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Effect of zinc supplementation on testicular biometry in Assam local male goat

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ABSTRACT

The present study was conducted in 36 Assam local male kids of 3 months of age and between 3 and 4 kg of body weight. The animals were divided into group 1 (control group, in which kids were grown without zinc supplementation), group 2 (inorganic group, in which kids were grown with inorganic zinc supplementation, zinc sulphate) and group 3 (organic group, in which kids were grown with organic zinc supplementation, zinc propionate). The experimental goats received concentrate mixture @ 50 g/day/goat up to 5 months and then @ 100 g/day/goat up to 7 months of age in addition to their free range grazing. The study revealed gradual increase of different testicular measurements i.e length, width, thickness and scrotal circumference. Both inorganic and organic zinc supplemented group showed higher values than that of control group. When compared, kids receiving organic zinc-supplement had higher body weight and testicular measurements than that of inorganic zinc-supplemented kids.

Key words: Goat kids, Scrotal circumference, Testicular length, Zinc supplementation

The evaluation of male for breeding is an important aspect of a reproductive management programme. Evaluation of the testicular measurements of goat breeds at comparable ages is an important criterion for the selection of superior breeding animals (Harder *et al*. 1995). Zinc was directly involved in anatomical development and normal function of male reproductive organs. The organic sources of minerals were more biologically available than inorganic sources of minerals and zinc supplementation either in the organic or inorganic form in the diet improved development of male reproductive organs (Kumar *et al.* 2006). This study has been undertaken to see the effect of organic and inorganic zinc supplementation on testicular biometry in 4 to 7 months of Assam local kids.

MATERIALS AND METHODS

Assam Local male kids (36) of 3 months of age and between 3 to 4 kg of body weight were included in this experiment. All the animals were reared under semi intensive system. Standard managemental practices were adopted in rearing of animals. The experimental goats received concentrate mixture @50 g/day/goat up to 5 months and then @100 g/day/goat up to 7 months of age in addition to their free range grazing. The animals were divided into 3 groups—group 1 (control) animals received no zinc supplementation, while the group 2 and 3 animals received inorganic (120 mg zinc sulphate) and organic form of zinc supplements (40 mg zinc propionate), respectively, along with concentrate mixture. The aforesaid concentrate mixture contained 2% mineral mixture –without zinc, which was supplied by AICRP project (Improvement of Feed Resources and Nutrient Utilization in Raising Animal Production). Testicular length, width and thickness were measured by conventional methods with the help of metric scale and divider. The scrotal circumference was measured using scrotal tape around the descended scrotum at the level of maximum diameter as per the standard method (Hahn *et al.* 1969). For all the observed data in the present experiment, the standard statistical procedures (Snedecor and Cochran 1994) were followed. The data were presented by showing mean and standard error.

RESULTS AND DISCUSSION

The average testicular length of right and left testes in control, inorganic and organic zinc supplemented groups at different ages are given in Table 1. The values showed definite trend of increase of testicular length, width and thickness within the group at various ages as measured at fortnightly

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Table 1. Testicular paramaters in Assam goat kids following zinc supplementation

