Survey on Artificial Insemination Practices in Shikalbaha Union of Karnafuli Upazilla, Chattogram

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Survey on Artificial Insemination in Shikalbaha Union of Karnafuli Upazilla, Chattogram

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Abbreviations	**Elaboration**
AI	Artificial Insemination
HF	Holstein Friesian
J	Jersey breed
L	Local breed
DLS	Department of Livestock Services
FAO	Food and Agricultural Organization

ABSTRACT

The research was carried out in Shikalbaha Upazilla located in the Chattogram district. The aim was to investigate the of cattle artificial insemination (AI) technology practices, taking into account factors such as general information of the farm and milk production based on genotypes. The conception rate of artificial insemination was also dependant on farm type. Data was gathered through a questionnaire administered to 15 farms during the timeframe of July 2023 to August 2023. The findings reveal that out of the surveyed farmers, 100% of them are inseminated using semen of Govt. sources. Four genotypes of cattle was found where HF(0.75)×L(0.25) and J(0.50)×L(0.50) exhibited the highest daily average milk yield (10-12L) in 40% of farms. Consequently, the total conception or success rate was calculated to be 68.29% whereas higher conception rate was found in A type farm. The observed lower success rate is potentially attributed to factors such as temperature, subpar semen quality, and the presence of inexperienced inseminators. Enhancement in the conception rate could be achieved by ensuring the provision of high-quality semen and skilled inseminators to the farmers.

Keywords: Artificial Insemination, Conception rate, Genotypes.

CHAPTER 1
INTRODUCTION

Bangladesh, primarily an agricultural nation, relies significantly on its livestock sector as a key element of its agricultural production alongside crops, fisheries, and forestry. This sector holds substantial importance in the country's economy, contributing approximately 6.5% to the Gross Domestic Product (GDP) and constituting about 13% of the total foreign exchange earnings, as reported by DLS in 1995. According to FAO's data from 2002, the combined population of ruminant livestock in Bangladesh consists of 24.0 million cattle, 34.4 million goats, 0.83 million buffaloes, and 1.14 million sheep.

Bangladesh boasts a notably dense cattle population, surpassing averages seen in numerous other global nations. Its rank as the 12th largest cattle population worldwide and the third among Asian countries is a testament to this (Alam, J., 1992). Despite this significant cattle density, the country has experienced shortages in milk, meat, and draught power. This shortfall can be attributed to the prevalence of indigenous cattle breeds, which exhibit characteristics like delayed maturity, brief lactation periods, extended calving intervals, and limited milk and draught power output. However, these breeds are resilient against diseases and well-suited to challenging environments (Rahman *et al.,1998*).

Artificial Insemination (A.I.) stands as the predominant method in animal breeding, involving the introduction of semen into the female reproductive system through mechanical means instead of natural mating. This technique holds immense significance in animal production, serving as a vital tool for enhancing the genetics of farm animals and their genetic improvement (Hafez, 1993).

Bangladesh, primarily an agricultural nation, relies significantly on its livestock sector as a key element of its agricultural production alongside crops, fisheries, and forestry. This sector holds substantial importance in the country's economy, contributing approximately 6.5% to the Gross Domestic Product (GDP) and constituting about 13% of the total foreign exchange earnings, as reported by DLS in 1995. According to FAO's data from 2002, the combined population of ruminant livestock in Bangladesh consists of 24.0 million cattle, 34.4 million goats, 0.83 million buffaloes, and 1.14 million sheep.

Dairy cows have a significant impact on poverty reduction in Bangladesh. However, several challenges affect profitable income from dairy cows, including low conception rates, intervals

between calving and conception, number of services per conception, postpartum heat periods, poor heat detection rates after artificial insemination, semen quality, semen preservation, breed differences, and seasonal variations (Alam & Ghosh, 1988).

Artificial insemination (AI) is a crucial technology for genetic improvement through the male line. AI has been increasingly adopted in Bangladesh, covering approximately 40-45% of cows. To enhance production potential and genetic quality in indigenous cows, superior germplasm has been introduced across the country (Sarder *et al.,* 2001).

Several factors impact the effectiveness of AI in field conditions, including bull health, semen collection and preservation, transportation procedures, processing of semen during AI gun loading, accurate heat detection, proper timing of AI, uterine environment during insemination, and maintaining AI records. The competence of AI technicians and the insemination technique also significantly influence fertility rates (Samsuddin *et al.*, 1997).

