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Effect of gonadotrophin releasing hormone to augment semen production in Jersey bulls*

R.BHASKARAN[1†] AND B.MUNILAL DUBEY[2]

Department of Gynaecology, Obstetrics and Animal Reproduction
Veterinary College, UAS, Hebbal, Bangalore - 560 024

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ABSTRACT

The effect of gonadotrophin releasing hormone (GnRH) to augment semen production in six low and very low semen producing imported Jersey bulls with normal libido were studied during the year 1999. Bulls were injected single dose of 200 mg GnRH (Buserelin Receptal® Hoechst) intramuscularly three hours ahead of semen collections. GnRH therapy did not show significant beneficial effect on libido, reaction time and on other semen characteristics like pH, spermatozoa motility, sperm density, total sperm concentration, spermatozoa viability and total abnormality of spermatozoa. The mean semen volume and spermatozoa motility in stored semen increased significantly ($P<0.05$). It was concluded that though there was beneficial effect on semen volume and motility with GnRH treatment, semen straw production was not improved.

Key words : Gonadotrophin releasing hormone therapy, Jersey bulls, semen, straw production, libido

Optimization of semen production from breeding bulls is an imperative need to view their augmenting role in crossbreeding programme and in milk production. Sires to be used in artificial insemination and embryo transfer technology should be evaluated for reproductive functions involving endocrine, sexual behaviour and semen characteristics. Potential use of dairy bull semen in artificial insemination programme is based on effective semen production (Branton *et al.*, 1952). Hypothalamo-pituitary-testicular axis directly affects semen production characteristics and sexual behaviour of bulls. Follicular stimulating hormone (FSH) has a role in germ cell production (Amann, 1988), whereas leutinising hormone (LH) plays a role in production and release of testosterone and oestradiol-17β. Testosterone maintains meiosis and spermatogenesis in hypophysectomised rams (Tekptey and Amann, 1988). However, there is paucity of information on the therapeutic effect of gonadotrophic and gonadal hormones in low and very low quality semen produced in Jersey bulls. Hence, the present investigation was undertaken to study the effect of GnRH therapy in low and very low semen straw producing Jersey bulls with normal libido.

MATERIALS AND METHODS

Six Jersey bulls imported from Australia and stationed at an organized bull breeding farm in Bangalore were taken for the present study. Semen was collected once in four days, processed and cryo-preserved for future commercial use. These bulls started producing low quality (less than 8000 semen straws per annum) and very low quality (less than 5000 semen straws per annum) semen.

Bulls were injected single dose of 200 µg GnRH (Buserelin Receptal® Hoechst) intramuscularly three hours ahead of semen collections. Semen collection was done before during and after treatment at four days interval. 14, 19 and 16 collections were made before during and after treatment, respectively. A total of 294 semen collections were made during the trial period. Semen was evaluated for qualitative and quantitative characteristics by approved laboratory methods, besides taking observations for sexual behaviour and reaction time. Libido scoring was done based on the sexual behaviour of bulls at the semen collection yard as per the method of Osborne (1971) on five points scale. The semen production characteristics studied in this investigation were volume (ml), pH (per cent), sperm motility (per cent), viability (per cent), concentration (million/ml), total sperm concentration (million), livability (per cent), abnormality, and sexual behaviour (0-5 point scale) and reaction time (seconds). The data generated was anlaysed

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[1]Associate Professor, Dept. of LPM
[2]Professor & Head

[†]Corresponding author

by the standard statistical method described by Snedcor and Cochran (1967) and the analysis was done using SPS Computer Software facility.

