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EFFECT OF SEMEN TYPE, BREED DIFFERENCE AND SEASONAL VARIATION ON THE CONCEPTION RATE OF COWS IN ARTIFICIAL INSEMINATION

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Abstract: The experiment was carried out during August 1996 to December 1998 to determine the conception rate (CR) in artificial insemination (AI) using liquid and deep frozen semen. The effects of season and breeds of cows on CR were also considered. Out of 184 cows and heifers inseminated, 62 were Local, 64 were Local × Friesian and 58 were Local × Sahiwal crossbreds. Sixty-one (61) and 123 cows and heifers were inseminated by liquid and deep frozen semen respectively. Liquid semen was produced locally at district AI center, Khulna and deep frozen semen was collected from central cattle breeding station, Savar, Dhaka. Average motility of sperm in liquid and deep frozen semen was 70% and 60% respectively. AI was done by recto-vaginal method between 8 to 24 hours after onset of estrous and pregnancy diagnosis of all non-returned animals was done between 60 to 90 days after insemination by rectal palpation method. The animals were reared under semi-intensive condition. Data were analyzed by statistical package 'MINITAB'. Analysis of variances revealed significant effect ($P<0.05$) of semen type (liquid or deep frozen) on CR. Mean CR was found 65.57 ± 6.13% and 49.59 ± 4.53% for liquid semen and deep frozen semen respectively and the overall rate was 54.89 ± 3.68%. On the other hand, average conception rate in Local (indigenous zebu type), Local × Friesian and Local × Sahiwal were 58.06 ± 6.32%, 46.88 ± 6.29% and 60.34 ± 6.48%, respectively. Seasonal variation in CR was insignificant ($P>0.05$).

Key words: Artificial insemination; Cow; Conception rate; Pregnancy; Bangladesh

Introduction

Artificial insemination (AI) programme is widely used in Bangladesh for genetic improvement of poor quality indigenous cattle. Both liquid and deep frozen semen are used for AI. Liquid semen is produced from 23 AI centers of Bangladesh and deep frozen semen is produced from Central Cattle Breeding Station. It has been observed that the conception rate is highly variable in AI. Variability of fertility data as reported in the literature is often misleading, since a standard basis for conclusion is not being applied to express these values. The existing AI program of Bangladesh covers only 15% of the cattle population and conception rate (CR) is much lower in AI than that in natural

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services (Bhuiyan, 1997). Sufian *et al.* (1998) observed that several factors influence the fertility of indigenous and crossbred cows. Determination of effects of various factors on fertility is therefore, of great economic importance. The present study was undertaken to determine the effects of semen type, breeds of cow and season of AI on conception rate. Little work has been done on AI in this region, therefore the present work is of great importance.

Materials and Methods

The study was conducted on a selective area at Daulatpur, Khulna during August 1996 to December 1998. Artificial insemination (AI) was carried on 184 cows and heifers taken at random.

Semen used for AI: Both liquid and deep frozen semen were used for AI. Liquid semen was produced from four crossbred bulls of Khulna District AI centre. Collected semen was diluted with "egg yolk citrate" dilutor. Sperm concentration was kept 20 to 25 million per ml and average motility was 65 to 70%. AI was done within 48 to 72 hours of preservation and semen was kept at 5^0C before AI. In this experiment 61 cows and heifers were inseminated with liquid semen. Deep frozen semen was supplied from Central Cattle Breeding Station, Savar, Dhaka. The number of motile spermatozoa per dose (0.25ml) was 30 million and average motility was 60%. A total of 123 cows and heifers were inseminated with deep frozen semen. Insemination was done by recto-vaginal method between 8 to 24 hours after onset of estrous.

Cows and heifers: A total of 184 cows and heifers were inseminated. Out of total inseminated animals, 38 were heifers and 146 were cows. The ages of the animals were between 2 to 12 years and the average was 5.20 years. Out of 184 cows and heifers, 62 were Local (indigenous zebu), 64 were Local × Friesian and 58 were Local × Sahiwal crossbreds. The animals were reared under semi-intensive condition. The animals were allowed to graze on natural grasses. Concentrate mixtures and rice straw were supplied in addition to grazing.

Season of AI: Year round AI programme was divided into three seasons, summer (March to June), monsoon (July to September) and winter (October to February) considering average ambient temperature, humidity and rainfall.

Pregnancy diagnosis: All the inseminated animals were observed through 22 days after insemination to find out the onset of estrous, if any. Non-returned animals were examined by rectal palpation method for pregnancy between 60 to 90 days after insemination as described by Ball (1980).