CHAPTER 2

MATERIALS AND METHODS

2.1 Study area

The study was centered around the Karnafuli Upazila in the Chattogram district with aspecific emphasis on the Shikalbaha union within this upazilla.

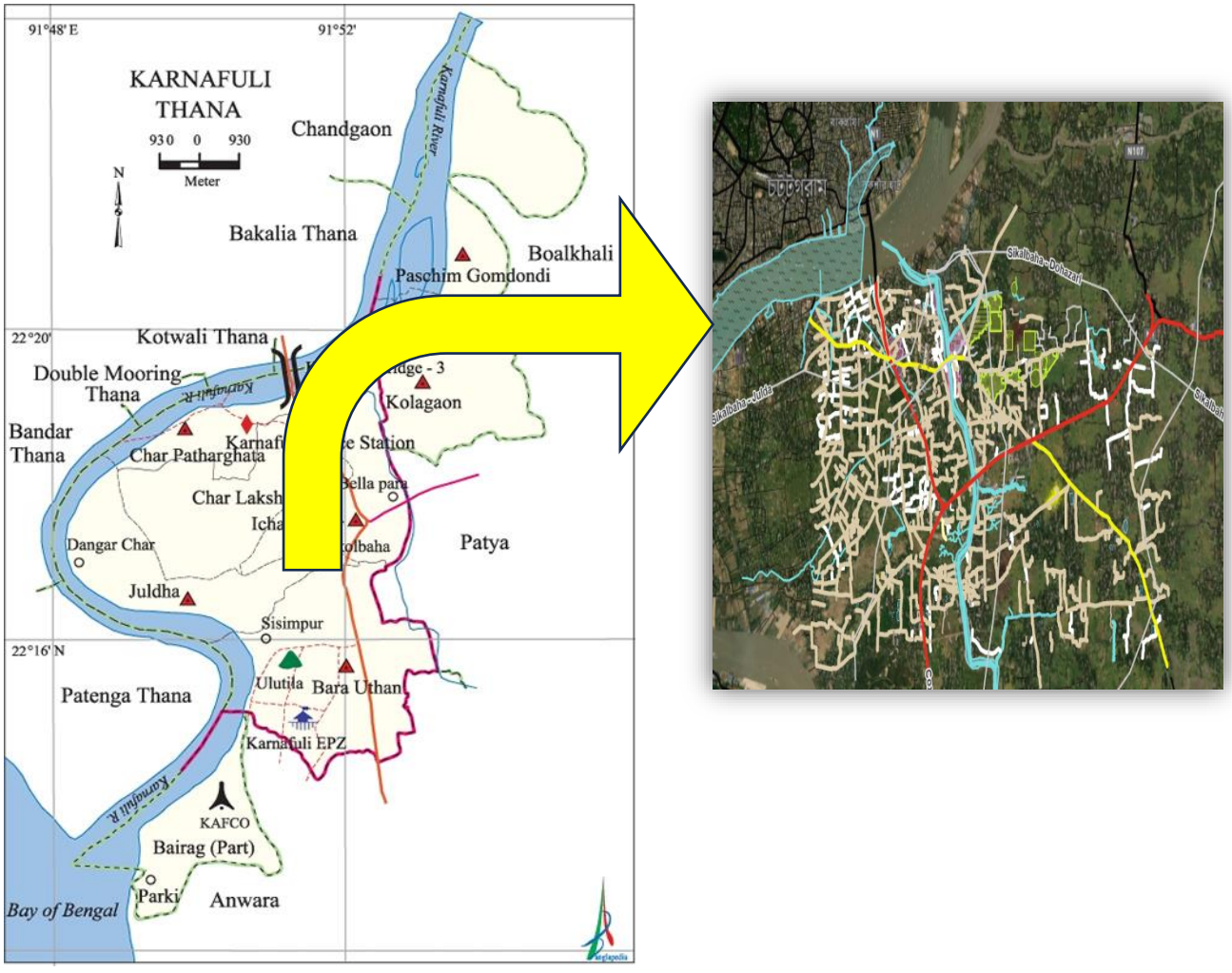

Figure 1: Geographical locations of the selected dairy farms

2.2 Data collection

The research took place between July 2023 and August 2023, involving data collection utilized both interviews and record sheets of approximately 15 cattle farms. The farmers' inclinations were assessed through the use of a questionnaire (found in Appendix-1). This survey protocol was thoughtfully organized, covering essential aspects including owner details, farm information, AI procedure, blood percentage, milk production data, housing methods, availability of feeds and fodder, as well as vaccination and medication records. Before taking interview farmers or owners were informed about the objectives of the study.