RESULTS AND DISCUSSION

Mean values (±SE) of semen characteristics before, at and after treatment periods are presented in Table 1. GnRH therapy did not show any effect on libido in bulls with low and very low semen straw production. Reaction time reduced at treatment (30.76±5.59 seconds) and after (22.32±4.91 seconds) treatment periods, but the differences were not significant. Overall semen volume increased significantly (P<0.05) at treatment period (4.74±0.12 ml) and then a slight decrease after treatment (4.68±0.47 ml) was inconsistency with the findings of Narasimha Rao (1990) for Murrah bulls and Roser and Hughes (1992) for Stallions. Overall pH values (6.5 per cent) were not altered by GnRH therapy as were reported by Roger and Hughes (1990) for Stallions. Sperm motility indicated significant variation at treatment (33.46±8.72 per cent) and after treatment (35.94±9.83 per cent) periods as reported by Narasimha Rao (1990) for Murrah buffalo bulls and Blue *et al.* (1991) for Stallions. Viability of sperm increased significantly (P<0.05) in neat (16.32±3.66 per cent) and extended (25.39±3.05 per cent) semen after six hours of storage during GnRH treatment period, but reduced during post-treatment period (6.87±2.54 and 18.96±6.36 per cent, respectively). Similar variation seen in 24 hours stored semen was not significant. Density of spermatozoa differed nonsignificantly at treatment (1169±269.0 million/ml) and after treatment (1264±297.8 million/ml) periods and total concentration of spermatozoa per ejaculate differed nonsignificantly during treatment (5405.68±563.28 million) and after treatment (5466.56±411.12 million) periods as reported by Schanbacher and Lustra (197), Gabor (1998) and differed from the findings of Narasimha Rao (1990). Sperm abnormality decreased during treatment (37.21±3.11 per cent) (P>0.05) and after treatment (20.26±1.46 per cent) (P<0.01) periods.

Favourable effect of GnRH therapy in low and very low quality semen producing Jersey bulls was not sufficient enough to increase semen straw production during treatment

Table 1. Mean(±SE) values of semen characteristics of low and very low quality semen producing Jersey bulls (n=6) treated with GnRH

Characteristics	Before treatment (N=14)	At GnRH injection (N=19)	After treatment (N=16)
Libido score	4.00±0.00[a]	4.00±0.00[a]	4.00±0.00[a]
Reaction time (sec.)	80.26±24.40[a]	30.76±5.59[a]	22.32±4.91[a]
Volume (ml)	3.53±0.48[a]	4.74±0.121[b]	4.68±0.47[b]
pH (%)	6.50±0.00[a]	6.50±0.00[a]	6.50±0.00[a]
Motility (%)			
Neat semen	33.61±8.38[a]	32.34±8.55[a]	34.87±9.78[a]
Diluted semen	43.92±7.56[a]	33.46±8.72[a]	35.94±9.83[a]
Viability (%)			
a. 6 hrs of storage			
Neat semen	7.43±3.51[a]	16.32±3.66[b]	6.87±2.54[a]
Diluted semen	16.15±2.11[a]	25.39±3.05[b]	18.96±6.36[a]
b. 24 hrs of storage			
Neat semen	0.37±0.24[a]	1.18±0.86[a]	2.96±4.29[a]
Diluted semen	1.85±1.85[a]	8.51±4.97[a]	5.83±3.75[a]
Concentration (million/ml)	1193.0±291.9[a]	1169.0±269.0[a]	1264.0±297.8[a]
Total sperm concentration (million)	3972.83±331.20[a]	5405.68±563.28[a]	5466.56±411.12[a]
Livability of spermatozoa (%)	58.24±3.14[a]	66.12±3.61[a]	74.61±3.17[a]
Abnormal spermatozoa (%)	45.54±2.92[a]	37.21±3.11[a]	20.26±1.41[b]

Means bearing different superscripts in a row differ significantly (P<0.05)
n = Number of bulls
N = Number of ejaculates

and after treatment periods, which may be attributed to altered testicular epididymidial and accessory sex gland functions in these bulls. Testes, epididymidis and accessory sex glands of these experimental bulls may not be responding to GnRH therapy suggesting testicular refractiveness to gonadotrophins at the receptor and post-receptor levels (Catt and Dufau, 1978) and may be because of testicular damage, which led to poor spermatogenesis, low to normal steroid production (deKrester and Kerr, 1983). Further, investigations are needed to confirm and strengthen this hypothesis laid in the present investigation.

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