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Effect of prostaglandin $F_2\alpha$, oxytocin and butylated hydroxytoluene on fertility of crossbred (HF x Hariana) bull spermatozoa*

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ABSTRACT

Semen samples collected from two crossbred bulls (HF x Hariana) were diluted in tris with three combinations of additives i.e., prostaglandin $F_2\alpha$ ($PGF_2\alpha$) (1.5 ng/ml), oxytocin (0.1 unit/ml) and butylated hydroxytoluene (BHT) (2 mM/ml) and frozen in liquid nitrogen. A total number of 176 oestrus cows were inseminated with all the additives treated and control semen samples, the pregnancy diagnosis was carried out 50-60 days post insemination. The results, revealed overall conception rate 40.48% 48.28% 42.31% and 42.91% in control, $PGF_2\alpha$, oxytocin and BHT treated groups. No significant difference was observed among the treated groups separately . However, the conception rate was higher with $PGF_2\alpha$ treated semen when compared to control.

Key words : Bull, spermatozoa, conception rate, $PGF_2\alpha$, oxytocin, BHT

Improvement in the keeping quality, freezability and fertility of bovine semen by incorporating various additives is the subject of study for the last few years. Different additives have been tried to enhance the motility of spermatozoa with the view to improve the conception rate (Balasubramanian, 1979). The addition of prostaglandins to semen prior to freezing was observed to improve the fertility rate in sheep (Gustafsson *et al.*, 1975) and buffaloes (Muralinath, 1988). Oxytocin is known to increase uterine and oviductal contractions (Reeves, 1987) and intrauterine infusion of oxytocin increases sperm transport (Baker *et al.*, 1968). BHT added to semen extenders prior to freezing may improve the fertility of bull semen and reduce the risk of transmitting viral diseases to cows during A.I. (Anderson *et al.*, 1994). Present investigation is an attempt to enhance the conception rate (CR) with the frozen semen containing added $PGF_2\alpha$, oxytocin and BHT additives.

MATERIALS AND METHODS

Twenty four ejaculates (12 from each bull) from two crossbred bulls (HF x Hariana) maintained under identical feeding and managemental regimen were used for the study. Semen was collected in A.V. twice a week. The ejaculates were split into 4 parts. Each part was diluted separately with Tris+additive combinations @(1.5 ng/ml $PGF_2\alpha$, 0.1 unit/ml oxytocin) as per the method described by Lokanathan, (1993) and BHT 2 mM /ml as per Killian *et al.* (1989), respectively and the 4th aliquot was kept as control. The four split samples were Frozen in medium french straws after providing combined cooling cum equilibration period of 4 hrs. A total number of 176 oestrous cows were inseminated with the frozen semen of treated and control groups (after thawing at 37°C for 30 seconds). Pregnancy verification was carried out 50-60 days post insemination. Statistical analysis of the data was done according to the method described by Snedecor and Cochran, (1989).

RESULTS AND DISCUSSION

The results obtained in this study are presented in Table 1. The mean conception rate was recorded higher

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Table 1. Conception rate (post AI) in different additive combinations

Treatment	Total no. of animals inseminated	Total no. of animals followed up	Total no. of animals pregnant	Conception rate (%) at 1st insemination	Overall mean mean CR (%)
			Bull A		
Control	25	23	10	43.47	40.48
Prostaglandin $F_2\alpha$	25	23	12	52.17	48.28
Oxytocin	25	24	11	45.83	42.31
BHT	25	24	11	45.83	42.91
			Bull B		
Control	19	16	6	37.50	
Prostaglandin $F_2\alpha$	19	18	8	44.40	
Oxytocin	19	18	7	38.80	
BHT	19	15	6	40.00	

in $PGF_2\alpha$ treated group (48.28%) followed by BHT (42.91%). oxytocin (42.31%) and control (40.48%). However. the difference in mean values among the traeted groups did not reach any statistical significance.

The CR in $PGF_2\alpha$ treated semen was higher (48.28%) than control (40.48%) in this study, which is well comparable to (Gokeen *et al.*, 1985) ram and (Radosalvov *et al.*, 1990) bull semen. However, in this study CR was higher than that reported in buffaloes (Reddy *et al.*, 1992). The trend in improved CR of our study was similar to that reported in ewes (Gustafsson *et al.*, 1977) and rabbit (Edquist *et al.*, 1975), using $PGF_2\alpha$ treated semen. This improvement possibly because of an increased sperm number in the oviduct following A.I. in rabbit (Edquist *et al.*, 1975) and ewe (Gustafsson *et al.*, 1977). The CR in oxytocin treated semen was higher (42.31%) as compared to control (40.48%) in this study. But, this is lower than cows (Drume, 1975 and Shubin *et al.*, 1982) and sows (Schlegel and Loebel, 1972). The difference in the CR among studies might be due to the variation in the concentration of oxytocin used in such studies. Addition of oxytocin increases uterine motility and sperm transport to oviduct (Reeves, 1987). Probably favoured the CR in the present study as it was in sows (Martinek *et al.*, 1978). The CR obtained in the BHT treated semen was relatively higher (42.91%) than control (40.48%) but failed to reach statistical significance. Similar response was reported elsewhere (Anderson *et al.*, 1994). It can be concluded that the addition of $PGF_2\alpha$, oxytocin and BHT prior to semen freezing, $PGF_2\alpha$ performed much better than other additives and control, but statistically it is not significant with control.