Group	4		4.5		5		5.5		6		6.5		7	
	Right	Left	Right	Left	Right	Left	Right	Left	Right	Left	Right	Left	Right	Left
Length														
Control	3.97^{a}	4.17^{a}	4.14^{a}	4.34^{a}	4.44^{a}	4.62^{a}	4.85^{a}	5.06^{a}	5.08^{a}	5.25^{a}	5.76^{a}	5.54^{a}	5.88^{a}	5.84^{a}
	±0.04	±0.02	±0.04	±0.02	±0.03	±0.02	±0.02	±0.05	±0.05	±0.03	±0.13	±0.07	±0.07	±0.05
Inorganic	4.57^{b}	4.73^{b}	4.65^{b}	4.81^{b}	4.84^{b}	4.94^{b}	5.36^{b}	5.48^{b}	5.86^{b}	5.73^{b}	6.11^{b}	5.86^{b}	6.35^{b}	6.02^{b}
	±0.10	±0.02	±0.02	±0.01	±0.05	±0.04	±0.11	±0.03	±0.09	±0.03	±0.03	±0.03	±0.05	±0.03
Organic	4.36^{c}	4.61^{c}	4.62^{b}	4.94^{c}	5.07^{c}	5.04^{c}	5.51^{b}	6.06^{c}	5.90^{b}	6.32^{c}	6.15^{b}	6.38^{c}	6.36^{b}	6.45^{c}
	±0.03	±0.05	±0.05	±0.04	±0.03	±0.04	±0.04	±0.06	±0.06	±0.02	±0.03	±0.02	±0.07	±0.02
Width														
Control	2.67^{a}	2.71^{a}	2.84^{a}	2.85^{a}	3.10^{a}	3.14^{a}	3.22^{a}	3.21^{a}	3.33^{a}	3.40^{a}	3.66^{a}	3.69^{a}	3.81^{a}	3.84^{a}
	±0.04	±0.02	±0.02	±0.03	±0.02	±0.02	±0.02	±0.02	±0.03	±0.01	±0.02	±0.01	±0.01	±0.01
Inorganic	2.61^{a}	2.64^{a}	2.87^{a}	2.89^{a}	3.24^{b}	3.27^{b}	3.57^{b}	3.58^{b}	3.77^{b}	3.80^{b}	3.91^{b}	3.93^{b}	4.07^{b}	4.10^{b}
	±0.02	±0.02	±0.01	±0.01	±0.03	±0.04	±0.02	±0.02	±0.02	±0.01	±0.01	±0.03	±0.02	±0.01
Organic	2.93^{b}	2.96^{b}	3.14^{b}	3.16^{b}	3.34^{c}	3.32^{c}	3.71^{c}	3.71^{c}	3.98^{c}	4.01^{c}	4.10^{c}	4.12^{c}	4.16^{b}	4.28^{c}
	±0.02	±0.02	±0.03	±0.03	±0.03	±0.07	±0.01	±0.01	±0.02	±0.04	±0.01	±0.01	±0.02	±0.01
Thickness														
Control	2.16^{a}	2.17^{a}	2.29^{a}	2.30^{a}	2.45^{a}	2.47^{a}	2.61^{a}	2.62^{a}	2.84^{a}	2.86^{a}	2.97^{a}	3.00^{a}	3.13^{a}	3.15^{a}
	±0.01	±0.01	±0.01	±0.01	±0.01	±0.004	±0.01	±0.01	±0.01	±0.01	±0.04	±0.04	±0.008	±0.03
Inorganic	2.19^{a}	2.20^{a}	2.23^{a}	2.30^{a}	2.10^{b}	2.30^{b}	2.74^{a}	2.75^{b}	3.10^{b}	3.11^{b}	3.16^{a}	3.17^{b}	3.21^{a}	3.22^{a}
	±0.01	±0.01	±0.01	±0.05	±0.23	±0.01	±0.02	±0.01	±0.03	±0.02	±0.02	±0.01	±0.03	±0.03
Organic	2.59^{b}	2.59^{b}	2.61^{b}	2.61^{b}	2.71^{c}	2.74^{c}±	2.81^{a}	2.82^{c}	3.16^{b}	3.18^{b}	3.19^{a}	3.20^{b}	3.24^{a}	3.26^{a}
	±0.01	±0.01	±0.01	±0.01	±0.01	0.01	±0.02	±0.01	±0.01	±0.01	±0.02	±0.02	±0.03	±0.02

Means bearing similar superscript in a column do not differ significantly.

Table 2. Scrotal circumference (cm, mean±se) in male goat kids following zinc supplementation

Group	Age (months)						
	4	4.5	5	5.5	6	6.5	7
Control	11.43^{a}±0.09	12.24^{a}±0.17	12.76^{a}±0.08	13.31^{a}±0.14	14.03^{a}±0.09	14.53^{a}±0.04	15.12^{a}±0.07
Inorganic	11.69^{b}±0.08	12.65^{b}±0.07	13.06^{b}±0.05	13.38^{a}±0.04	14.27^{a}±0.08	15.83^{b}±0.04	16.73^{b}±0.18
Organic	11.78^{b}±0.0	12.71^{b}±0.11	13.44^{c}±0.15	13.97^{b}±0.23	15.02^{b}±0.3	16.11^{b}±0.51	16.66^{b}±0.44

interval from 4 to 7 months of age. Testicular thickness of right and left testes from 4 to 7 months of age also increased. Scrotal circumference of kids in different treatment groups showed a definite trend of increase of scrotal circumference within the group at various ages as measured at fortnightly interval from 4 to 7 months of age (Table 2).

In the present study, the significantly higher ($P<0.05$) testicular measurements (length, width, thickness and scrotal circumference) were found in both the organic and inorganic zinc-supplemented kids than that of control group (Tables 1, 2). Both the zinc supplementation sources had the positive effect on testicular growth in the present study. Similar findings were also reported by several workers (Anderson *et al*. 1993, Sarlos *et al*. 2004). Increased testicular development might be due to stimulatory effect of zinc on the hypothalamo-pituitary axis to increase the production of testosterone through gonadotropic hormone, which in turn helped in the development of male genital organs. Importance of zinc supplement was also revealed in the earlier studies, since deprivation of zinc caused reduction in secretion of GnRH from the hypothalamus in rams (Martin and White 1994). Even the sexually matured male goats had reduced testicular size when exposed to severe zinc deprivation (Neathery *et al.* 1972).

The present study also revealed that the growth of all the testicular dimensions was relatively greater in organic zinc-fed group. Similar growth effect on testicular dimensions was also reported earlier (Arthington *et al*. 1995, Boland *et al*. 1996), because zinc absorption in the intestine from the organic zinc sources appeared to be higher than that of inorganic zinc supplementation (Rojas *et al*. 1995).

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