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Effect of Substitution of Buffalo Bull Seminal Plasma with That of Cow Bull on Liveability and Conception Rate

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Abstract
The present project was designed to study the effect of substitution of buffalo bull seminal plasma with that of cow bull on liveability and fertility of buffalo bull spermatozoa. After collection, semen was divided into three fractions. a) Half of the seminal plasma of buffalo bull was substituted with equal amount of cow bull seminal plasma, b) The seminal plasma of buffalo bull was completely substituted with that of cow bull, c) No substitution was made (control group). The liveability (hrs) of buffalo bull spermatozoa stored at 37°C was significantly higher ($p < 0.05$) in half substituted seminal plasma (21.3) as compared to that in full substituted (8.4) and control groups (13.7). Significantly higher conception rate was observed with half substituted seminal plasma semen samples (65.58) as compared to inseminations with control group (54.4) semen samples.

Key words: Buffalo bull, cow bull, liveability, conception rate, seminal plasma

Introduction
Low conception rate is one of the serious reproductive problems affecting the dairy industry. Among various factors influencing the conception rate, high concentration of seminal plasma has been shown to be deleterious to bovine spermatozoa (Pickett *et al*., 1975; Baas *et al*., 1983). The seminal plasma of both cattle (Avenell, 1982) and buffalo bulls (Ahmad *et al*., 1994) has been shown to reduce the motility percentage, liveability and absolute index of liveability of spermatozoa. Buffalo bull semen contains higher contents of inhibitory factors compared to cattle semen (Ganguii, 1978; Sahni, 1990). Cockrrll (1974) postulated that the poor keeping quality of buffalo bull semen may be due to higher seminal plasma concentrations of calcium, esterified phosphate and various phosphate splitting enzymes.

Substitution of buffalo bull seminal plasma with that of cattle seminal plasma has been shown to have beneficial effect on liveability and preservation of buffalo bull spermatozoa (Ibrahim *et al*., 1981; Sahni, 1990). However, the possible beneficial effect of this treatment on the fertility has not yet been established. Therefore, the objective of this study was to investigate the effect of substitution of buffalo bull seminal plasma with that of cattle on liveability (hrs) and fertility of buffalo bull spermatozoa under local conditions.

Materials and Methods
For this study, semen of one buffalo and one cow bull (cross bred), maintained under identical conditions of feeding and management at Semen Product ion Unit, Department of Animal Reproduction, University of Agriculture, Faisalabad, was used. A total of 10 ejaculates of each buffalo and cow bull were collected. After collection, each ejaculate was divided into three fractions A, B and C. In fraction A half of the seminal plasma of buffalo bull was substituted with equal amount of cow bull seminal plasma. In fraction B, the seminal plasma of buffalo bull was completely substituted with that of cow bull. The fraction C was kept as untreated control. For substitution, the seminal plasma from fraction A and B was removed by centrifuging the ejaculates at 3000 rpm for 15 minutes (Ahmad *et al*., 1994).

All semen fractions were diluted in whole milk egg yolk glycerol extender at the rate of 1:10 and stored at 37°C For determination of liveability, the motility percentage of each sample was recorded at hourly interval till the death of all spermatozoa (Milavenof, 1962).

On the basis of liveability results, inseminations were done only with fractions A and C semen. A total of 150 buffaloes each of control and half substituted seminal plasma samples, were inseminated at the clinic of the Department of Animal Reproduction. University of Agriculture, Faisalabad. Buffaloes of both the groups were checked for pregnancy through rectal palpation at least eight weeks following insemination.

Statistical analysis: The data on liveability (hrs) of all experimental groups were subjected to completely randomized design (Steel and Torrie, 1980) and the means were compared by Duncan's Multiple Range Test (Duncan, 1955). To see any statistical difference in conception rate of two groups the "Chi-Square" test was applied.

