

**NOTE**

**SCROTAL AND TESTICULAR MEASUREMENTS  
IN MEHRABAN AND GHEZEL RAMS**

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**ABSTRACT**

The relationships between scrotal circumference (SC), width (SW) and length (SL), and testicular weight (TWT), volume (TV), width (TWH) and length (TL) of 2-yr old Mehraban and Ghezel rams were studied. Correlation coefficients of SC with TWT, TV and TWH were 0.73 for Mehraban and 0.48 for Ghezel rams ( $P<0.01$ ). In Ghezel rams, the correlation coefficients of SW with testicular measurements were slightly larger as compared with those between SC and the testicular measurements. SC, SW, TWT, TV and TWH were positively correlated with body weight (BW) in both breeds ( $P<0.05$ ). TL showed a significant correlation with BW in Ghezel ( $r=0.44$ ) but not in Mehraban ( $r=0.25$ ) rams. It is concluded that SW in Ghezel, and either SC or SW in Mehraban sheep would provide a good indication of the testicular weight. It is suggested that parameters of testicular size be considered in ram selection in Iran.

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### اندازه های اسکروتوم و بیضه ها در قوچ های مهربان و قزل

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#### چکیده

رابطه بین اندازه های بیضه ها درون اسکروتوم (در برگیرنده محیط، عرض و طول) با اندازه های واقعی آنها (وزن، حجم، عرض و طول) پس از کشتار، با استفاده از ۵۴ قوچ ۲ ساله مهربان و ۴۸ قوچ ۲ ساله قزل، بررسی شد. ضریب همبستگی محیط اسکروتوم با وزن، حجم و عرض بیضه ها برای نژاد مهربان،  $0.73$  و برای قزل،  $0.48$  بود ( $P < 0.01$ ). در قوچ های قزل، ضریب همبستگی عرض اسکروتوم با اندازه گیری های بیضه، کمی بیشتر از ضریب همبستگی آنها با محیط اسکروتوم بود. ضریب همبستگی طول اسکروتوم با وزن بدن معنی دار نبود اما ضریب همبستگی بین محیط اسکروتوم، عرض اسکروتوم، وزن بیضه ها، حجم بیضه ها و عرض بیضه ها با وزن بدن برای هر دو نژاد مثبت و معنی دار بود ( $P < 0.05$ ). در نژاد قزل، طول بیضه ها با وزن بدن همبستگی مثبت و معنی داری نشان داد ( $r = 0.44$ ) ولی این همبستگی برای نژاد مهربان ( $r = 0.25$ ) معنی دار نبود. چنین نتیجه گیری شده است که اندازه گیری عرض اسکروتوم در نژاد قزل و اندازه گیری عرض و یا محیط اسکروتوم در نژاد مهربان، برآورد خوبی از اندازه بیضه ها در آن ها را نشان خواهد داد. در نظر گرفتن این فراسنجه ها به هنگام گزینش قوچ در ایران می تواند به بهبود توان تولید مثلی گله ها، کمک کند.

## **INTRODUCTION**

High reproductive capacity of rams has a beneficial effect on the genetic make-up and fertility of the breeding flock. Testicular weight is an excellent indicator of sperm-producing capacity in rams (2, 4). Several indirect measurements of testicular weight, such as scrotal circumference (SC) and width also provide good indications of spermatogenic function (2). A positive relationship was found between scrotal circumference of Rambouillet ram lambs and the fertility of their female sibs (1).

In Iran, not much attention is paid to testicular size when rams are selected for breeding purposes. There is also no information on the relationship between scrotal dimensions and testicular weight in Iranian native sheep. The purpose of the present experiment was to investigate the relationships between testicular measurements (length, width and circumference) in the scrotum and actual measurements (weight, volume, length and width) obtained immediately following slaughter of rams of fat-tailed Mehraban and Ghezel sheep.

## **MATERIALS AND METHODS**

Rams used in this experiment were approximately two-yr old at the time of slaughter, and belonged to fat-tailed Mehraban and Ghezel breeds. Scrotal length (SL) and width (SW) were measured with a caliper, and circumference (SC) was determined with a tape-measure immediately before slaughter. Testes were removed upon slaughter and the following measurements were made on the right and left testes: weight (TWT), volume (TV), width (TWH) and length (TL) with and without caput epididymis. Volume was determined by water displacement. Values for SL (=2a) and SW (=2b) were converted to volume by means of a formula for spheroid ( $V = 1.33\pi ab^2$ ) as an index of TV (8). Estimated TV values were correlated with TV values obtained by water displacement after immersion of right and left testes in water. Data were analyzed by using the Proc Anova and Proc Corr of the SAS (6).

## RESULTS

Preslaughter body weight (BW) (Table 1) was greater for Ghezel as compared with Mehraban rams. SC and TWH were greater for Ghezel as compared with Mehraban breed but the differences disappeared when BW was used as a covariate in the analysis of variance.

Table 1. Testicular and scrotal measurements and their regression coefficients (b) on body weight in Mehraban and Ghezel rams.

