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Serum testosterone profile in breeding rams

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ABSTRACT

Serum testosterone profile of Patanwadi and half bred Merino rams was studied to ascertain the effect of breed. season and semen collection stimulus. Patanwadi rams had a significantly higher concentration of hormone (6.12 ± 0.39 ng/ml.) with a concomitant rise during the breeding season (6.89 ± 0.61 ng/ml.) in comparison to half bred Merinos (4.58 ± 0.37 ng/ml.). In both the breeds. testosterone increased significantly just prior to semen collection. 7.38 ± 0.53 and 6.00 ± 0.43 ng/ml.; and thereafter decreased to lowest following 60 minutes later to ejaculation. 4.89 ± 0.48 and 3.12 ± 0.49 ng/ml. in Patanwadi and cross bred rams, respectively. It was concluded from the results that blood serum testosterone profile was influenced by the breed and semen collection stimulus in both breeds while. seasonal variations were restricted to only Patanwadi rams.

Key Words: Testosterone. season. breed. collection stimulus

Testosterone controls the libido and mating behaviors of the male animals beside its stimulatory effect on sperm maturation in the epididymis. The release of hormone is episodic, and has been reported to be influenced by the various factors like breed, season of the year and exposure of rams with estrus ewes " female effect" (Boland *et al*., 1985; Perkins *et al*.,1992; Gastel *et al*.,1995. Knight *et al*.,1998 and Sarlos *et al*.,1996). However. information on serum testosterone on either side of semen collection is scanty.

Therefore. the present investigation was undertaken to monitor pre-and post-ejaculation testosterone levels in the blood serum of Patanwadi and crossbred rams.

MATERIALS AND METHODS

Six healthy rams of 3-4 years age, 3 each of Patanwadi and half bred Merino breeds, maintained at Livestock Research Station of Gujarat Agricultural University, Sardar Krushinagar, were utilized to collect blood samples 5 minutes prior and 60 minute later to semen collection by AV technique using a non-estrus female as teaser during the breeding (Mid August to October) and non breeding season (December to February). The serum isolates from all the blood samples were obtained and stored frozen at -200C until the assay of testosterone by RIA kits ' Coat-A-Count' (Diagnostic Product Corporation, Los Angeles,USA). The accuracy of kit to detect hormone levels was 0.04 ng/ml with uniformly low co-efficient of variation. The cross reactivity of the antiserum was 5 percent to dihydrotestosterone. Data were analyzed statistically by using Randomized Complete Block Design (Snedecor and Cochron, 1980).

RESULTS AND DISCUSSION

The variations in serum concentration of testosterone throughout the experiment have been presented (Table 1). The average concentration of hormone was observed to be higher significantly (6.12 ± 0.39 ng/ml) in Patanwadi rams in comparison to half bred merino rams (4.58±0.37 ng/ml) with a range of 0.30 to 15.05 ng/ml. Similar breed variations in testosterone levels have been reported by earlier researchers (Boland *et al*., 1991, Besancon *et al*., and yue,1996). However, the values reported by these workers stand either low or high in comparison to the present observations. Such a

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Table 1. Testosterone levels (ng/ml) in serum of Patanwadi and crossbred rams

Variance	Breed	Patanwadi		Crossbred		Pooled
		n	Mean ±SE	n	Mean +SE	
a.	Season					
	Breeding	30	6.89 ± 0.61	30	4.68 ± 0.58	5.76 ±0.44
	Nonbreeding	30	5.38 ± 0.45	30	4.44 ±0.48	4.93 ± 0.33
b.	Time					
	Pre-ejaculation	30	7.38 ± 0.53	30	6.oo ± 0.43	6.69 ± 0.35
	Post-ejaculation	30	4.89 ± 0.48	30	3.12 ± 0.49	4.01 ± 0.36
	Overall mean		6.12 ± 0.39		4.58 ± 0.37	

variation in testosterone profiles might be related with the variable body weight and age of the animals used in different studies. These traits have been reported to influence testosterone levels in the rams (Barreto *et al.*, 1991; Oba *et al.*, 1988; Karagiannidis *et al.*, 1991 and Poti *et al.*, 1998). In the present study, a significant variation ($P< 0.05$) in testosterone was also discernible among the individual rams of both breeds. This finding is corroborated with the earlier observations of Haynes and Haresign (1987), and is likely to be expected as the circulatory levels of testosterone depend upon the secretion and metabolic clearance rate (Pineda and Faulkner. 1980), which might varie among the individuals of same genotype.

Testosterone profiles were also observed to be influenced by the season. In Patanwadi rams, the hormone levels remained elevated during the breeding season in comparison to non-breeding season, whereas, crossbred rams did not show such variations (Table 2). The present observation in Patanwadi rams corroborates the findings of earlier studies (Rekkas *et al.*, 1993, Gonzalez *et al.*, 1989 and Sarlos et al., 1996) and in crossbred rams with that of Gudev *et al.* (1989) and Illius *et al.* (1976). Photoperiodicity induces high frequency of GnRH pulses followed by LH release, which in turn results, into higher quantity of testosterone secretion (Less, 1965). Hence, higher testosterone during the breeding seasons might be explained by the fact of variation in sensitivity of rams to the photoperiods. Poti *et al.* (1998) also reported a seasonal effect in testosterone concentration between the mature and young rams.

Both breeds of rams in the present study had higher testosterone just prior to semen collection and thereafter, it decreased significantly following 60 minutes post ejaculation (Table 2). It is in accordance with Smith et al (1973) and Patel (1991) who studied this effect in bulls. A significant increase of testosterone has been reported in rams following their exposure to anoestrus (Knight et al, 1998) and estrus ewes (Perkins *et al*, 1992).

