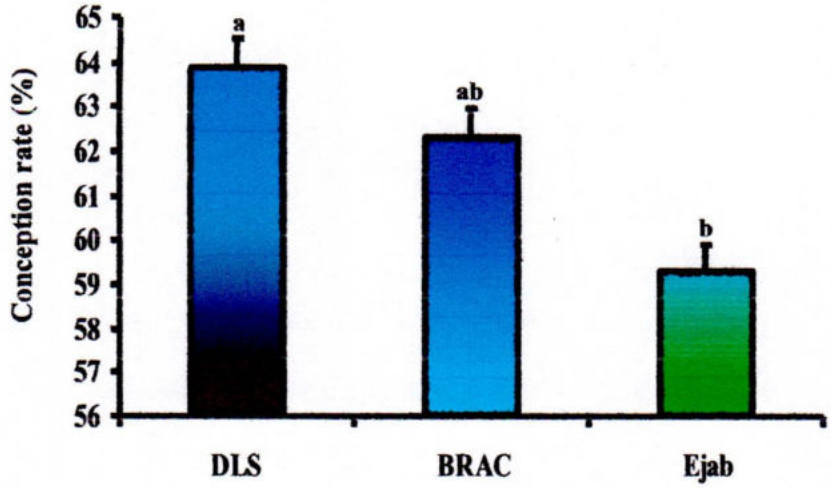

Figure 3: Effect of bull semen supplied by different companies on conception rate in RC crossbred (L×RC) cows. Each bar with error bar represents Mean ± SEM value. Without a common lower case letter on error bars indicate significant differences ($P<0.05$) among the groups.

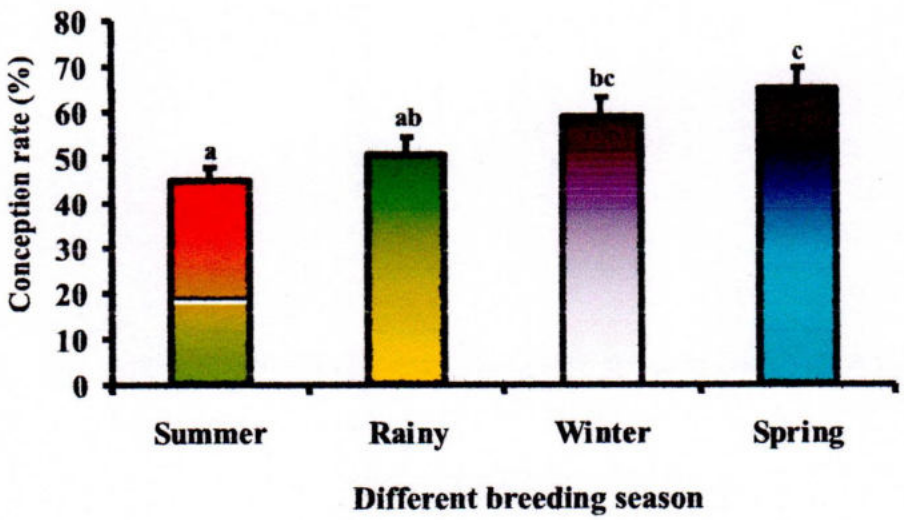

Figure 4: Effect of different breeding season on conception rate in RC crossbred (L×RC) cows. Each bar with error bar represents Mean ± SEM value. Without a common lower case letter on error bars indicate significant differences ($P<0.05$) among the groups.

4.5 Effect of experience of AI technician on conception rate

The first service conception rates achieved by the AI technicians having variable experiences are shown in Figure 5. The first service conception rate was significantly varied ($P<0.05$) on the experience of AI technicians. While the average conception rates were 56, 67, 68% in the cows inseminated by the AI technicians has 1-2, 2-3 and 3-5 years experience, respectively. The first service conception rate was significantly higher in the cows inseminated by the AI technicians having 3-5 years than that of the cows inseminated by the AI technicians having 1-2 years experience. There was a highest conception rate achieved by the AI technicians having 3-5 years experience, and the lowest was achieved by the AI technicians who have experience only for 1-2 years. Although there are no recent publications on the reasons for inter-technicians variability in conception rates.Visser*et al.* (1988) attributed 19% of the explained variation in conception rate to the individual AI technicians. De Kruif (1978) and Barth (1993) cited personal qualities or personal problems as possible reasons for differences in performance between individual AI technicians.

