

## STUDY ON FACTORS AFFECTING THE CONCEPTION RATE IN RED CHITTAGONG COWS

M. M. R. Mufti, M. K. Alam, M. S. Sarker, A. B. M. R. Bostami and N. G. Das<sup>1</sup>

### Abstract

The research was undertaken to identify the factors affecting the conception rate in Red Chittagong cows (RCC). A total of 130 questionnaires were filled up to collect the related data during artificial insemination (AI) and subsequently pregnancy diagnoses were done after three months of AI at five upazillas (Satkania, Chandanaish, Potia, Anwara and Raozan) in Chittagong district. 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. Conception rates were 19.4% higher in 1<sup>st</sup> delivered cows than that of the older cows attained the 4<sup>th</sup> or more parities. Red Chittagong Cows producing 3 kg or more milk during AI period had lower conception rate than the low producing cows. The conception rates of RCC were higher when inseminated between 10 to >14 hours after onset of estrous and the value was 74.19%. The conception rates of RCC were higher at a thawing period of 10-12 seconds than 5-7 seconds and 15-17 seconds and varied significantly. The conception rate was 10.62% higher in RCC for semen deposited in the body of uterus than deposited at the middle of the cervix. The conception rate of RCC for normal, difficult calving, retained placenta, uterine infectious and cystic ovaries cows were 70.27, 50, 33.33, 25 and 0%, respectively and the overall conception rate of disordered cows were 31.57%. In this study, the overall conception rate of RCC was found in 63.85%. This figure can be improved by taking different measures like; insemination at observing clear mucus and 10.0-14.0 hours after the onset of estrous, thawing of straw at 37°C for at least 10-12 seconds, heating of insemination devices, service at docile condition, placement of semen at the body of the uterus and avoid crossing of RCC with exotic blood to ensure protection from health disorder like difficult calving and retained placenta.

**Key words:** Red Chittagong cows, Artificial insemination, Conception rate

### Introduction

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 dairy cows, with an increased number of days open and decreased conception rates (Silvia, 1998).

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<sup>1</sup> Animal Production Research Division, Bangladesh Livestock Research Division, Savar, Dhaka, Bangladesh

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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. (Kathy Lee, 2004).

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 Lee, 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 getting cows pregnant, some selection for improved fertility may be justified in a herd's genetic program. RCC breed improvement and conservation project has undertaken in five RCC concentrated areas of Chittagong district. In a field survey in 2007, it was claimed that conception rate of RCC declined gradually and the repeat breeding case increased and therefore, the research was undertaken with the objective to identify the factors affecting the conception rate of Red Chittagong cows at the RCC communities of Chittagong district.

## **Methodology**

A total of 130 questionnaires were filled up to collect related data during artificial insemination (AI) and subsequently pregnancy diagnosis were done after three months of AI at five upazillas (Satkania, Chandanaish, Potia, Anwara and Raozan) in Chittagong district. All the data collected from the farmers were analyzed and a table was prepared on the basis of the objective of the study. The various factors investigated were: 1) age of animals; 2) milk yield during the day of insemination 3) time of day of detected estrus and subsequent artificial insemination (AI); 4) presence of clear mucus during AI 5) time of service after the onset of estrous; 6) semen thawing period; 7) heating insemination devices; 8) temperament; 9) semen placement position and 10) health disorder. Data were analyzed to detect the conception rate (%) for individual factor using MS excel and SPSS for T-test data analysis software package.

## **Results and Discussion**

### **Age**

Conception rates were 19.4% higher in 1<sup>st</sup> delivered cows than that of the older cows attained the 4<sup>th</sup> or more parities. Conception rate is generally lower in older cows. In a Virginia study, conception rate remained constant (50%) during the first 3 lactations (Nebel, R. L., 2004). 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 statistically differ ( $P < 0.05$ ) significantly.

