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GnRH therapy in matured Holstein Friesian and Jersey bulls with impaired reproduction*

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ABSTRACT

Effect of GnRH therapy in seven Holstein Friesian (HF) and three Jersey bulls with impaired reproduction aged between 4 and 5 years was investigated. The investigated impaired reproductive condition was 'normal libido with very poor quality and quantity of semen'. Each experimental bull received single injection of 20mg of synthetic GnRH (Buserelin-Acetate Receptal®, Hoechst) for 19 consequent times at four days interval, semen was collected in artificial vagina and subjected for detailed analysis of characteristics. GnRH therapy significantly reduced ($P<0.05$) the reactions time and increased the semen volume ($P<0.01$) during therapy and post therapy period. pH value was not altered. Per ml concentration and total concentration increased ($P<0.01$). Mean motility of spermatozoa increased significantly (($P<0.01$) in neat semen and non-significant increase was observed in extended semen during therapy period. Viability of spermatozoa in 6 and 24 hours stored neat and extended semen showed nonsignificant increase. Livability of spermatozoa was not altered by GnRH therapy. Total abnormality decreased significantly during therapy period. However, the improvement in quantitative and qualitative characterstics of semen in the present study was not optimum for cryopreservation of semen.

Key words: GnRH therapy, Taurus bulls, semen characteristics, impaired reproduction

Maximization of semen production in bulls is an imperative need in view of their ever increasing role for maintaining exotic in heritance in crossbreeding programme. Decreasing reproductive function in pedigreed young bulls is extremely frustrating both for farm manager as well as for clinician attempting to manage these bulls. Lowered reproductive performance in bulls is a major single cause for disposal of sires used for artificial insemination service (Kotayya and Narasimha Rao, 1981). However, reproductive problems of genetically superior sires were corrected at an early stage of infertility by therapeutic manipulation of gonadotrophic releasing hormone (Convey, 1973) and promising results have been obtained in bulls reproductive performance following GnRH or human chronic gonadotrophine (hCG) challenges by altering plasma testosterone concentration (Morrow, 1986). However, use of GnRH therapy in poor libido Murrah buffalo bulls increased libido, semen output and semen quality (Narasimha Rao, 1990). Improvement in libido and semen qualities were observe in bucks when treated with GnRH (Minoia *et al.*, 1989). Chronic pulsatile low doses of GnRH were successfully used in man with hypogonadism for induction of testosterone production and spermatogenesis (Gorenskarin *et al.*, 1982; Oppermann *et al.*, 1989). Hence, an attempt has been made in the present investigation to study the effect of synthetic GnRH (Buserelin-Acetate) in HF and Jersey bulls with normal libido, poor quantity and quality of semen in correcting their reproductive function.

MATERIALS AND METHODS

A total of 65 bull calves (46 HF and 19 Jersey) aged 14 to 20 months were imported by an organised Bull Breeding Farm and Frozen Semen Bank, Bangalore during December 1994. These bull calves were maintained under optimum nutritional and managerial conditions. Around the age of two years they were trained for semen collection in artificial vagina. Semen was collected at four days interval, analysed for qualitative, quantitative characteristics and subjected for cryopreservation.

Out of the total bull calves imported, seven HF and three Jersey bulls showed poor semen characters and poor

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freezability. These 10 bulls with impaired reproduction were selected for the present GnRH therapy study, which was conducted during January to September 1999.

During pre-therapy period, semen was collected for 14 times from each bull at four days interval in artificial vagina. During therapy period each bull received single intramuscular injection of 20 mg of synthetic GnRH (Buscerelin-Acetate, Receptal® Hoechst) for 19 consequent times at four days intervals and semen was collected 3 hours later. During post-therapy period, a total of 16 semen collections were made from each bull at four days interval. A total of 490 semen collections were made from experimental bulls during the trial period. Reaction time was noted in seconds by using stop watch. Semen was analysed for quantitative characters like volume (ml), pH (%), per ml concentration (million/ml), total concentration (million/ejaculate) and quantitative characters like motility (%), viability (%), livability (%) and total abnormality (%). The data was subjected for factorial analysis of variance as described by Snedecor and Cochran (1967). Statistical analysis was done using SPSS Computer Software facility.