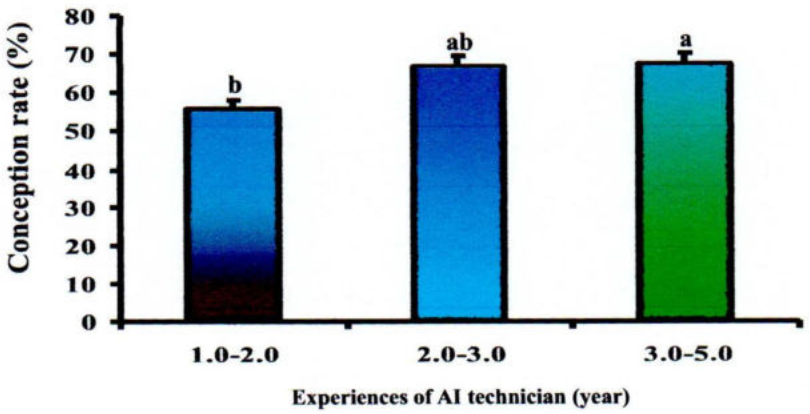

Figure 5: Effect of experience of AI technician on conception rate in RC crossbred (L×RC) cows. Each bar with error bar represents Mean ± SEM value. Without a common lower case letter on error bars indicate significant differences ($P<0.05$) among the groups.

4.6 Effect of age on conception rate in RC crossbred cows

Effect of age on conception rate in RC crossbred cows is shown in Figure 6. Conception rates at first service were significantly differed by the influence of age of the cows. The conception rate was significantly ($P<0.05$) higher in the cows were 2.5–3.0 years old (68 %) than the cows were 4.5–5.0 years old (54%). The conception rate was moderate higher in the cows of 2.0–2.4 years old (61%). Smith (1982) stated that conception rate is generally lower in older cows. In a Virginia study conception rate remained constant (50%) during the first 3 lactations (Nebel*et al.*, 2004). Mufti *et al.* (2010) found that conception rates were 19.4% higher in 1st delivered RC cows than that of the older RC cows attained the 4th or more parities. Conception rate was generally lower in older cows.

Conception rate of heifers and cows delivered 1, 2, 3 and 4 calves were 64.52, 72.73, 64.86, 60 and 53.33%, respectively and differed significantly. Miah *et al.* (2004) observed that the first service conception rate was increased up to 2nd parity and then decreased up to last parity (5th parity). Bhagat and Gokhale (1999) also reported similar results that conception rate increased gradually from the 1st parity to the 4th parity and then decreased in the subsequent parities. XuFengxum (1997) observed higher conception rate in 1st, 2nd and 3rd parities than in the later parities. Biochard and Manfredi (1994) reported that the conception rate in 1st parity of cows was highest (54%) and the lowest in 7th parity of cows (38%). So, it may be concluded that the conception rate in zero to 3rd parity of cows are almost higher than that of subsequent parities.

4.7 Effect of improved feeding on conception rate in RC cows

Effect of improved feeding on first service conception rate in RC crossbred cows was presented in Figure 7. Conception rate was significantly increased by dietary improvement. Higher conception rate was observed in the cows were under improved feeding (straw with concentrate such as rice polish, wheat bran, different pules bran, oil cakes and molasses contribute with some multivitamin) system (61%) than the cows were under traditional feeding system (52%).

This result is agreement with the very recent result demonstrated by Shahriar*et al.* (2014). They also found that supplementation of improve diet increased the conception rate in the cows as compared to the cows supplied traditional diet. Improved diet maintains at least good body condition score which may have greater effect on first service conception rate. Dairy cattle can tolerate a fairly wide range of nutrient intakes for a short time without suffering poor reproduction. Serious deficiencies of individual nutrients for an extended period can impair reproduction. Nutrition is an important component of a sound reproduction program. Feeding programs can't correct poor reproductive performance caused by poor management (Randy *et al.*, 2004).

