TESTOSTERONE TO ESTRADIOL RATIO IS A DIFFERENTIAL FEATURE BETWEEN GOOD AND POOR LIBIDO CROSSBRED BULLS

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ABSTRACT

Forty-five crossbred bulls were categorized into good (n=20) and poor libido (n=25) on the basis of their reaction time (good <3 min, poor >3 min). Serum prolactin and thyroid hormone profile was similar (p>0.05) in both the categories, whereas, serum testosterone was high (p<0.05) and serum estradiol was low (p<0.05) in good libido bulls. In brief, testosterone to estradiol ratio is a differential feature between good and poor libido crossbred bulls.

Keywords: Bulls, Estradiol, Libido, Testosterone, Thyroid hormone, Prolactin

Good libido bulls are advantageous as they give higher number of services, better semen quality and have beneficial impact on the fertility of subsequent female progeny (Ellis *et al.,* 2005). Preliminary studies suggested that bull endocrine profile (serum testosterone, estradiol and thyroid hormone) play an important role in manifestation of libido (Singh *et al.,* 2009). The present detailed study assessed serum testosterone, estrogen, prolactin and thyroid hormone profile in relation to libido in breeding crossbred bulls.

Forty-five breeding crossbred (Holstein Friesian x Sahiwal) bulls (age 8-10 year) maintained under similar feeding and management were divided into two groups on the basis of reaction time as good libido (<3 min, n=20) and poor libido (>3 min, n=25). All the bulls were administered (i.m.) 20 µg GnRH analogue (Buserelin acetate) and jugular vein blood samples were collected after 3h. Serum testosterone, estradiol, prolactin (DIA source Immuno Assay S.A., Belgium) and thyroid hormones (Benesphera, Avantor Performance Materials India Limited, Dehradun) were estimated using ELISA kits. The data were analyzed using student's t-test.

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Serum testosterone was high (p<0.05) in good libido as compared to poor libido bulls (14.8±1.5 *vs.* 11.5 ± 0.1 ng/ml). A direct influence of circulating testosterone on libido is reported in breeding bulls (Dias *et al*., 2009). Also, lower testosterone was observed in poor libido bulls in an earlier study (Verma and Singh, 1992). Serum estradiol in good libido bulls was low (p<0.05) as compared to poor libido bulls (63.1±3.7 *vs.* 89.9±11.4 pg/ml). Increased estradiol can affect libido as testosterone and estradiol were negatively correlated (Javed *et al.,* 2000). In fact, testosterone to estradiol ratio is more important than their individual values in regulating libido (Singh *et al.,* 2015). In present study, testosterone to estradiol ratio was high in good (234.7±21.5) than poor libido bulls (153.5±15.1). Increased estradiol in comparison to testosterone is associated with poor libido in breeding buffalo bulls (Muller *et al.,* 2012). In our study, serum testosterone was high in good libido bulls and serum estradiol was high in poor libido bulls. The underlying reason is leydig cells produce testosterone, which gets converted to estradiol by aromatization in sertoli cells, adipose tissues and hypothalamic pre-optic area (Michael *et al.,* 1987). Increased aromatization of testosterone to estradiol causes decreased testosterone to estrogen ratio. Hence, decreased testosterone and increased estradiol might be associated with poor libido in

breeding crossbred bulls.

Prolactin is required for maintaining good libido and manifestation of sexual activity, however, in present study, serum prolactin was similar (p>0.05) in both groups (Good, 82.5±4.5; Poor, 78.4±3.4 ng/ml). Also, serum TSH that is positively correlated to testosterone secretion was similar (p>0.05) in both groups of present study (Good, 28.5±1.7; Poor, 25.5±1.4 µIU/ml). Moreover, serum T3 and T4 were similar (p>0.05) in good and poor libido bulls (T3, 1.55±0.08 *vs.* 1.08±0.07 ng/ml; T4, 5.89±0.28 *vs.* 5.05±0.31 µg/dl). Moreover, T3 to T4 Ratio was similar in both the groups (21.47±2.11 in good *vs.* 25.12±4.53 in poor, p>0.05).

In brief, serum prolactin and thyroid hormones were similar in good and poor libido bulls. However, serum testosterone was high and serum estradiol was low in high libido bulls.

REFERENCES

Dias., J.C., Andrade, V.J., Emerick, L.L., Martins, J.A.M., Valhe Filho, V.R. and Silva, M.A. (2009). Libido test in young guzerat bulls and their associations with reproductive tracts and serum testosterone levels. *Arch. Vet. Sci.,* **14**: 204-213.

Ellis., R.W., Rupp, G.P., Chenoweth, P.J., Cundiff, L.V. and Lunstra, D.D. (2005). Fertility of yearling beef bulls during mating. *Theriogenology,* **64**: 657-678.

Javed, M.T., Khan, A. and Ali, M. (2000). Influence of season on seminal plasma testosterone and oestrogen in healthy and abnormal buffalo bulls and their relationship with other semen parameters. *Vet. Archives,* **70**:141-149.

Michael, R.P., Bonsall, R.W. and Rees, H.D. (1987). Sites at which testosterone may act as an estrogen in the brain of the male primate. *Neuroendorinology,* **46**: 511.

Muller, G., Andrade, A.J., Santos, A.S., Reghelin, A.L. and Garcia, D.M. (2012). Testicular testosterone: Estradiol ratio in domestic cats and its relationship to spermatogenesis and epididymal sperm morphology. *Theriogenology,* **78**:1224-1234.

Singh, K., Kumar, A. and Honparkhe, M. (2015). Endocrine status of serum testosterone, estradiol, prolactin and thyroid hormones in good and poor libido breeding buffalo bulls. *Ind. Vet. J.,* **92**: 39-40.

Singh, J., Kumar, A., Honparkhe, M., Dadarwal, D. and Dhaliwal, G.S. (2009). Effect of GnRH therapy on Plasma steroids, thyroid hormones and and libido in Breeding Bulls. *Ind. Vet. J.,* **86**: 584-585.

Verma, M.C. and Singh, N.P. (1992). Histopathological changes in relation to testosterone levels in bulls with complete loss of libido. *Indian J. Anim. Sci.,* **62**: 1170-1171.