### **Level of milk production**

In this study, conception rates of RCC producing 3 kg or more milk at AI period were 62.50% and 2 to 3 kg and 1 to 2 kg were 63.04 and 64.86%, respectively and statistically did

not differ. Conception rate decreased with the increase of milk production of RCC. Many studies on the relationship between level of production and fertility in dairy cattle have been reported. Some suggested that the higher producing cows in a herd have lower conception rates. Other studies indicated that level of production had no effect on conception rate (Boyd *et al.*, 1954). The antagonism between milk production and conception rate is most extreme and this study revealed that there is positive correlation between milk production and conception rates.

### **Estrous/Heat detection**

One factor that can result in poorly timed insemination and low conception rates is inaccurate estrous detection. This problem usually occurs in herds that breed a large number of cows on the basis of secondary signs of estrus. In small scale livestock keeper can detect their heated cows easily due to close monitoring and contact. There are many signs of estrous like; bowling, restless, mounting, swelling of vulva, mucous discharge etc. Among the signs, presence or absence of clear mucus at AI period is an important factor that closely related with conception rate of cows. There was significant ( $P<0.05$ ) effect on estrous detection on conception rate of RCC cows. The conception rates of RCC in the presence of clear mucus at AI period were 68.75%, where as in the absence, it was 50%. Stevenson *et al.* (1983) also found the conception rate of Holstein cows in presence of clear mucus was 54% where as in absence was 46%.

### **Timing of service**

For maximum conception rate, cows should be bred at a time that will ensure that healthy, live sperm are present at the site of fertilization when the unfertilized egg arrives. Thus, to accurately “time” the insemination one needs to predict when ovulation will occur. Standing behavior is the most reliable sign for predicting when cows will ovulate and, therefore, when they should be inseminated. This is based on the fact that ovulation occurs 24 to 30 hours after the animal first stands to be mounted. In field condition, inseminator practices variable time during AI in Chittagong district. They asked question to farmer when his cow came into heat and inseminated from 6 to 22 hours after the onset of estrous. The conception rates of RCC were higher when inseminated between 10 to >14 hours after onset of estrous and the value was 74.19%. On the other hand, the conception rates of RCC at 6 to >10 hours, and 14 to above were 50% and 58.82%, respectively, which differ ( $P<0.05$ ) significantly.

### **Thawing period**

Frozen semen is essential to thaw before practicing AI. Semen should thaw at a temperature ranged between 37 to 40°C at warm water. In field condition, different thawing times were practiced in the studied areas. The effect of thawing at different period of interval on conception rate was greater ( $P<0.05$ ). The conception rates of RCC with semen thawed for 5-7 seconds, 10-12 seconds or 15-17 seconds were 33.33, 72 and 44.44%, respectively. The conception rates of RCC were higher at a thawing period of 10-12 seconds than 5-7 seconds and 15-17 seconds.

**Table 1. Effect of different factors on conception rate of RCC**

Factors	No. of observation	Conception rate (%)	P-Value for T-test
<b>1. Age</b>			
Heifer	31	64.52 <sup>b</sup>	P<0.05
1 <sup>st</sup> Calved	22	72.73 <sup>c</sup>	
2 <sup>nd</sup> Calved	37	64.86 <sup>b</sup>	
3 <sup>rd</sup> Calved	25	60.00 <sup>ab</sup>	
4 <sup>th</sup> or more Calved	15	53.33 <sup>a</sup>	
Overall Cow	99	63.64	
<b>2. Milk Production (kg) at AI period</b>			
1.0-2.0	37	64.86	P<0.34
2.0-3.0	46	63.04	
3.0-Above	16	62.50	
<b>3. Clear mucus at AI</b>			
Absent	34	50.00 <sup>a</sup>	P<0.05
Present	96	68.75 <sup>b</sup>	
<b>4. Time of Service (h) after onset of estrous</b>			
6.0-10.0	34	50.00 <sup>a</sup>	P<0.05
10.-14.0	62	74.19 <sup>b</sup>	
14.0-Above	34	58.82 <sup>a</sup>	
<b>5. Thawing period (sec.) of straw at 37°C</b>			
5.0-7.0	21	33.33 <sup>a</sup>	P<0.01
10.0-12.0	100	72.00 <sup>c</sup>	
15.0-17.0	9	44.44 <sup>b</sup>	
<b>6. Heating of insemination devices</b>			
Yes	93	64.52	P<0.36
No	37	62.16	
<b>7. Temperament of animal at AI</b>			
Docile	73	68.49	P<0.18
Aggressive	57	56.14	
<b>8. Semen placement at AI</b>			
Body of uterus	86	67.44 <sup>b</sup>	P<0.05
Middle of cervix	44	56.82 <sup>a</sup>	
<b>9. Health disorder</b>			
None	111	70.27 <sup>b</sup>	P<0.01
Difficult calving	4	50.00	
Retained placenta	9	33.33	
Uterine infection	4	25.00	
Cystic ovaries	2	0.00	
Overall disordered	19	31.57 <sup>a</sup>	