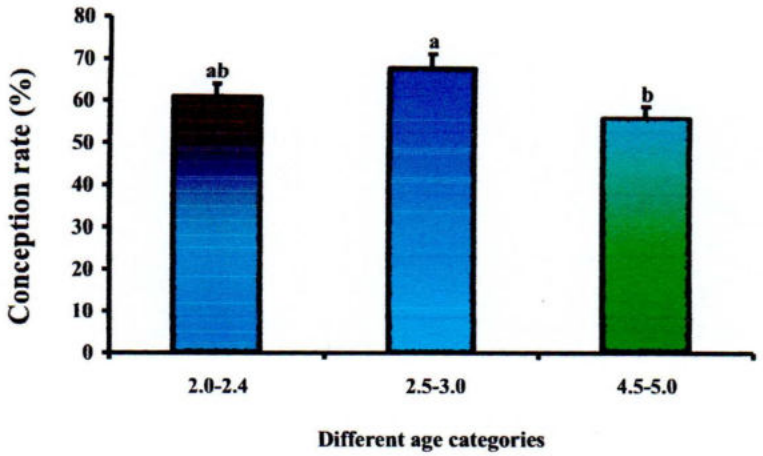

Figure 6: Effect of age on conception rate in RC crossbred (L×RC) cows. Each bar with error bar represents Mean ± SEM value. Without a common lower case letter on error bars indicate significant differences (P<0.05) among the groups.

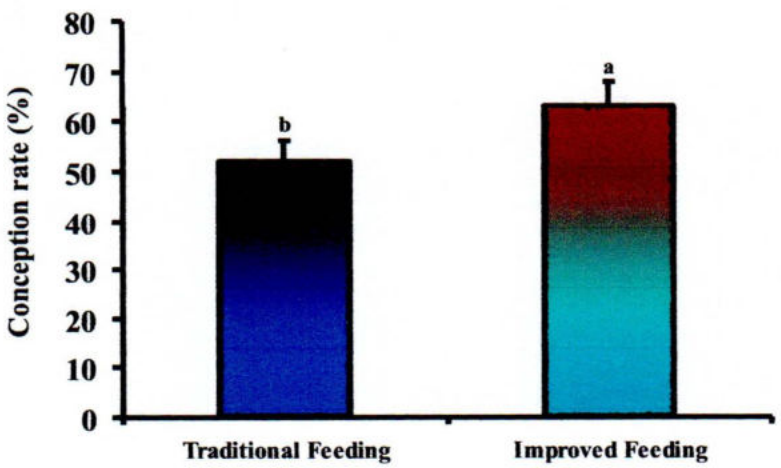

Figure 7: Effect of improved feeding on conception rate in RC crossbred (L×RC) cows. Each bar with error bar represents Mean±SEM value. Without a common lower case letter on error bars indicate significant difference (P<0.05) between the feeding system groups.

4.8 Effect of deworming on conception rate in RC crossbred cows

Effect of deworming on conception rate in RC crossbred is demonstrated in Figure 8. The average conception rates were observed 73.8 and 66.7% in the cows administrated and without administrated deworming drug. The greater ($P<0.05$) conception rate was achieved in the cows administrated deworming drug than the cows were not administrated any deworming drug. Internal parasites can cause significant production losses in cattle, resulting in substantial economic losses for owners. Often, parasite losses are subclinical and unnoticed but severe infestations can cause disease and even death. Subclinical production losses caused by internal parasites include reduced milk production, reduced weaning weights, delayed puberty and decreased fertility in replacement heifers, reduced conception rates in mature cows (Rahman*et al.*, 1998). The major threat to cattle health and performance comes from internal parasitic nematodes (worms), especially those found in the stomach and intestines (gastrointestinal parasites). Pasture management is a critical component of effective parasite control. Cattle production relies on the efficient use of grazing for cost-effective weight gains; however, grazing exposes young cattle to large numbers of parasite larvae if pasture parasite contamination isn't controlled. Most of the internal parasites of cattle are found in the abomasum (true stomach) or small intestine (James, 2012).

