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POST AI CONCEPTION RATE IN CATTLE AT RAJARHAT, KURIGRAM, BANGLADESH.

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The present study was conducted to determine the conception rate of cows/heifers artificially inseminated at Upazila Livestock Office, Rajarhat, Kurigram. A total of 184 cows/heifers of different breed, age, season, body weight and parity were selected and artificial insemination was performed by using frozen semen. The cows were inseminated between 6-20 hrs. of onset of heat. All cows were examined for pregnancy by rectal palpation of genital tract at 80-90 days post AI. One hundred and seven were inseminated 1 or 2 times and 77 animals for 3 and more services. Out of 184 animals 101 animals were conceived and 83 animals did not conceived. The overall conception rates were 54.9%. A significantly decreased conception rate ($p<0.01$) was observed in age group more than 8 years than other groups. Cows received insemination at parity 1 showed highest conception rate (73%) and cows received insemination at parity 6 showed lowest conception rate (25%). The overall and within group conception rate percentage in Local (52.9%) and Friesian cross (62.3%) cows/heifers were relatively higher than that of Sahiwal cross (40%). However the difference was not significant ($p>0.05$).The conception rate was observed significantly higher (78.9%) in the cows which were inseminated in spring than the cows were inseminated in summer (29.8%), winter (72.1%) and rainy (35.7%) season. The conception rate was significantly higher ($p<0.01$) in 1st and 2nd service compared with 3rd services (89.7% vs 6.5%). A proportion of cows, which failed to conceive in the first service repeated in second, third services and or more.

Key words: Conception rate, AI, Friesian cross, Sahiwal cross, Parity

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The dairy cows play a vital role to improve the livelihood of poor and marginal people of Bangladesh. The major constraints of profitable dairy farming is low conception rate (CR)/pregnancy rate (PR), number of services per conception, calving to first service interval, Days open and poor heat detection rate after Artificial insemination (AI) (Shamsuddin *et al.,* 2001; Paul *et al.,* 2011). AI is one of the tools for genetic improvement through male line. In Bangladesh the conception rate (CR) using fresh and frozen semen is 45.3% and 57.3% respectively (Das *et al.,* 2002). Shamsuddin *et al.,* (2001) reported higher conception rate (54%) in cows inseminated with frozen semen than that (37%) in cows inseminated with chilled semen. The average conception rate of local nondescript and crossbred cows with Holestein-Friesian and Sahiwal breed 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), weak herd health 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 (29ºC) of dairy cattle markedly affects the pregnancy rate (25.4%, Ricardo *et al.*, 2004). Jabbar and Ali (1988) studied the productive performance of indigenous and crossbred cows in Bangladesh and demonstrated the overall AI per pregnancy was 1.7. AI per pregnancy of Local, L×HF and L×SL was 1.6, 2.2 and 1.6, respectively. It is supported by Shamsuddin *et al.*, (2001) who reported that the local cows required fewer services per conception (1.4) than the crossbred animals (1.8). Economy of dairy farming largely depends on a good pregnancy rate after AI. The low conception rate and other fertility indices after AI 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.

Rajarhat, Kurigram is a flood and monga 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. Therefore, the present study was undertaken to determine the conception rate of dairy cows in Rajarhat, Kurigram with overall improvement of conception rate after AI, reduced number of services required per conception and assessment of age, parity, breed and season of the cows on conception rate.

MATERIALS AND METHODS

Animal selection

The study was carried out in the Kurigram district during the period of June 2012 to October 2012. One hundred and eighty four cows brought to the Upazila Livestock Office, Rajarhat, Kurigram were artificially inseminated for this study.

Management of cows

The cattle management system is small scale dairy with traditional crop-based farming system. The small-scale dairy system mainly practices zero grazing with occasional semi-zero and tethering systems. The feeding practice is 'cut and carry system' where indigenous grass is obtained from various places and carried back to the housed animals. Common supplements are rice polish, wheat bran and oilcake but their supply to animals are low, irregular and restricted mostly to milking cows. The common breeds are indigenous and their crosses with Holstein-Friesian and Sahiwal. The frozen semen was brought from Central Cattle Breeding Station (COBS), Savar, Dhaka.

Techniques of artificial insemination with frozen semen:

Sterilization of instrument

The instruments were washed with tap water and then rinsed in alcohol. After that the instruments were again rinsed several times in distilled water. The metal instruments were autoclaved before use. Here temperature is 121°C, time is 15 minutes, and pressure is 15lb (140kpa).