2.3 Data tabulation and analysis

The farmer's responses were documented on the questionnaire. Following this, the collected data was systematically arranged and presented in tabular form, with numerical figures represented as percentages.

$$\text{Conception/success rate} = \frac{\text{Total number of cow pregnant} \times 100\%}{\text{Total number of cow inseminated}}$$

CHAPTER 3
RESULTS AND DISCUSSION

3.1 General information of the farm

3.1.1 *Farm type*

Out of 15 farms that were visited 26.67% were A type,33.33% were B type and 40% were C type farms.

3.1.2 *Experience*

The owner experience is distributed as follows: 13.33% have 0-2 years of experience, 20% have 3-5 years of experience, 40% have more than 10 years of experience and lastly 26.67% of them have more than 20 years of experience. This distribution indicates a combination of both newcomers and experience individuals within the fields.

3.1.3 *Genotypes*

Mainly 4 types of crossbreed animal were found in the survey. They are as follows HF (0.75) × L (0.25), HF (0.50) × L (0.50), J (0.50) × L (0.50) and J (0.75) × L (0.25). Out of them 26.67% of the farms consists of just HF (0.75) breed, 60% have both HF (0.75) and J (0.50) breeds and 13.33% of them contains HF (0.50) and J (0.75) breeds.

3.1.4 *Semen source*

There are 4 sources of semen are generally available which includes Govt., BRAC, ACI and Lal Teer. Out of the 15 farms, 100% of them collect or use the semen of Govt. sources.

3.1.5 *Cost of AI*

The cost per insemination is categorised into 3 different groups. They are 450-500 tk, 500-600 tk and 700 tk respectively. 26.67% of the farms cost 450-500 tk per insemination, 60% of them costs 500-600 tk and 13.33% of them costs 700 tk.

3.1.6 *Floor type*

In relation to the type of housing system, it is clear that a noteworthy percentage of respondents show a preference for concrete floors (66.67%), with brick flooring being the second choice (33.33%).This preference for concrete flooring underscores its popularity as the favoured flooring option among the participants.

Table 1: General information of the farm

Parameters	Categories	Number	Percentage (%)
Farm type	A (>50 cows)	4	26.67%
	B (31-50 cows)	5	33.33%
	C (<30 cows)	6	40%
Experience	0-2 years	2	13.33%
	3-5 years	3	20%
	10 years+	6	40%
	20 years+	4	26.67%
Genotypes	HF (0.75)	4	26.67%
	HF (0.75) & J (0.50)	9	60%
	HF (0.50) & J (0.75)	2	13.33%
Semen source	Govt.	15	100%
	BRAC	0	0%
	Others	0	0%
AI cost	450-500	4	26.67%
	500-600	9	60%
	700	2	13.33%
Floor type	Brick	5	33.33%
	Concrete	10	66.67%
Foot bath	Yes	3	20%
	No	12	80%
Grass provided for feed	Napier	8	53.33%
	Napier and Para	4	26.67%
	Maize	3	20%

3.1.7 *Footbath*

When considering the adoption of Footbath practices, it becomes evident that a minority of participants (20%) have incorporated this hygiene measure, while the majority (80%) have chosen not to do so. This indicates that a significant portion of the participants has not yet adopted this particular method.

3.1.8 *Grass provided for feeding*

In terms of fodder varieties as feed, Napier grass stands out as the most favoured option (53.33%), with the combination of Napier and Para following closely (26.67%), and Maize alone being chosen by a smaller fraction (20%). This trend implies a preference for these particular fodder choices, likely attributed to their accessibility and nutritional benefits.

3.2 Milk production based on genotypes

3.2.1 *Average milk production (L/day)*

The table presents the milk production of cows with different genotypes across 15 dairy farms of Shikalbaha union. The daily average milk production ranges from 5 litre to 12 litres for the four genotypes across the farms. Among them HF(0.75)×L(0.25) and J(0.50)×L(0.50) exhibited the highest daily average milk yield(10-12L) and the farm percentage is 40%.Conversely,HF(0.50)×L(0.50) and J(0.75)×L(0.25) showed the lowest average milk yield(5-8L) and the percentage of the farm is 13.33%.This contrast with the findings from Islam *et al*. (1999), Amin and Nahar (2007) and Miazi *et al.* (2007) who reported average milk yields of 6.2±0.31,4.2±0.50 and 5.8±0.36 litres/day for crossbred dairy cows respectively. The variations in milk production in this survey can be attributed to genotype differences, management practices and the herd size maintained by the dairy farms in Shikalbaha union of Karnafuli Upazilla. These results suggests that crossbred dairy cows are well suited to the local conditions and produce higher milk yields. However, factors like feed storage, health, housing and farm management systems may contribute to lower milk production in certain dairy farms.