Statistical analysis: Data were analyzed by statistical package 'MINITAB'. General Linear Model was used to analyze the effects of semen type, breeds of cows and season of AI on conception rate.

Results and Discussion

The effects of the semen type (liquid and deep frozen), breeds of cows and season of AI are shown in table 1 and least squares means ± SE conception rate are shown on table 2.

Table 1. Summary showing the effect of semen type, breeds of cows and season of AI on conception rate.

Factors	F-value	Level of significance
Type of semen	4.26	*
Breeds of cows	1.30	NS
Season of artificial insemination	1.95	NS

NS= Non-significant (P>0.05) *= Significant (P<0.05)

Semen type: Significant difference (P<0.05) was found in conception rate (CR) between liquid and deep frozen semen. The higher and lower CR was found in liquid semen (65.57 ± 6.13%) and deep frozen semen (49.59 ± 4.53%) respectively, and the overall mean CR was 54.89 ± 3.68% (Table 2). The findings were consistent with those of Shamsuddin *et al.* (1987). They found CR of 53.25% and 48.65% with liquid semen and deep frozen semen respectively. However, Howlader *et al.* (1997) had a different observation. They found higher CR with deep frozen semen (64.92%) than with liquid semen (58.83%). These differences might be due to variation in the fertility of donor bulls, improper maintenance of cold chain of liquid and deep frozen semen, faulty thawing of deep frozen semen, variation in the concentration and motility of spermatozoa in semen, etc. CR with deep frozen semen has been reported by some workers as 62.51% (Das *et al.* 1993), 51.87% (Qureshi, 1979), 48.5% (Prakash and Saini, 1987), and 40.18% (Nair, 1975).

Table 2. Mean ± SE conception rate for semen type, breeds of cows and season of AI.

Factors		Number of observations	Conception rate (%)
Type of semen	Liquid semen	61	65.57 ± 6.13
	Deep frozen semen	123	49.59 ± 4.53
Breeds of cows	Local	62	58.06 ± 6.32
	Local × Friesian	64	46.88 ± 6.29
	Local × Sahiwal	58	60.34 ± 6.48
Season of AI	Summer	33	51.52 ± 8.83
	Monsoon	119	59.66 ± 4.52
	Winter	32	40.62 ± 8.82
Over all mean		184	54.89 ± 3.68

Breeds of cow: Analysis of variance showed that the breeds of cow had insignificant (P>0.05) effect on conception rate (Table 1). The result was consistent with the findings of Sufian *et al.* (1998), Ashraf *et al.* (2000), Islam and Bhuiyan (1997), Sultana (1995), Ghosh (1995) and Khan (1990). The mean conception rate for Local, Local × Friesian and Local × Sahiwal were 58.06 ± 6.32%, 46.88 ± 6.29% and 60.34 ± 6.48%, respectively. The result was in closer agreement with the findings of Shamsuddin *et al.* (1987) as 53.33% in Local and Crossbred, and Qureshi (1979) as 51.87% in Kumaon Hill cattle. Comparatively higher conception rate were observed by Bhatnagar *et al.* (1978) as 60.57% in Sahiwal cattle and Das *et al.* (1993) as 62.51% in Local cattle, and lower CR

were obtained by Nair *et al.* (1975) as 40.18% in Ongole cattle, and Prakash and Saini (1987) as 48.5% in Jersey and Holstein cattle.

Table 3. Mean conception rate of different breeds of cows using liquid and frozen semen.

Breeds of cows	Semen types	Number of observation	Conception rate (%)
Local	Liquid semen	18	61.1 ± 11.8
	Deep frozen semen	44	56.82 (7.55
Local (Friesian)	Liquid semen	20	55.0 (11.4
	Deep frozen semen	44	43.18 (7.55
Local (Sahiwal)	Liquid semen	23	78.26 (8.79
	Deep frozen semen	35	48.57 (8.57

Effect of season: The effect of season of AI on CR was found insignificant (P>0.05). The highest CR was found in monsoon (59.66 (4.52%) followed by summer (51.52 (8.83%) and winter (40.62 (8.82%). Possible reason is that the availability of naturally grown grasses is abundant in monsoon and scarcity of grasses in winter season. Cruz et al. (1995) found significant effect of season of AI on CR. They found average CR in Bos taurus (Bos indicus cows and heifers as 61.7%, 55.9% and 54.9% in December-March, April-July and August-November period respectively.

Conclusion

It might be concluded here that the CR with liquid semen was higher than deep frozen semen. Proper preservation and handling of deep frozen semen as well as appropriate thawing techniques would enable to increase the efficiency of deep frozen semen. There were no significant effects of cow breeds and season of AI on CR.

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