Equipment required for artificial insemination

I. Tank- Aluminum vacuum-insulated vessel used to hold semen and liquid nitrogen.

II. Canister- Removable cylinder with a mesh or solid bottom to hold semen in the tank. It has a long, hooked handle to permit straw identification and access from the mouth of the tank.

III. Mini-goblet- Plastic cylinder with a sealed base, and which fits into the canister. It held up to twenty-five straws in a bath of liquid nitrogen.

IV. Straws- Each straw contains enough semen to inseminate a cow once. The volume of semen in the mini-straw was 0.25 ml, which normally contains 20 million sperm cells with a usual minimum of 40% live at thaw.

A hygiene checklist

I. Before and during the insemination:

New plastic glove, new sheath, fresh paper towel were used. The 'cut end' of loaded gun was kept uncontaminated; did not allowed it to contact any surface in the dairy or,

breeding race. The vulva was wiped as clean as possible. The lips of the vulva were parted and introduced the point of the gun as clean as possible. Insemination was avoided too deeply and excessive movement of the gun inside the cow was avoided, as these actions are likely to cause minor injuries that allow a better chance for infection to enter and reduce the chance of the cow holding.

II. Between cows on the same day:
Free hand was washed if contaminated by dung or mucus. Fresh paper was used. Then it was preceded as for points above.

III. Insemination technique
Always it was ensured that kit box and its contents were cleaned and it contained gloves and paper towel, insemination gun, sheaths, thaw box, thermometer and lubricant.

Thawing of semen
Water temperature in the thawing flask maintained within a range of 35°- 38°C. Thawing of semen above 40°C might cause it to overheat and 'cook'. It was ensured that the level of the water should be enough to cover only about 4/5th of the straw. The neck plug was removed from the tank. The canister was selected containing the semen required. The location of semen straw was marked in the flask and avoiding of unnecessary handling of-straws. A semen location diary was kept with the tank. The canister was lifted to the top of the frost line in the neck of the tank. The frost line is about 50 mm below the top of the neck and the canister did not bring up to the top of the neck. The required straw or straws were selected from the mini-goblets using tweezers. It was essential positive identification. Tweezers were used to avoid warming the straw and causing frost bite to fingers. "Important". The goblet was provided to full of liquid nitrogen, the canister might be held in the neck of the tank for up to 12 seconds before being returned to the bottom of the canister. While holding the laboratory end of the straw, a flick was given to the straw as this would dislodged any liquid nitrogen that has accumulated in the manufacturer's end of the straw. The straw was placed in the thawing water as quickly as possible and leaved it there for a minimum of 12 seconds. Thawing for a longer period do not caused any harm but the straw should be used within 20 minutes of removing it from the tank. Once thawed, straws must not be refrozen. The neck plug was replaced in the tank.

Loading the gun
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. Drying is accomplished by following these steps:
I. The straw was held by the laboratory end.
II. It was drawn through the paper once.
III. The straw was grasped by the manufacturer's (double wad) end.
IV. It was drawn through the paper once more.

The straw was held by the manufacturer's end after drying is completed. It was not allowed dry excessively as heat buildup caused by friction might raise the semen temperature. The name of the bull printed on the straw was checked. The wrong straw was discarded. 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-to-180mm.The straw were held by the end, to avoid damage to the semen through temperature shocks, the manufacturers end (double wad end) was thread into the gun as far as it would gone. There was an in-built stop preventing it going too far. It was prepared to cut-off the laboratory end of the straw by thoroughly cleaned and dried scissors. The loaded gun was held vertically at eye-level and with clean sharp scissors a horizontal Cut was made 10mm above the gun to remove the crimped end. The cut was at right angles to the straw and a perfect seal occurred between the straw and the sheath. A sheath was selected from its protective package and placed it over the barrel of the gun. Only the split end of sheath was handled keeping the cow end clean. The sheath was pushed through the beveled center hole of the locking ring and twisted it down on the conical seat of the gun. The sheath prevents

gun contamination and holds the straw in place during expression of the semen. The seal between the sheath and the gun was secured-, otherwise semen leak into the gun. Pressed the plunger of the gun until the semen is just visible at the end of the gun. This reduces the stretching of fingers needed to handle the gun. Put the loaded Al gun in mouth or placed it across the kit box ensuring that the cow end does not contact anything. Placed the paper in back pocket