RESULTS AND DISCUSSION

The data collected were analysed and the mean±SE of the semen traits studied are presented in Table 1. GnRH therapy reduced mean reaction time significantly ($P<0.05$) in bulls with impaired reproduction. There is paucity of information on reaction time during GnRH therapy in Taurus bulls. The mean volume of semen increased significantly ($P<0.01$) during therapy and post therapy period. Zolman and Convey (1973) reported that GnRH had increased the level of leutinizing hormone (LH) and testosterone in blood of Taurus bulls. In the present study also probably testosterone had an influencing effect on functional activities of testes, epididymidis and accessory sex glands and their secretion would had contributed to the increased volume of semen. The mean pH of semen in the present study increased nonsignificantly during therapy period and reduced during post therapy period. However, GnRH therapy was not having significant influence on pH value of semen and concurs with the reported findings of Perez (1964) in Taurus bulls and Sexena and Singh (1973) in Murrah bulls.

Table 1. Semen characteristics of HF and Jersey bulls with impaired reproduction during GnRH therapy period

Sl. No.	Traits	No. of bulls	Pre therapy (n=14)	Therapy (n=19)	Post therapy (n=16)
1	Reaction time (sec.)	10	35.54±4.18[a]	22.08±3.67[b]	25.58±4.72[b]
2	Volume (ml)	10	2.58±0.28[a]	3.98±0.34[d]	3.54±0.34[d]
3	pH value (%)	10	6.22±0.20[a]	6.48±0.09[a]	6.31±0.0[a]
4	Sperm concentration (million/ml)	10	1038.19±122.45[a]	1488.87±147.66[d]	1385.70±166.85[d]
5	Total sperm concentration (millions)	10	2876.23±488.12[a]	6017.04±756.72[d]	5218.54±809.45[d]
6	Motility				
	In neat semen		8.59±1.98[a]	17.61±4.24[d]	17.88±3.90[d]
	In diluted semen		15.21±6.02[a]	20.90±4.60[a]	20.28±4.14[a]
7	Viability	10			
	a. 6 hrs of storage				
	In neat semen		8.06±1.54[a]	14.71±3.67[d]	13.00±3.78[a]
	In diluted semen		6.70±1.73[a]	12.65±3.30[a]	7.01±1.57[a]
	b. 24 hrs of storage				
	In neat semen		0.88±0.70[a]	2.99±2.00[a]	0.98±0.79[a]
	In diluted semen		0.16±0.11[a]	3.08±1.15[d]	0.97±0.34[a]
8	Livability of spermatozoa (%)	10	49.70±4.37[a]	53.67±2.87[a]	56.65±2.04[a]
9	Total abnormal spermatozoa	10	47.11±4.04[a]	46.38±2.73[d]	48.15±3.47[c]

a,b = $P<0.05$
a,c,d = $P<0.01$
NOTE: Common superscript in rows a,b,c,d
Means bearing at least any one of the common superscript in a row do not differ significantly

Spermatozoa concentration increased significantly ($P<0.01$) during GnRH therapy and post-therapy period and similar findings were observed by Abdel Malak (1992) in buffalo bulls, Roser and Hughes (1992) in subfertile stallions during nonbreeding seasons and Narasimha Rao (1990) in low libido Murrah buffalo bulls. The total concentration of spermatozoa increased significantly ($P<0.01$) during therapy and post-therapy period. There is no available literature on the concentration of spermatozoa of bulls treated with GnRH, however similar observations were made by Schandacher and Lùstra (1977) in rams during nonbreeding season and Blue *et al.* (1991) in reproductive abnormal stallions.

GnRH therapy significantly increased ($P<0.01$) the motility of spermatozoa in neat semen during therapy and post-therapy period, whereas the motility in tris-extender extended semen increased nonsignificantly. However, the increase in motility per cent of neat and extended semen of bulls of the present study was not up to the level of normal fertile bulls. The viability of spermatozoa in 6 and 24 hours stored neat as well as extended semen increased nonsignificantly. There is lack of informations on viability of spermatozoa in Taurus bulls treated with GnRH. GnRH therapy nonsignificantly increased the livability of spermatozoa during therapy and post-therapy period. Total abnormality significantly decreased during therapy period and increased during post-therapy period. Narasimha Rao (1990) and Gabor *et al.* (1995) found no discernable effect of GnRH on per cent of total sperm abnormalities and live spermatozoa per cent in no libido as well as low libido buffalo bulls.

GnRH therapy in the present study in matured HF and Jersey bulls with impaired reproduction had shown certain beneficial effect in quantitative and qualitative characteristics of semen. However, the beneficial effects were not optimum for cryopreservation of semen.

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