Table 2: Milk production based on genotypes

Genotypes	Milk production	Number of farms	Percentage (%)
HF (0.75) × L (0.25)	10-12 litres	1	6.67%
	8-10 litres	3	20%
	5-8 litres	0	0%
HF (0.75) × L (0.25) & J (0.50) × L (0.50)	10-12 litres	6	40%
	8-10 litres	3	20%
	5-8 litres	0	0%
HF (0.50) × L (0.50) & J (0.75) × L (0.25)	10-12 litres	0	0%
	8-10 litres	0	0%
	5-8 litres	2	13.33%

3.3 Conception rate of AI based on farm type

In the pie chart conception rate of 3 different types of farms are showed. The conception rate ranges between 60% to 79%.The highest conception rate (78.57%) was observed at A type farm. The recorded average conception rates for indigenous and crossbred cattle were 76.61% and 73.96%, respectively, as noted by Rahman *et al.* (1998), while similar species had rates of 74.47% and 77.65% according to Halim (1992). However, this current study found lower (68.29%) conception/success rates than the referenced values. AI performance is influenced by climatic factors like temperature, rainfall, solar radiation, and post-insemination temperature, as suggested by Gwazdusks *et al.* (1975)

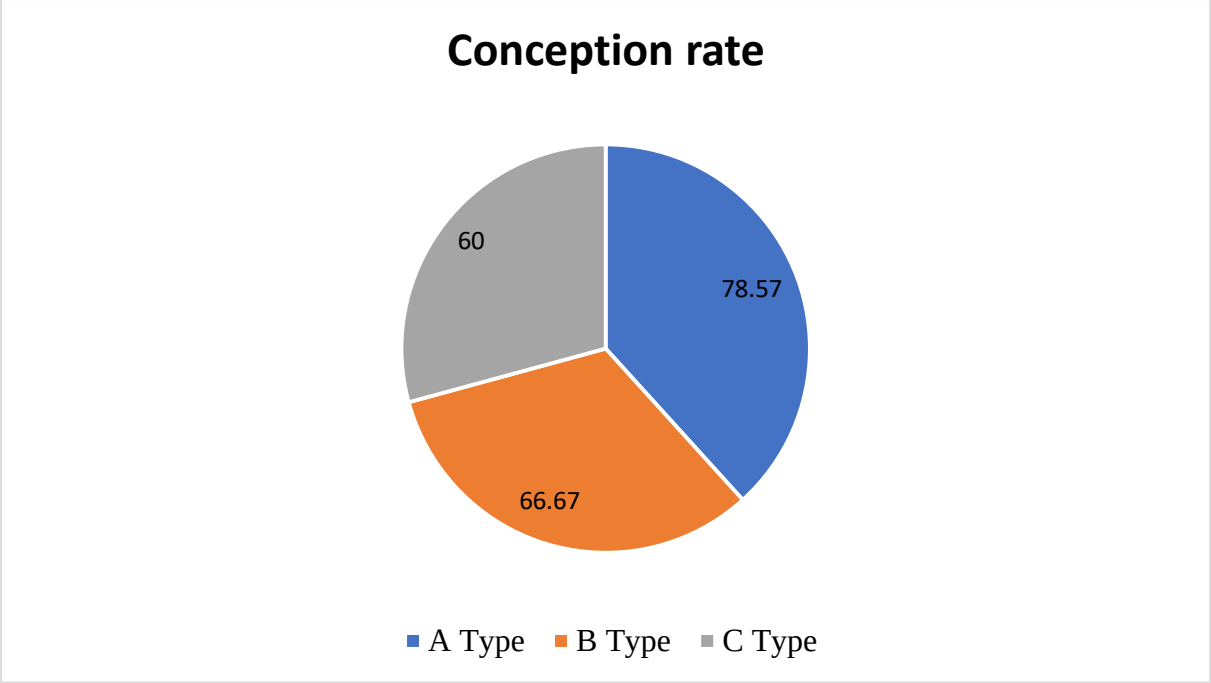

Chart 1: Conception rate in different types of farm

$$\text{Total AI conception rate} = \frac{\text{Total number of cow pregnant} \times 100\%}{\text{Total number of cow inseminated}}$$