Inseminating the cow

A glove was always used when inseminating. Plastic disposable gloves were used. The glove was donned and wetted it by dipping the gloved hand into bucket clean water, scooping water up in hand and letting it run back down arm. A small quantity of glove lubricant was applied to the back of hand. The loaded gun was carried in mouth ensured that the cow end did not become contaminated by contacting walls. The vulva was thoroughly cleaned of all soap, dung and dirt by wiping it with the piece of paper used on the tail. A fresh piece was used if the paper is too soiled. The cows were made aware of presence. A startled cow may kick. The paper was retrieved from pocket. Hand was protected from contamination with a piece of paper toweling, then grasped the cow's tail and lifted it aside. Using the lubricated back of the gloved hand with the gloved hand, lubricant was smeared across the cow's anus. A cone was formed with the gloved fingers and inserted hand into the rectum. At this stage was paused and encouraged the anus to relax by gently revolving fingers. The wide part of hand could then be eased in without dragging the rough dry skin surrounding, the anus. Rough sudden entry was avoided which could abrade the anus and cause the release of Adrenalin which reduces conception rates. Bored downwards with the wrist of the hand in the rectum which helped to part the lips of the vulva presented a clean area for inserting the gun. The gun was inserted cleanly - between the lips of the vulva into the vagina. Care was taken to ensure the gun passes along the top of the vagina thus avoiding the entrance to the bladder. The gun was pushed gently through the vagina until it reached the surface of the cervix which has a ‘grating’ feel about it. When the gun reaches the mouth of the cervix, hold the cervix in the - finger tips. A light forward pressure was maintained on the gun and manipulated the cervix so 'that the gun passes through the cervix canal. When failed to hold the cervix pined it against the pelvis. While passing the gun through the cervix located the forward end of the cervix with the middle or index finger. The gun was pushed gently forward but only as far as this locating finger. This is important when doing a repeat service as the cow may be pregnant. Deep penetration of the uterus was avoided as the gun may cause damage and possibly infection thus reducing the chance of conception or in the case of a pregnant cow, an abortion (up to 5 per cent of pregnant cows show some signs of heat). The semen was begun to express at this position ensuring that most of the semen (two-thirds) is expressed in the body of the uterus. The remaining, one third were placed near the uterus in the front 1 cm of the cervix. Care was taken not to draw the gun too far back. It was easy to pull back too far at this stage, even as far as the vagina. The semen was expressed gently being careful not to 'spit' it out. Paused before withdrawing the gun allowing the semen to get away, then the gun was withdrawn slowly from the cervix. Rapid withdrawal of the gun can suck semen back through the cervix into the vagina. The gun was removed slowly from the vagina. The arm was withdrawn slowly from the rectum of the cow. The locking ring was loosen on the gun and removed the soiled sheath. The empty straw was come out with the sheath. The straw, sheath, paper and dirty glove were disposed of in a waste bin. When unprotected parts of the insemination gun was soiled with the dung or mucus then the gun were thoroughly cleaned before it is returned to the kit box. Only clean equipment was replaced in kit box.

Confirmation of Pregnancy

Pregnancy diagnosis by Rectal Palpation:

All the animals under this study were subjected to pregnancy diagnosis per rectum after 60-90 days post-Al by visiting owner's house. The results of the pregnancy

diagnosis were recorded to find out the conception rate. The pregnancy was confirmed by observing the asymmetry of the horn, palpation of the fetus and slipping of fetal membrane.

Recording and Analysis of Data

All the findings of the study were recorded and the data were analyzed statistically. The data generated from this experiment were entered in Microsoft Excel® Worksheet, organized and processed for further analysis. Descriptive statistics were performed to calculate the mean, SE and percentages of total conception rate using frozen semen. Multiple Logistic Regression analysis was performed to find the relationship between age, season, parity, BCS and conception rate.

Reproductive indices:

$$\text{Service per conception} = \frac{\text{Total number of service}}{\text{Total number of cow conceived}}$$

Conception rate calculation/estimated success rate of AI:

Conception rates (CR) are estimated from the proportion of pregnancies confirmed by rectal examination of the genital tract at day 60 of post-insemination among the total number of cows/heifer inseminated artificially with frozen semen in a specified period of time.