4.9 Effect of vaccination on conception rate in RC crossbred cows

Effect of vaccination on conception rate in RC crossbred cows was shown in Figure 9. The average conception rates were observed 75.2 and 68.8% in the vaccinated cows and unvaccinated cows. The greater ($P<0.05$) conception rate was achieved in the cows vaccinated against different common diseases than the cows were not vaccinated. Near about 90% farmers' vaccinated the cattle regularly schedule wise but 10% farmers' not maintain schedule of vaccination. Due to irregular vaccination program the incidence of diseases were high. Any one of many diseases may significantly reduce the reproductive performance (Banerjee, 2004). Values bearing different letters within a column differ significantly ($P< 0.05$).

CHAPTER V

SUMMARY AND CONCLUSION

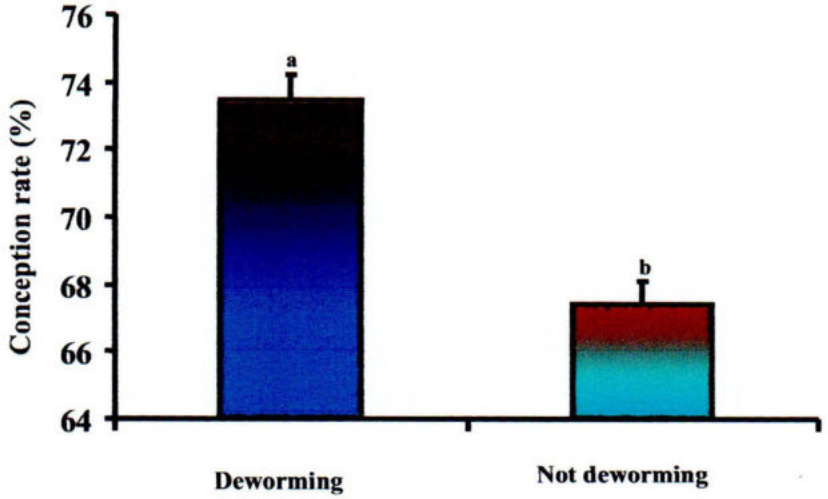

Figure 8: Effect of deworming on conception rate in RCC crossbred (L×RCC) cows. Each bar with error bar represents Mean±SEM value. Without a common lower case letter on error bars indicate significant difference ($P<0.05$) between the treatment groups.

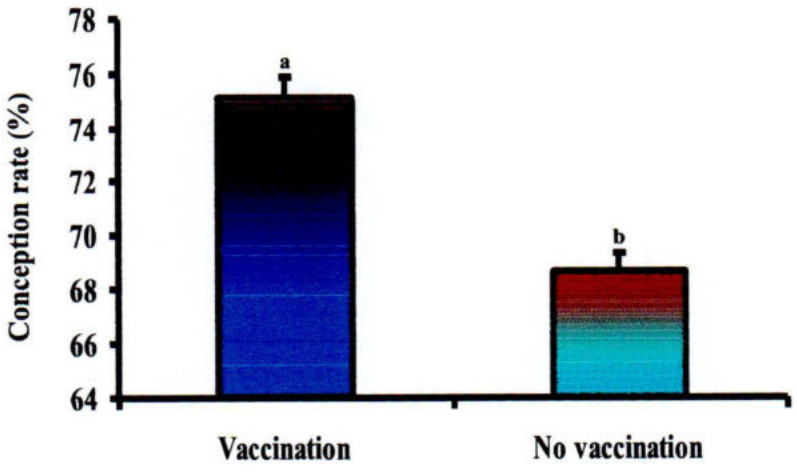

Figure 9: Effect of vaccination on conception rate in Red Ctg crossbred (RC×L) cows. Each bar with error bar represents Mean ± SEM value. Without a common lower case letter on error bars indicate significant difference ($P<0.05$) between the treatment groups.

