

Effect of hemi-castration on testicular growth and seminal characteristics of Iraqi male goats

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Abstract

The present study was conducted to investigate the effect of hemi-castration on testicular size and semen characteristics of Iraqi local bucks. Eighteen adult bucks aged 1.5-2.5 years, weighing 36.9-43.7 kg were used. Animals were randomly divided into three groups (6 in each); groups 1 control group. Animals in groups 2 and 3 were subjected to hemi-castration in left and right testicles, respectively. Testicular circumference was measured two weeks before hemi-castration and ten weeks after. Semen samples were collected using electro-ejaculator two weeks after hemi-castration. Volume, color, mass motility, individual motility, percentage of live sperm, percentage of abnormal sperm and sperm concentration were analyzed immediately after collection. Results of the present study showed a significant ($P<0.05$) increase in testicular circumference after hemi-castration. Testicular circumference in left hemi-castration was higher than that in right hemi-castration. Result also showed a significant ($P<0.05$) increase in semen volume, mass motility individual motility and percentage of live sperm in semen of animal without any differences between left and right hemi-castrated animals comparing with control groups. The study concluded that hemi-castration leading to improve semen characteristics due to compensatory mechanism of the remaining testis.

Keywords: Hemi-castration, Semen, Testes, Goat.

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Introduction

Goat is multi-purpose animals that produced milk, meat, skin and hair. Goat recorded good sexual properties so it can tolerance a hard circumstances and produced twins in high percentage (1).

Testis subjected to various affection which affect one or both testes. Some of these affections may be hereditary such as cryptorchidism (2), or due to infections such as orchitis (3), and others may develop as result of accident such as trauma, testicular injuries, torsion and scrotal hernia (4). Other testicular affection may occur due to unknown causes such as tumors, hydrocele, varicoele, and malignant diseases (5). These affections interfere with function of testis: especially spermatogenesis and hormonal secretion, and treatment of these cases may be requiring remove of the affected testis (hemi-castration) or in some cases both testes (6).

In some cases, hemi-castration may be done for other purpose, Foster (7) found that hemi-castration increase the body weight, hair production and sexual behavior of rams.

Many studies reported that hemi-castration have compensatory effect through measurement of testosterone hormone level and ejaculate volume in different animals (8), but there is no information about the effect of hemi-castration on seminal characteristics especially in goat; for this reason of this study conducted to evaluate the effect of hemi-castration on testicular and seminal characteristics of Iraqi local bucks.

Material and methods

The study was done in laboratory of artificial insemination, College of Veterinary Medicine, University of Mosul, in period between 1/4/2004 to 15/6/2004. Eighteen adult Iraqi male goat aged between "1.5-2.5" years old and weighing between 36.9-43.7 kg, were used in this study. All animals were healthy and have good sexual characteristics; Bucks were maintained at the animal house (College of Veterinary Medicine, University of Mosul) under uniform feeding and housing condition. Bucks were divided randomly into three groups (6 in each one); the animals in-group 1 were left as a control group, animal in group 2 had left testis castration, and in group 3 castration of right testis was done.

Hemi-castration was done surgically under anesthesia of xylazin %2 at dose 0.01 mg/Kg B.W (CEVA Tierhesudheit GmbH. Kanzlerstr. 4.40472. Germany). Local anesthesia by lidocain at dose 1 ml /1 cm area (Holden medical. Leyslan. Netherlands) at the site of injection.

The scrotum was opened at the site of spermatic cord and the testis was draw from the scrotum. Spermatic cord was ligated by double rows of trans fixation technique, and

then the spermatic cord was cut between the two legations. Testicular circumference was measured 2 weeks before hemi-castrations and 10 weeks after castration using graduated tap. Postoperative care included injection of penicillin (10000 IU/ Kg B.W) and streptomycin (25 mg/Kg B.W) per day for 4 days.

After two weeks of castration, semen samples were collected from the bucks in all three groups. Samples were collected weekly for 10 weeks using the electro ejaculation (bailey ejaculator). After evaluations of each ejaculate, semen was diluted and storage at 4 C (9).

Semen sample were analyzed immediately after collection and after storage at 4 C. Additional to semen volume and color the light microscope was used to evaluate the mass and individual motility (10), percentage of life spermatozoa, percentage of sperm abnormalities (11) and sperm concentration (12).