Reproductive indices:

$$\text{Conception rate (CR)} = \frac{\text{No. of cows/heifer pregnant}}{\text{No. of cows/heifer inseminated}} \times 100$$

RESULTS

The egg production and egg laying A total of 184 cows were inseminated with frozen semen brought to the Upazila Livestock Office, Rajarhat, Kurigram. In this study the number of Local and Friesian cross cows inseminated were large in number than Sahiwal cross breed. Among the age group 2 to 3.9 years were relatively larger than other groups. Majority of the animals had a BCS of 2 to 3. An overview of the data for different variables (Breed, age and BCS) of cows as shown in Table 4.1

Table 4.1: Description of demographic variables of cows inseminated artificially

Variable	Category level	Number of Observation
Breed	Local	121
	Friesian Cross	53
	Sahiwal Cross	10
Age (years)	<2	07
	2-3.9	79
	4-5.9	66
	6-7.9	27
	≥8	5
BCS	2-3	151
	3.5-4	33

4.1 Conception Rate

4.1.1 Effects of age on conception rate

The total conception rate and the variation in relation to different age group are shown in Table 4.2. A total of 101 cows conceived among 184. The total conception rate was 54.9%. A significantly decreased conception rate ($p<0.01$) was observed in age group more than 8 years than other groups (Table 4.2). Among the age group ≥8 the overall and within group conception rate was 1.1% and 40%, respectively.

4.1.2 Effects of parity on conception rate

The conception rate in different parity of cows inseminated in the present study is shown in Table 4.3. The conception rate with respect to different parities ranged from 25 to 73%. Cows received insemination at parity 1 showed highest conception rate (73%) and cows received insemination at parity 6 showed lowest conception rate (25%). There was no significant difference between them on pregnancy rate ($p<0.01$).

4.1.3 Effects of breeds on conception rate

The conception rate in different breeds of cows is presented in Table 4.4. Although both overall and within group conception rate percentage in Local (52.9%) and Friesian cross (62.3%) cows were relatively higher than that of Sahiwal cross (40%), However the difference was not significant ($p>0.05$).

Table 4.2: Conception rate in different age group of cows

Age group (Years)	No. of cows inseminated	No. of cows conceived	Conception rate (%)	
			Overall	Within group
<2	07	03	1.63	42.85
2-3.9	79	45	24.45	56.96**
4-5.9	66	36	19.56	54.54
6-7.9	27	15	8.15	55.55
≥8	05	02	1.09	40
Total	184	101	54.89	-

Table 4.3: Conception rate in different parity of cows

Parity	No. of cows inseminated	No. of cows conceived	Conception rate (%)	
			Overall	Within group
0	68	35	19.02	51.47
1	37	27	14.67	72.97**
2	38	25	13.59	65.79**
3	22	7	3.81	31.81
4	12	5	2.72	42.66
5	3	1	0.54	33.33
6	4	1	0.54	25
Total	184	101	54.89	-

** means 1% level of significant ($p<0.01$)

Table 3: Conception rate in different breeds of cows

Breed	No. of cows inseminated	No. of cows conceived	Conception rate (%)		Significant level
			Overall	Within group	
Local	121	64	34.8	52.9	NS
Friesian cross	53	33	17.9	62.3	NS
Sahiwal cross	10	4	2.2	40.0	NS
Total	184	101	54.9	-	

NS means non-significant ($p>0.05$)

4.1.4 Effects of season on conception rate

Seasonal effects on conception rate of inseminated cows are presented in Table 4.5. Significantly higher ($p<0.01$) in the cows which were inseminated in spring (78.9%) than the cows were inseminated in summer (29.8%) winter (72%) and rainy (35.7%).

Table 4.5: Effect of season on conception rate

Seasons	No. of cows inseminated	No. of cows conceived	Conception rate (%)	
			Overall	Within group
Winter	43	31	16.9	72
Spring	52	41	22.3	78.9**
Summer	47	14	7.6	29.8
Rainy	42	15	8.2	35.7
Total	184	101	54.9	

** means 1% level of significant ($p<0.01$)

4.2 Service per conception

The frequency distribution of service and conception is placed in Table 4.6. Among 184 cows inseminated 107 required 1-2 services and 77 cows required 3 and more than 3 services. The overall and within the group the conception rate with 1-2 services was 52.2%, 2.7% and 89.7% , 6.5%, respectively.