Results
The mean values (±S.E) for liveability of spermatozoa in control, full substituted and half substituted seminal plasma semen samples are shown in Table 1. Statistical analysis revealed that liveability (hrs) was significantly higher ($p < 0.05$) in half substituted seminal plasma semen samples as compared to rest of the two groups, whereas liveability (hrs) was significantly higher ($p < 0.05$) in the

Table 1: Liveability of buffalo bull spermatozoa (hrs) at 37°C in half, full substituted seminal plasma and control semen samples.

Sample No.	Control semen	Full substituted seminal plasma semen samples	Half substituted seminal plasma Semen samples
1	13	8	18
2	14	9	20
3	15	8	17
4	13	10	22
5	12	8	24
6	16	9	23
7	14	10	22
8	13	7	26
9	15	8	19
10	12	7	22
Mean ± SE	13.7	8.4	21.3

Table 2: Analysis of vriance showing the effect of substitution of seminal plasma on liveability (hrs) of buffalo bull spermatozoa

S.O.V	d.f.	Sum of squares	Mean square	f-value
Between groups	2	840.867	420.433	117.512**
Error	27	96.600	3.578	
Total	29	937.467		

control group as compared to the one in which complete substitution of seminal plasma was performed (Table 2). Statistical analysis regarding effect of substitution of seminal plasma on conception rate showed significantly higher ($p<0.1$) conception rate in half substituted seminal plasma 65.38 per cent semen samples as compared to 54.4 per cent in control group (Table 3).

Table 3: Effect of substitution of buffalo bull seminal plasma with that of cow bull on fertility of $b_u ff_a l_o$ bull spermatozoa.

	Control Group	Half substituted seminal plasma
No. of inseminations	150	150
Traced out	125	130
Pregnant	88	85
Conception rate (%)	54.4b	63.38a

Values with different superscripts differed significantly ($p<0.05$).

Discussion

High concentrations of seminal plasma have been shown to be deleterious to storage of buffalo bull semen (Sahni, 1990 Sahni and Mohan, 1990; Ahmad *et al*., 1994). Centrifugation has been used as an approach for reducing concentration of seminal plasma (Pickett *et al*., 1975; Clay *et al*., 1984).

It is obvious from results of the present study that the preserving ability of buffalo bull spermatozoa is dependent someway on the presence of seminal plasma (Table 1). These findings are in agreement with previous results recorded by Albright *et al*. (1958) and Ibrahim *et al*. (1981), who reported that preserving ability of buffalo bull spermatozoa was improved with the substitution of half the volume of seminal plasma of cow bull. This improvement may be attributed to the dilution of the inhibitory factor(s) believed to be present in higher concentration in the seminal plasma of buffalo bull (Sengupta *et al*., 1976). Cockrrll (1974) reported that the poor keeping quality of buffalo bull semen may be due to higher concentrations of calcium, esterified phosphatase and the phosphate splitting enzyme in buffalo semen. The observed improvement in spermatozoa viability following the withdrawal of 50 per cent of the volume of the seminal plasma in buffalo semen in the present study was indirectly supported by these views. However, the possibility of presence of some other unknown factor (s) cannot be excluded. The improvement in sperm viability in half seminal plasma substituted semen samples suggests that the molarity of the mixed seminal plasma is more suitable than complete and un-substituted seminal plasma semen samples. However, the complete replacement of seminal plasma resulted in significant reduction ($p<0.05$) in the viability of buffalo bull spermatozoa over the control, indicating that the permissible change in the molarity was achieved when the substitution was done to only 50 percent of the volume. These findings are in agreement with those reported earlier by Bora and Rao (1969), since they showed that the half combination of buffalo seminal plasma with zebu cattle improved significantly the keeping quality, while complete substitution of seminal plasma resulted in significant decrease in liveability of spermatozoa of either species.

In this study 50 percent substitution of buffalo bull seminal plasma with that of cow bull significantly improved the conception rate over the control group samples. This could be due to higher liveability of spermatozoa in half substituted seminal plasma semen samples. Verma and Mohan (1982) and Fadeev *et al*. (1983) reported significantly higher conception rate with semen samples having longer liveability (hrs) compared to samples having shorter sperm liveability.