$$= \frac{28 \times 100\%}{41}$$

$$= 68.29\%$$

Warmer months were associated with lower conception rates, as highlighted by Taylor *et al.* (1985). Conception rates decreased for semen from bulls aged 8 years and older, which wasn't addressed in this study. An increase in maximum temperature from 29.7˚C in April to 33.9˚C in July was linked to a decline in first-service conception rates from 25.7%, as reported by Cavestany *et al.* (1985). This study was conducted in July and August, and the lower success rate might be attributed to factors like high temperature, poor semen quality, and inseminator proficiency.

CONCLUSION

The inclination of rural farmers towards artificial insemination is influenced by factors like literacy rate, farming experience, and the type of farming they practice. To enhance the adoption of A.I. technology among farmers, it's crucial to establish more A.I. sub-centers, dispel superstitions, increase the number of educated farmers, and train more skilled technicians. Therefore, it's important to implement effective strategies that facilitate the growth and spread of artificial insemination in Shikalbaha union of Karnafuli upazila, Chattogram, in order to maximize the benefits of A.I. usage. The creation of farmers' associations and the establishment of A.I. sub-centers in every village of the Chattogram district could have significantly contributed to the success of this program.

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BIOGRAPHY

I am Md. Shayed Alam, the son of Mrs. Fatema Alam and Mr. Shamsul Alam. I completed my Secondary School Certificate examination in 2014 with a G.P.A of 5.00, and subsequently passed the Higher Secondary Certificate examination in 2016 with a G.P.A of 4.58. I am currently serving as an intern veterinarian within the Faculty of Veterinary Medicine at Chattogram Veterinary and Animal Sciences University. In the coming years, I aspire to engage in research concerning clinical animal diseases and cell biology in Bangladesh.

APPENDIX

Questionnaire

Name of the Farm :

Owner of the Farm :

Address :

Age and Experience :

Related data of the Farm :

Total cow

Milking :

Pregnant :

Total heifers

Pre pubertal :

Pubertal :

Average milk production :

Total bull :

Genotype :

1) How many times do you often milk your cows?

a) Once (b) Twice (c) more

2) Do you maintain the milking time of cows?

a) Always b) sometimes c) No

3) Do you have foot bath in your farm?

a) Yes b) No

General management (Feeding and housing)

1) Type of housing-

a) loose b) intensive c) semi-intensive d) others

2) Arrangement-

a) face in b) face out c) cluster d) others

3) Feeding managements and quantities

a) Roughage or green grass :

b) Hay :

c) Concentrate :

d) Average feed cost :

Breeding Management

1) Availability of record keeping

a) yes b) no

2) How the heat is detected in a cow?

a) Visual method b) Record following c) others

3) Breeding system practiced in the farm -

a) Natural b) AI c) both

4) If AI, then the source of semen-

a) Govt.. b) ACI c) BRAC d) others

5) Quality and percentage of semen known-

a) Yes b) No

6) Who performs AI?

a) FAI b) Trained vet c) Private vet d) Employees

7) How many times do you usually inseminate a cow in heat?

a) Once b) Twice c) Thrice d) more

8) Do you follow up the inseminated cow to check the returning heat after 21 days?

a) Yes b) Sometimes c) No

9) How do you detect the pregnancy of inseminated cow?

a) Reappearing heat signs b) Rectal palpation

c) Ultrasonography d) others

10) What do you do if the cow return to heat after several insemination?

a) Continue insemination b) Consult with vet

c) Natural services d) Cull

11) Cost per insemination-

a) 450-500 b) 550-600 c) 700-800

Vaccination and Medication

1) Do you vaccinate your cows?

a) Yes b) No

2) If yes, how often do you vaccinate your cows?

a) Maintain vaccination schedule b) Consult with vet

c) Roughly 3 months after d) others

Name of the diseases :

I have been given information about research title and discussed with researcher's Md. Shayed Alam who is conducting this research as a part of DVM degree, supervised by supervisor Dr. Tahmina Bilkis (Associate Professor) in the department of Genetics and Animal Breeding at the CVASU. My participation in this research is voluntary and the data collected from me will be used for thesis and I consent it to be used in this manner.

Signature