Table 4.6: Frequency distribution of service and conception

Service	Number of cow served	No. of cows conceived	Conception rate (%)	
			Overall	Within group
1-2	107	96	52.2	89.7**
>3	77	5	2.7	6.9
Total	184	101	54.9	-

** means 1% level of significant ($p<0.01$)

4.2.1 Age and breed

Service required in different age groups and breeds of cows is shown in Table 4.7. At 1-2 services a relatively higher conception rate were observed in age group 4-5.9 However, this higher conception rate was not statistically different.

Table 4.7: Frequency distribution of services required in different age groups and breeds of cows

Services	No. of cows in different age groups					No of cows in different age breeds		
	<2	2-3.9	4-5.9	6-7.9	≥8	Local	Friesian X	Sahiwal X
1-2	2	47	48	6	4	84	19	4
3 to rest	5	32	18	21	1	37	34	6
Total	7	79	66	27	5	121	53	10

4.2.2 Parity

The services required in different parities of cows are presented in Table 4.8. Relatively higher conception rate was observed in heifer 1-2 than 3 or more services. However, the variation in conception rates with different parities at different number of services was not significant.

Table 4.8: Frequency distribution of services required in different parities of cows

Services	No of cows in different parities						
	0	1	2	3	4	5	6
1-2	39	26	25	7	6	3	1
3 to rest	29	11	13	17	7	0	0
Total	68	37	38	24	13	3	1

The services per conception for Local cows were 52.9%, for Holestein-Friesian Cross 62.3% and for Sahiwal Cross 40% as shown in Figure 4.3. Upon increasing age the service required for conception was irregular showing in Figure 4.1.

DISCUSSION

The overall conception rate in cattle using frozen semen was 54.9% which is in agreement with Shamsuddin *et al.* (2001). This rate was, however, similar to Biochard *et al.* (1994) and Fengxum (1997). Bach (1983) reported that highest (79%) and lowest (61.8%) conception rate may be obtained when cows were inseminated at strong or weak oestrus signs, respectively. Insemination with increased proportion of abnormal spermatozoa beyond the normal limit may induce lower fertility (Larson, 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.

Cows with age group 2 to 3.9 have significantly increased conception rate (57.0%) than other age group. 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 after 10 years of age. Donovan (2003) stated that there is a decline in fertility with advancing age, and a decrease in ovulation rate due to lack of gonadotropin 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. From the present investigation it is found that a significantly increased conception rate in both parity 1(73.0%) and parity 2 (65.8%). These findings were in agreement with Biochard and Manfredi (1994). The differences in conception with respect to parities among studies might be due to differences in breeds of cows.

The overall and within group conception rate percentage in Local (52.9%) and Friesian cross (62.3%) cows/heifers were relatively higher than that of Sahiwal cross (40%). However the difference was not significant ($p>0.05$).The conception rate was observed significantly higher (78.9%) in the cows which were inseminated in spring than the cows were inseminated in summer (29.8%) winter (72%) and rainy (35.7%). Seasonal effects on conception rate of inseminated cows are presented in Table 4.5. Significantly higher ($p<0.01$) in the cows which were inseminated in spring (78.9%) than the cows were inseminated in summer (29.8%) winter (72.1%) and rainy (35.7%). Alam and Ghosh (1988) reported that conception rate of the cows significantly differed in different seasons, changes in nutrition, environmental temperature, and climate and photo period. 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 availability of necessary nutrition for feeding of animals. Animals with 1-2 services in a heat showed conception rate 89.7% and animals with ≥3 services showed conception rate 6.5%. This variation might be due to BCS, improper timing of AI, faulty AI technique and poor heat detection. This finding is related with that of Biochard and Manfredi (1994). Gwazdawskas *et al.* (1975) found that conception rate is generally lower in older cows. In a Virginia study conception rate remained constant (50%) during the first 3 lactations. Conception rates were 10% higher in virgin heifers and 10% lower in 4th lactation and older cows. However EI-Amin *et al.* (1981) reported that there was no significant difference between the breed groups in the number of services per conception (av. 2.6) or gestation length (av. 275.6 days). Grass *et al.* (1982) found that the breed resulted differences in age at puberty. Ron *et al.* (1984) studied on effects of heritability of sires on CR and found to be .016 for cows and 0.006 for heifers.

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