Table 2. Effect of season and time of semen collection on serum testosterone levels in rams

Source of variation	d.f.	MSS		'F'	
		Patanwadi	Crossbred	Patanwadi	Crossbred
Season	1	34.50	0.89	4.76*	0.14^{NS}
Time	1	92.90	124.44	12.75**	19.20 **
Error	57	7.25	6.48		
Total	59				

* ($P< 0.05$), ** ($P< 0.01$); ^{NS}non-significant

Visual and olfactory contact of rams with stimulus animals increases circulatory levels of testosterone (Alexander *et al.*, 1999). This finding also holds true for higher testosterone just prior to semen collection as the sexual excitement might undergone by each ram through visual reflexes from the teaser in the present study.

REFERENCES

Alexander, B.M., Stellflug, J.N., Rose, J.D., Fitzgerald, J.A., Moss, G.E. (1999). Behavior and endocrine changes in high performing, low performing and male oriented domestic rams following exposure to rams and ewes in estrus when copulation in prechuded. J.Anim.Sci., 77(7): 1869-1874.

Barreto Filho, J. B., Melo, M.I.V., Lage, A.P., Marques, A.P., Jr., Vale Filho, V.B. (1991). Evaluation of serum testosterone concentration in buffaloes at the ages of 10-24 months. ABA, **60**: 126.

Besancon, J., Demers, P., Lemay, J.P., Tremblay, R.R. (1991). Opposite variations of twoepididymal components and blood plasma testosterone in two breeds of rams. Comp. Biochem. Physiol., 99(1-2): 173-177.

Boland, M.P., Al-kamali, A. A., Grossby, T. F., Haynes, N.B., Howles, G.M., Kelleher, D.L. and Gordon, I. (1985). The influence of ram breed, season and photoperiod on semen characteristics and hormone concentrations. Animal Reprod. Sci., 9: 241-252.

Gastel, T., Bielli, A., Perez, R., Lopez-A, Castrillejo, A., Tagle, R., Franco, J., Laborde, D., Forsberg, M. and Rodriguez-Martinez, H.C. (1995). Seasonal variations in testicular morphology in Uruguayan Corriedale rams. Anim. Reprod. Sci., **40**: 59-75.

Gonzalez, R., Orgeur, P., Poindron, P. and Signoret, J. (1989). Seasonal variations in LH and testosterone response of rams following the introduction of estrus ewes. Anim. Reprod. Sci., **21**: 249-259.

Gudev, D. (1989). Age changes in cortisol and testosterone in synthetic crossbred rams of dairy type. Zhivotnov dni Nauki, **26**: 48-51.

Haynes, N.B.; Haresingn, W. (1987). Endocrine aspects of reproduction in the ram important to the male effect. World review of Animal Production, **23**: 22-28.

Illius, A.W.; Haynes, N.B.; Purvis, K. and Lamming, G.E. (1976). Plasma concentration Of testosterone in the developing ram in different social environments. J.Reprod. Fertil., **48**: 25-32.

Karagiannidis, A., Alexopoulos, C., Ayinnidis, A. and Tsakalof, P. (1991). Concentration of testosterone in blood of Chios, Serrai and Karagouniko lambs at puberty. Bulletin of Hellenic Veterinary Medical Soc. **42**: 35-38.

Knight, T.W., Ridland, M. and Litherland, A.J. (1998). Effect of prior ram-ewe contact on the ability to stimulate early oestrus. Proc. N.Z. Soc. Anim.Prod., **58**: 178-180.

Less, J. (1965). Seasonal variation in breeding activity of rams. Nature, London **207**: 221.

Oba, E., Define, R.M., Muniz, L.M., Ramos, A. and De, A.(1988). Radioimmunological determination of serum concentrations of FSH, LH and testosterone in Nelore Cattle at different ages. Arquivo Brasileiro de Medicina Veterinaria e zootecnia **40**: 25-34.

Patel, K.V. (1991). Andrological Investigation on Breeding bulls. Ph.D. Thesis, G.A.U., Sardar krishinagar-385506.

Perkins, A., Fitzgerald, J.A. Price, E.O (1992). Lueteinizing hormone and testosterone response of sexually active and inactive rams. J. Anim. Sci., **70**: 2086-2093.

Pineda, M.H. and Faulkner, L.C. (1980). Male Reproduction . In: Veterinary Endocrinology and reproduction. Edt. McDonald, L.E. 3rd edn., Lea and Febiger , Philadelphia. Pp 256.

Poti, P.; Bedo, S.; Mezes, M. and Tezser, J. (1999). Estimating reproductive ability of Hungarian Merino rams. Archiv fur Tierzucht, **42**: 459-468.

Rekkas, C., Kokolis, N., Smokovitis, A. (1993). A breed and seasonal variation of plasminogen activator activity and plasminogen activator inhibin in spermatozoa and seminal plasma of the ram in correlation with testosterone in the blood. Andrologia, **25**: 101-109.

Sarlos, P., Molnar, A., Huszar, S., Rathy, J. and Brussow, K.P. (1996). Seasonal changes in andrological characteristics in British milk ram. Archiv.fur Tierarzucht, **39**: 265.

Smith, O.W.; Mongkonpunya, K.; Hafs, H.D.; Convey, E.M. and Poxender, W.D. (1973). Blood serum testosterone after sexual preparation or ejaculation or after-injection of LH or prolactin in bulls. J. Anim. Sci., **37**: 979-984.

Snedecor, G.W. and Cochran, W.G. (1980). Statistical Methods. 7th edn.Oxford and IBH Publication Co., Calcutta.

Yue, G.H (1996). Reproductive characteristics of Chinese Hu sheep. Anim. Reprod. Sci., **44**: 223-230.