CHAPTER V

SUMMARY AND CONCLUSION

The results revealed that first service conception rate was not significantly differed among the cows of different genotypes. It was higher in L×RC crossbred cows (66%) than that of L×HF crossbred cows (63%), where the conception rate was 65% in local cows. In practices, it is difficult to find out the effect of cow's genotype on their fertility. Environmental and management conditions those might have more influence on fertility. Conception rate was significantly higher in the cows mated naturally by local bull (73%) than the cows inseminated artificially (AI) by the semen of L×HF crossbred bull (61%). The cows showed moderate conception rate mated naturally by L×RC crossbred bull (66%). The conception rate of cows is influenced by the quality and quantity of semen, which vary according to different breeds of bulls as well as their feeding, management, etc. To maximize conception rate, high quality semen must be placed in the cow's reproductive tract. Semen quality at the time of breeding is dependent on the quality of semen at the time it was purchased, storage conditions on the farm, thawing procedures and handling techniques. First service conception rate was higher in the cows inseminated by using the semen supplied by DLS as compared to the semen supplied by Ejab, even though the semen of BRAC. The variations in conception rate were actually due to the ultimate variability of semen quality which were depends on bull genotype, semen collection technique, processing, preservation, heat detection, experience of AI technicians, etc. Farmers who use professional AI

technicians from reputable AI organizations usually have fewer concerns about semen quality being a major cause of low conception rates. The first service conception rate was affected by season of breeding the cows. The first service conception rate was 45, 51, 59 and 66% in the cows were inseminated in the summer, rainy, winter and spring season, respectively. It was higher in the cows inseminated in spring season than the cows were inseminated especially in summer season as well as in rainy and winter seasons. Lowest conception rate was in the cows were inseminated in summer season. Therefore, on the basis of all consideration, it may be concluded that spring is the best season for highest conception rate of cows having suitable ambient temperature and humidity in Bangladesh with satisfactory level of available feedstuffs. Conception rate was significantly varied on the experience of AI technicians. While the average conception rates were 56, 67, 68% in the cows inseminated by the AI technicians has 1-2, 2-3 and 3-5 years experience, respectively. The first service conception rate was significantly higher in the cows inseminated by the AI technicians having 3-5 years than that of the cows inseminated by the AI technicians having 1-2 years experience. There was a highest conception rate achieved by the AI technicians having 3-5 years experience, and the lowest was achieved by the AI technicians who have experience only for 1-2 years. Conception rates at first service were significantly differed by the influence of age of the cows. The conception rate was significantly higher in the cows were 2.5–3.0 years old (68 %) than the cows were

4.5–5.0 years old (54%). The conception rate was moderate higher in the cows of 2.0–2.4 years old (61%).

Higher conception rate was observed in the cows were under improved feeding system (61%) than the cows were under traditional feeding system (52%). Dairy cattle can tolerate a fairly wide range of nutrient intakes for a short time without suffering poor reproduction. Serious deficiencies of individual nutrients for an extended period can impair reproduction. Nutrition is an important component of a sound reproduction program. The average conception rates were observed 73.8 and 66.7% in the cows administrated and without administrated deworming drug. The greater conception rate was achieved in the cows administrated deworming drug than the cows were not administrated any deworming drug. Internal parasites can cause significant production losses in cattle, resulting in substantial economic losses for owners. Conception rates were observed 75.2 and 68.8% in the vaccinated cows and unvaccinated cows. The greater conception rate was achieved in the cows vaccinated against different common diseases than the cows were not vaccinated.

Near about 90% farmers' vaccinated the cattle regularly schedule wise but 10% farmers' not maintain schedule of vaccination. Due to irregular vaccination program the incidence of diseases were high.

Therefore, it may be suggested that to achieve the satisfactory conception rate in char areas, the farmers should inseminate their cows during spring season with experience AI technician by using good quality semen. They may choose to rear Red Chittagong cows or their crossbreds. They should provide concentrate feed at least a minimum amount and have to practice of regular vaccination and deworming to their cattle.

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