<sup>a,b,c</sup> means with different superscripts are significantly different at P<0.01

### **Heating of insemination devices**

Sperms are more sensitive to temperature shock. Before pushing semen to heated animal it is necessary to maintain same temperature of semen as like the temperature in female reproductive organs. In Chittagong district some inseminator practices heating of insemination devices at 37°C for few seconds and some are not. The study revealed that the conception rate of RCC were higher, those who used heated insemination devices. The conception rate of RCC for heated and non-heated devices were 64 and 56% respectively and did not differ significantly.

### **Temperament of animal at AI**

Temperament of animal during AI period is essential that directly related to conception rate of cows. Some animal remain docile and some are aggressive during AI period. The conception rates of RCC were higher in docile than aggressive at AI period and the value was 68.49 and 56.14%, respectively and did not differ significantly.

### **Semen placement**

Faulty insemination technique is a major factor causing low conception rate in many herds. Correct semen placement is critical. This study indicates that the major difference between AI technicians with high conception rates and those with low rates was semen placement. The conception rates of RCC were higher for those who deposited semen in the body of uterus than other positions. The conception rate of RCC for the placement of semen at the middle of cervix and the body of uterus were 56.82% and 67.44%, respectively and revealed significant ( $P < 0.05$ ) differences. The result revealed that the conception rate was 10.62% higher for semen deposited in the body of uterus. Macpherson (1968) reported that cervical insemination resulted in a 10% decrease in fertility when compared with deposition in the uterine body. Although Senger *et al.* (1988); Lopez-Gatius (1996) reported increased conception rates when semen was deposited in the uterine horns rather than the uterine body. However, Williams *et al.* (1988); McKenna *et al.* (1990) and Hawk and Tanabe (1986) found no difference in fertility when comparing uterine body and uterine horn inseminations.

### **Health disorder**

In many cows the search for factors causing low conception rates begins in the calving area. Failure to provide a clean environment and (or) failure to practice good hygiene when examining and assisting cows at calving contributes to retained placentas and reproductive tract infections. These disorders slow the reproductive tract repair processes and can lower conception rates, especially if they do not receive timely and effective treatment.

Calving and post-calving reproductive disorders seriously affect conception rates as illustrated by a study of 130 cows in Chittagong. 85% of the cows were normal (never treated for a reproductive disorder after calving). Reproductive disorders in the remaining 15% of the cows were an important cause of reduced conception rates. The conception rate of RCC for normal, difficult calving, retained placenta, uterine infectious and cystic ovaries cows were 70.27, 50, 33.33, 25 and 0%, respectively and the overall conception rate of

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disordered cows were 31.57%. The conception rate of RCC very much ( $P < 0.01$ ) varied with reproductive disorder. The cases in difficult calving and retained placenta occurred due to cross bred calved deliberation situations.

## Conclusions

In this study, the overall conception rate of RCC was found in 63.85%. This percentage can be increased by taking different measures like; insemination at observing clear mucus and 10.0-14.0 hours after the onset of estrous, thawing of straw at 37°C for at least 10-12 seconds, heating of insemination devices, service at docile condition, placement of semen at the body of the uterus and avoid crossbreeding of RCC with exotic blood to ensure protection from reproductive disorder like difficult calving and retained placenta. To ensure AI support in RCC concentrated areas, two inseminators from each RCC communities were trained up and their skills on the above factors would be updated through training and demonstration.

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