

EFFECT OF *AZOLLA* FEEDING ON TESTICULAR BIOMETRY OF ALPINE X BEETAL CROSSBRED BUCKS

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ABSTRACT

Present study was conducted at ICAR-National Dairy Research Institute, Karnal, Haryana on eighteen Alpine x Beetal crossbred bucks. The bucks were divided into three groups viz., T₁, T₂ and T₃. The animals of T₁ (control) were provided standard feeding schedule. Animals of T₂ were fed similarly to T₁ except 20% replacement of concentrate mixture by sun dried *Azolla*. The animals of T₃ were fed on a similar line to T₁ except animals were fed with concentrate supplemented with 20% sun dried *Azolla*. The testicular parameters were recorded with the help of vernier calipers whereas testicular volume and testicular mass were calculated as per standard formula. The dry matter and crude protein content of *Azolla* was estimated by standard laboratory methods. There was a positive effect of *Azolla* feeding on testicular parameters (Scrotal circumference, testicular length, width, volume and mass) at different monthly interval.

Key words: *Azolla*, Crossbred bucks, Testicular parameters, Scrotal circumference

Measurement of testicular parameters is of utmost importance for breeding soundness examination of male animals. There is positive correlation between size and functions of reproductive organ and semen quality. Body size and testicular measurements are important parameters for evaluating breeding soundness. In many previous studies, the effect of feed nutrients on biometry of reproductive organs was studied (Okolski *et al.*, 1971, Brown, 1994 and Nath, 2011). In present conventional feeding system, the feed ingredients are expensive and not available around the year. *Azolla* is a rich source of protein, minerals and vitamins (Ara *et al.*, 2015, Bhattacharya *et al.*, 2016 and Roy *et al.*, 2016). The objective of present investigation was to study the effect of *Azolla* (*Azolla pinnata*) on testicular parameters in Alpine x Beetal crossbred bucks.

MATERIALS AND METHODS

In present study, eighteen Alpine x Beetal crossbred bucks were equally and randomly divided into three groups viz., T₁, T₂ and T₃. The animals of T₁ (control) were provided standard feeding schedule. The locally available green were fed. Animals of T₂ were fed similarly to T₁ except 20% replacement of concentrate mixture by sun dried *Azolla*. The animals of T₃ were on a similar line to T₁ except animals were fed with concentrate supplemented with 20% sun dried *Azolla*. The replacement was based on dry matter basis. The dry matter and crude protein content of *Azolla* was estimated by standard methods. The testicular parameters were recorded from three month of age to eleven month of age at monthly interval. The scrotal circumference, testicular length and testicular width were measured by measuring tape and Vernier calipers. Testicular volume and mass were calculated by standard formulae (Bailey *et al.*, 1996).

Testes volume (cm³) = 0.5236 x (testis length) x (testis width)²

Testicular weight (g) = 0.5533 x (testis length) x (testis width)

RESULTS AND DISCUSSION

The monthly mean±SE values of testicular parameters in different treatment groups are presented in Table 1 to 5. The dry matter and crude protein content of *Azolla* was 90.00±0.77 and 22.05±0.72. The initial and final scrotal circumference was 9.75±0.21, 10.55±0.25 and 10.53±0.32 and 26.36±0.25, 25.95±0.45 and 28.00±0.42cm for T₁, T₂ & T₃ groups, respectively. The scrotal circumference of animals in T₃ group was significantly higher (P<0.05) as compared to T₁ and T₂. The initial and final testicular length was 3.20±0.24, 3.06±0.15 and 3.20±0.16 and 8.01±0.32, 8.30±0.39 and 9.13±0.18cm for T₁, T₂ and T₃ groups, respectively. The initial and final testicular width was 1.80±0.12, 1.66±0.10 and 1.51±0.10 and 4.95±0.20, 5.10±0.16 and 5.71±0.24cm for T₁, T₂ and T₃ groups, respectively. The significant (P<0.05) difference for testicular length and testicular width was found from 6th and 7th month. Testicular length and testicular width was increased with advancement of age.

The initial and final testicular volume was 5.83±1.20, 4.66±0.86 and 4.06±0.88 and 105.16±12.59, 114.91±12.74 and 158.05±14.95cm³ for T₁, T₂ and T₃ groups, respectively. The testicular volume depends on testicular dimension so testis volume changed with change in testicular length and testicular width. The initial and final testicular mass was 6.17±1.27, 4.92±0.90 and 4.29±0.91 and 111.12±13.30, 121.42±13.47 and 167.01±15.80cm for T₁, T₂ and T₃ groups, respectively.

The effect of *Azolla* on all testicular parameter was observed. *Azolla* is a rich source of protein and trace minerals like of Zn, Cu, Mn and Se etc. *Azolla* provided better environment for digestibility resulted in better absorption of nutrients. *Azolla* feeding resulted in comparatively fast growth and reproductive organ development in experimental animals. All testicular parameters were increased with increase in age because there is a positive relationship between age and

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Table 1 :
Average Scrotal circumference (cm) of growing bucks at monthly interval in different groups

Age (months)	T ₁	T ₂	T ₃
3	9.75±0.21	10.55±0.25	10.53±0.32
4	11.40±0.44	12.26±0.40	12.60±0.26
5	14.05±0.38 ^a	14.38±0.36 ^a	15.65 ±0.36 ^b
6	16.41±0.52 ^a	17.01±0.49 ^a	18.76 ±0.40 ^b
7	19.33±0.60 ^a	19.45±0.45 ^a	22.00 ±0.60 ^b
8	22.45±0.55 ^a	22.18±0.55 ^a	24.45 ±0.51 ^b
9	24.18±0.45	24.10±0.47	26.03±0.61
10	25.10±0.28 ^a	25.26±0.48 ^a	27.30 ±0.44 ^b
11	26.36±0.25 ^a	25.95±0.45 ^a	28.00 ±0.42 ^b