Statistical analysis: analysis of variance (ANOVA) was used to determine the differences between groups. Data were analyzed using SPSS (SPSS 2003, SPSS Inc.), and ($P<0.05$) was consider as statistically significant.



Figure 1: the site of opening through the hemi-castration of bucks.

Results

Measurement of testicular circumference and semen analysis of control group and both castrated groups were summarized in table 1. After 10 weeks of castrations, the hemi-castrated bucks show an increase in the testicular size of the other testis. Testicular circumference increased significantly ($P<0.05$) in both castrated groups in comparison with the control group. The testicular circumference of left hemi-castrated bucks was higher significantly ($P<0.05$) than those of right hemi-castrated bucks figure 2 and 3.

Ejaculated semen volume in both hemi-castrated groups was significantly higher ($P<0.05$) when compared with control groups, but there was no significant different in ejaculate volume between the two treated groups, there were no significant changes in semen color between the treated and control groups. Result of semen analysis indicate that no differences in semen parameters (mass motility, individual motility, percentage of live sperm and sperm concentration) between both hemi-castrated bucks but these parameter were significantly ($P<0.05$) higher than those in bucks of control group.

The percentage of morphologically abnormal sperm at the time of semen collection was in similar value in all groups and no significant changes were recorded between hemi-castrated and control groups.



Figure 2: Testis circumference before hemi-castration in adult Iraqi bucks.



Figure 3: Testis circumference measurement after left hemi-castration in adult Iraqi bucks.

Discussion

Results of the study showed a significant increase in testicular circumference of both right and left hemi-castrated bucks, this effect due to the compensatory hyperatropy of the remaining testis (13).

In this case, hyperatropy occurs due to an increase in the volume of testicular interstitial tissues and the vasculature of the intact testis (14). These results agree with other studies which were done on goat (13,14), sheep (15) and bulls (8). The results also show significant differences between right and left hemi-castrated bucks in testicular circumference, this observation may be due to the difference in weight between the left and right testis (16).

Table 1: Changes in testicular circumference and semen analysis following hemi-castration in adult Iraqi bucks (Means \pm SEM).

Parameters	Control Group	Left testis Castration	Right testis Castration
Testicular circumference (cm)	15.98 \pm 0.1 a	19.43 \pm 0.04 b	18.53 \pm 0.1 c
Semen volume(ml)	1.30 \pm 0.06 a	3.76 \pm 0.06 b	3.73 \pm 0.06 b
Color	Milky-creamy	Milky-creamy	Milky-creamy
Mass motion (%)	85.75 \pm 1.8 a	98.18 \pm 0.2 b	98.01 \pm 0.1 b
Individual sperm motion (%)	85.96 \pm 0.5 a	98.90 \pm 0.3 b	98.25 \pm 0.3 b
Percentage live sperm (%)	92.48 \pm 0.5 a	98.90 \pm 0.3 b	98.50 \pm 0.3 b
Sperm concentration 10 ⁹ \times	1.71 \pm 0.04 a	2.48 \pm 0.2 b	2.42 \pm 2.2 b
Percentage abnormal sperm (%)	22.28 \pm 0.4 a	22.90 \pm 0.8 a	0.8 \pm 22.70 a

Values are expressed as Means \pm SE, Different letters means significantly different at ($P<0.05$).

The study indicates that there is a significant increase in ejaculated volume in both castrated groups. This effect may be due to the compensatory activity of the testis and hyperatropy, which occurred in the other testis (17). The

changes in this study was higher than those seen in other studies on local Iraqi bucks (13,14), which may be due to the age of animals which are higher in this study than those in another studies which used animals between 3-6 month

age. No changes were observed in semen color in all groups, and in general, this result agreed with previous report on bucks semen (19).

Sperm parameters of the control groups in the current study were higher than semen parameter of Iraqi bucks, which were observed previously by other studies (8,13-15,17). Hemi-castration improves sperm parameter especially mass and individual motility, sperm viability and sperm concentration in comparison with those in control groups (8,13,17).

This improvement may be occurred due to the compensatory hyperatrophy of the remaining testis (15). This result agreed with other study on West African dwarf bucks (17).

Percentage of morphological abnormal sperm show no significant differences between the three groups and the main abnormalities showed were free head, broken tail, coiled tail and free head (secondary abnormalities), this high percentage of abnormalities may be due to the effect of season and the type of semen collection, these results in agreement with another studies (18,17).

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