Results of the present study clearly indicate that liveability and conception rate of buffalo bull spermatozoa can be improved by substituting the half of seminal plasma

with that of cow bull prior to extension of the semen. However, its effect on freezing quality and fertility status of frozen buffalo bull spermatozoa needs further investigations.

References

Ahmad, M., Z.A. Shah, K.M. Ahmad, A. Khan and M.Z. Hassan, 1994. Liveability of buffalo spermatozoa with and without seminal plasma at 37°C. Pak. Vet. J., 14: 203-206.

Albright, J.L., M.H. Ehlers and R.E. Erb, 1958. Spermatozoa survival in milk diluent with and without seminal plasma. J. Dairy Sci., 41: 1110-1112.

Avenell, J.A., 1982. Freezing of swamp buffalo semen. Anim. Reprod. Sci., 5: 141-145.

Baas, J.W., P.C. Molan and P. Shannon, 1983. Factors in seminal plasma of bulls that affect the viability and motility of spermatozoa. J. Reprod. Fertil., 68: 275-280.

Bora, N.N. and M.B. Rao, 1969. Combination of buffalo bull sperm with zebu seminal plasma. J. Reprod. Fertil., 41: 257-259.

Clay, C.M., N.P. Slade, R.P. Amann and E.L. Squires, 1984. Effects of extender, storage temperature and centrifugation on stallion spermatozoal motility and fertility. Proceedings of the 10th International Congress on Animal Reproduction and Artificial Insemination, June 10-14, 1984, University of Illinois, Urbana, pp: 186-188.

Cockrrll, W.R., 1974. The husbandry and tlomestick buffaloes. FAO/UN Home.

Duncan, D.B., 1955. Multiple range and multiple F tests. Biometrics, 11: 1-42.

Fadeev, V.S., U.N. Deronyah, V.A. Klenov and S. Abshev, 1983. The optimum time and frequency of insemination of beef cows. In Osriov Napravleiniya v Selektsii Skota Mass Prod. Orenburg USSR, 64-66 (Russian).

Ganguii, N.C., 1978. Biochemistry of semen processing. Proceedings of the Seminar on Buffalo Reproduction and Artificial Insemination, December 4-15, 1978, National Dairy Research Institute, Karnal, India.

Ibrahim, S.S., A.M. Rakha, A.A. El-Chahidi and A.I. El-Azab, 1981. Preservation of buffalo semen. 2. The role of seminal plasma. Egypt. J. Vet. Sci., 18: 67-76.

Milavenof, U.K., 1962. Biology of reproduction. Published for Agriculture Literature, J. Pamphlets, Moscow, USSR, pp: 451-452.

Pickett, B.W., J.J. Sullivan, W.W. Byers, M.M. Pace and E.E. Remmenga, 1975. Effect of centrifugation and seminal plasma on motility and fertility of stallion and bull spermatozoa. Fertil. Steril., 26: 167-174.

Sahni, K.L. and G. Mohan, 1990. Effect of removal of plasma on preservation of bovine semen. Indian J. Anim. Sci., 60: 783-785.

Sahni, K.L., 1990. Inhibitory effect of seminal plasma on motility of bovine semen. Indian J. Anim. Sci., 60: 786-788.

Sengupta, B.P., L.N. Singh and J.S. Rawat, 1976. Reversible spermiostatic factor present in buffalo seminal plasma. Curr. Sci., 45: 258-260.

Steel, R.G.D. and J.H. Torrie, 1980. Principles and Procedures of Statistics: A Biometrical Approach. 2nd Edn., McGraw Hill Book Co., New York, USA., ISBN-13: 9780070609266, Pages: 633.

Verma, R.P. and G. Mohan, 1982. Efficiency of double inseminations in crossbred cattle. Indian J. Dairy Sci., 35: 178-179.