Table 2
Average Testicular length (cm) of growing bucks at monthly interval in different groups

Age (month)	T ₁	T ₂	T ₃
3	1.80±0.12	1.66±0.10	1.51±0.10
4	2.36±0.11	2.16±0.10	2.03±0.12
5	2.75±0.15	2.70±0.08	2.80±0.12
6	3.15±0.14	3.20±0.08	3.58±0.17
7	3.60±0.16 ^a	3.61±0.12 ^a	4.25±0.21 ^b
8	4.01±0.19 ^a	4.08±0.17 ^a	4.75±0.21 ^b
9	4.45±0.12 ^a	4.51±0.17 ^a	5.20±0.20 ^b
10	4.80±0.18 ^a	4.86±0.17 ^a	5.53±0.22 ^b
11	4.95±0.20 ^a	5.10 ±0.16 ^a	5.71±0.24 ^b

Table 4 :
Average Testicular volume (cm³) of growing bucks at monthly interval in different groups

Age (month)	T ₁	T ₂	T ₃
3	5.83±1.20	4.66±0.86	4.06±0.88
4	11.62±1.73	9.65±1.66	8.86±1.40
5	18.74±3.48	17.61±1.93	20.49±2.17
6	28.31±3.67 ^a	28.41±2.67 ^a	41.17±4.80 ^b
7	42.23±5.57 ^a	41.69±4.60 ^a	69.15±8.55 ^b
8	59.88±8.41 ^a	61.04±7.58 ^a	95.40±11.08 ^b
9	78.50±6.96 ^a	81.42±9.78 ^a	122.72±12.43 ^b
10	95.86±10.60 ^a	100.17±11.41 ^a	144.74±13.93 ^b
11	105.16±12.59 ^a	114.91±12.74 ^a	158.05±14.95 ^b

Table 3 :
Average Testicular width (cm) of growing bucks at monthly interval in different groups

Age (month)	T ₁	T ₂	T ₃
3	3.20±0.24	3.06±0.15	3.20±0.16
4	3.83±0.25	3.78±0.19	3.98±0.18
5	4.51±0.23	4.53±0.20	4.91±0.11
6	5.30±0.24 ^a	5.23±0.22 ^a	6.01±0.11 ^b
7	6.06±0.28 ^a	5.98±0.26 ^a	7.16±0.16 ^b
8	6.88±0.32 ^a	6.83±0.29 ^a	7.93±0.19 ^b
9	7.48±0.30 ^a	7.46±0.32 ^a	8.55±0.21 ^b
10	7.80±0.30 ^a	7.93±0.34 ^a	8.91±0.19 ^b
11	8.01±0.32	8.30±0.39	9.13±0.18

reproductive organs development. The animal of T₃ group performed significantly better because significantly higher DM, CP and TDN intake was observed in T₃ group as compared to T₁ and T₂ (20% extra *Azolla* on dry matter basis). *Azolla* is a good source of Zn which might have account for better development of testis. Smith and Akinbamijo (2000) found positive effect of minerals on reproductive organs. The role of Zn for testis growth and development was reported by previous workers (Endre *et al.*, 1990; Underwood and Somers, 1969).

Elmaz *et al.* (2007) reported that scrotal circumference, testicular length and width significantly (P<0.05) increased with high protein diet (18% CP) than low protein diet (12% CP) in Kivircik Ram on 195 day. Rekwot *et al.* (1998) found that scrotal circumference was significantly higher with high protein diet (14.45% CP) than low protein (8.51 % CP) in Bunaji bulls and

Table 5 :
Average Testicular mass (g) of growing bucks at monthly interval in different groups

Age (month)	T ₁	T ₂	T ₃
3	6.17±1.27	4.92±0.90	4.29±0.91
4	12.28±1.83	10.20±1.76	9.36±1.48
5	19.80±3.68	18.61±2.03	21.65±2.30
6	29.92±3.88 ^a	30.02±2.82 ^a	43.50±5.07 ^b
7	44.63±5.88 ^a	44.05±4.86 ^a	73.08±9.04 ^b
8	63.27±8.88 ^a	64.51±8.01 ^a	100.81±11.71 ^b
9	82.96±7.36 ^a	86.04±10.33 ^a	129.68±13.13 ^b
10	101.31 ±11.20 ^a	105.86±12.06 ^a	152.95 ±14.72 ^b
11	111.12 ±13.30 ^a	121.42±13.47 ^a	167.01 ±15.80 ^b

their Friesian crosses. The higher level of protein in *Azolla* was reported by many authors (Arvindraj *et al.*, 2012, Ara *et al.*, 2015 and Bhattacharya *et al.*, 2016).

Intake of high protein diet resulted in faster growth of seminiferous epithelium and diameter of seminiferous tubules (Oldham *et al.*, 1978; Abi Saab *et al.* 1997). In present study crude protein content of sun dried *Azolla* was 22.05±0.72. Previously it was found that expansion of seminiferous germ cell population resulted in increase in testis volume (Murta *et al.*, 2010). It has been reported that when animals were provided above the maintenance requirement, testicular size was increased (Boukhliq *et al.*, 1997; Fernandez *et al.*, 2004; Kheradmand *et al.*, 2006). In present study, it was found that when other testicular parameters (testis length, testis width and scrotal circumference) were significantly (P<0.05) improved by *Azolla* supplementation, similar changes were observed in testis volume and testis mass.

CONCLUSION

It can be concluded that *Azolla* feeding resulted in improvement of testicular parameters of Alpine x Beetal crossbred bucks.

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