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REFERENCES

Anderson. S., Harkness. W., Akin, Y., Kaproth, M. and Killian. G. (1994). Categorical data analysis of the effect on bull fertility of butylated hydroxytoluene addition to semen extenders prior to freezing. J. Dairy Sci., 77(8): 23-02-2307.

Baker. R.D., Dzuik. P.J. and Norton. H.W. (1968). Effect of volume of semen. number of sperm and drugs on transport of sperm in artificially inseminated gilts. Journal of Animal Science, 27(1-3): 88-93.

Balasubramanian, R. Captain, (1979). Comparative studies on the usage of liquid semen and frozen semen in artificial insemination in cow. M.V.Sc. thesis submitted to the Tamil Nadu Agriculture University. Coimbatore.

Drume. C. (1975). Improving the conception rate of cows by adding oxytocin to semen. Lucrari-stiintifice. - Institutal-de-Cercetari-pentru-cresterea Taurinelor. 2: 105-111.

Edquist. S., Einarsson. S. and Gustafsson. B. (1975). Effect of prostaglandin F_2a on sperm transport in the reproductive tract of the ewe. Acta Veterinaria Scandinavica., 16: 149-151.

Gokeen. H., Asti, R., Cekgul. E. and Sener. E. (1985). Investigation on the effects of the addition of prostaglandin $F_2\alpha$ and vitamin E to frozen ram semen on acrosome morphology and conception rate. Veteriner-Fakultesi-Dergisi-Uludag-Universitesi. 4(1-3): 77-82.

Gustafsson, B., Edquist, S., Einarsson, S. and Linge, E. (1975). The fertility of deep frozen ram semen supplemented with PGF$_2\alpha$. Acta Veterinaria Scandinavica, 16: 468-470.

Gustafsson, B.K., Graham, E.F., Crabo, B.G., Pavelko, M.K. and Wagner, W.C. (1977). Prefreeze supplementation of ram semen with PGE$_2$ and PGF$_2\alpha$. Effect of sperm vitality in vitro and on the sperm transport in the ewe. Proc. 10th Annual Meeting, Society of Reproduction, August, 14-17.

Killian, G., Hondel, T., McNutt, T., Henault, M., Wegner, C. and Dunlap, D. (1989). Evaluation of butylated hydroxytoluene as a cryopreservative added to whole (or) skim milk diluent for bull semen. J. Dairy Sci., 72(5): 1291-1295.

Lokanathan (1993). Effect of certain additives on bovine semen freezability. M.V.Sc. Thesis submitted to TANUVAS, Chennai.

Martinek, J., Kolmacka, J. and Bren, J. (1978). The effect of oxytocin on conception rate and fertility of sows. Veterinarstvi, 23(3): 115-117.

Muralinath, E. (1988). In: M.V.Sc. thesis submitted to College of Veterinary Science. Tirupathi, Andhra Pradesh Agriculture University, Hyderabad.

Radosalvov, V., Spasov, and Encheva, M. (1990). Improving the conception rates in cows. Veterinaria Sbirka, 88(3): 49-50.

Reddy, B.B., Murthy, A.S.M., Murthy, A.V.N. and Rao, V.S.N. (1992). Role of seminal prostaglandins on fertility of Murrah buffaloes. J. Anim. Reprod. Sci., 29: 117-122.

Reeves, J.J. (1987). Endocrinology of Reproduction. II. Physiology of Reproduction in Farm Animals, (Ed) Hafez, E.S.E. 5th Edn. Lea and Febiger 6000 Washington Square, Philadelphia, PA 19106-4198. USA pp. 922-1330.

Schlegel, W. and Loebel, J. (1972). Studies on the dependence of fertility on uterine motility and semen backflow and the effect of oxytocin on them. Monatsheffe-fur-veterinarmedizin, 27(14): 537-539.

Shublin, A., Morugin, A. and Piskova, N. (1982). The effect of synthetic oxytocin on conception of cows. *Molochnoei*-Myasnoe-Skotovodstvo, 6: 41-42.

Snedecor, G.W. and Cochran, W.G. (1989). Statistical Methods. 6th edn. The Iowa State University Press, Ames. Iowa, USA.