	Mehraban (n=54)				Ghezel (n=48)			
	Mean±SD	Min.	Max.	b	Mean±SD	Min.	Max.	b
<u>Testis</u>								
Length (cm) <sup>†</sup>	11.5±0.8	9.8	14.0	0.07	11.7±0.8	9.8	13.4	0.08
Length without epididymis (cm) <sup>†</sup>	9.2±0.8	7.6	11.3	0.02	9.5±0.8	7.7	11.3	0.03
Width (cm) <sup>†</sup>	6.7±0.5	5.6	8.1	0.14	6.8±0.8	5.7	7.9	0.14
Volume (ml) <sup>§</sup>	401±87	245	680	0.03	423±92	235	672	0.05
Weight (g) <sup>§</sup>	456±98	258	770	0.03	489±110	292	770	0.05
<u>Scrotum</u>								
Length (cm)	12.2±1.2	9.6	14.8	0.04	12.4±1.1	9.5	15.1	0.03
Width (cm)	11.1±1.1	9.6	13.4	5.34	11.6±1.2	9.5	14.0	5.86
Circumference (cm)	32.1±2.3	27	37	5.41	33.3±3.0	26	42	7.49
Body weight (kg) <sup>¶</sup>	57.1±6.6	40	70	-	61.8±6.6	44	77	-

<sup>†</sup> Average for both testes.

<sup>§</sup> Total for both testes.

<sup>¶</sup> Significant breed difference (P<0.01).

Correlation coefficients between scrotal and testicular measurements were significant and generally greater for Mehraban than for Ghezel rams (Table 2). Correlation coefficients of BW with TL and SL in Mehraban rams were nonsignificant (Table 3). In Ghezel, TL but not SL showed a significant correlation with BW. Correlation coefficients of SC and TWH with BW were significant for both breeds. TWT and TV were highly correlated in both

*Scrotal and testicular...*

breeds. Correlation coefficient of the measured and estimated TV was 0.78 for Mehraban and 0.65 for Ghezel rams. Correlation coefficient of the estimated TV with TWT was 0.72 for Mehraban and 0.58 for Ghezel rams.

Table 2. Correlation coefficients<sup>†</sup> between testicular and scrotal measurements in Mehraban and Ghezel rams.

Testis measurements	Scrotal measurements		
	Length	Width	Circumference
<u>Mehraban rams</u>			
Length	0.47	0.52	0.44
Length without epididymis	0.52	0.72	0.59
Width	0.49	0.69	0.73
Volume	0.60	0.77	0.73
Weight	0.64	0.67	0.73
<u>Ghezel rams</u>			
Length	0.56	0.57	0.47
Length without epididymis	0.58	0.59	0.47
Width	0.37 <sup>§</sup>	0.56	0.48
Volume	0.46	0.65	0.49
Weight	0.42 <sup>§</sup>	0.57	0.49

<sup>†</sup> Significant at  $P < 0.01$  except for values followed by  $\S$  which are significant at  $P < 0.05$ .

## DISCUSSION

Testicular weight is the measurement most correlated with all aspects of sperm production in rams (2, 3, 4); it is, however, difficult to assess it in the live animal. Knight (2) observed that other indicators of the testicular size (e.g. SC, scrotal volume and mean testis diameter) were significantly correlated with the sperm production and testicular weight. Although SC is considered as the better predictor of the testicular weight in mature lambs (5) but testicular diameter was a more useful measurement of testis weight for sexually maturing rams (9). In 2-yr old Ghezel rams, correlation

coefficient of the testicular weight with SC (0.49) was slightly smaller than the correlation between testicular weight and scrotal width (0.57); however the reverse was found for Mehraban rams (0.73 vs. 0.67).

Table 3. Correlation coefficients between live body weight and testicular and scrotal measurements in Mehraban and Ghezel rams.

Measurements	Mehraban	Ghezel
Mean testicular length	0.22 <sup>ns</sup>	0.40 <sup>†</sup>
Mean testicular length without caput epididymis	0.25 <sup>ns</sup>	0.44 <sup>†</sup>
Mean testicular width	0.52 <sup>††</sup>	0.47 <sup>††</sup>
Total testicular weight	0.37 <sup>†</sup>	0.55 <sup>††</sup>
Total testicular volume	0.38 <sup>†</sup>	0.55 <sup>††</sup>
Left testicular weight	0.35 <sup>ns</sup>	0.56 <sup>††</sup>
Right testicular weight	0.39 <sup>†</sup>	0.53 <sup>††</sup>
Scrotal length	0.10 <sup>ns</sup>	0.29 <sup>ns</sup>
Scrotal width	0.41 <sup>†</sup>	0.50 <sup>††</sup>
Scrotal circumference	0.39 <sup>†</sup>	0.35 <sup>†</sup>

† P<0.05.

†† P<0.01.

ns non significant.

Scrotal circumference is generally accepted as being related to semen volume. Rams with larger SC had higher percentage of normal cells, as well as individual motility than rams with small SC (7). This suggests that culling rams with small SC would reduce the incidence of abnormal sperm and enhance fertility of the ram herd.

It is concluded that SW in Ghezel, and either SC or SW in Mehraban sheep would provide a good indication of TWT. Because of the positive and significant correlations between TWT and semen quality, the flock owners in Iran should include these measurements in ram selection. Due to wide variation in testicular measurements of Mehraban and Ghezel rams, selection for testicular size seems feasible. It is also concluded that conversion of SW

and SL to volume, as performed by some investigators, does not improve the correlation coefficient of these measurements with the testicular weight.

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### LITERATURE CITED

1. Bunge, R., D.L. Thomas and J.M. Stookey. 1990. Factors affecting productivity of Rambouillet ewes mated to ram lambs. *J. Anim. Sci.* 68:2253-2262.
2. Knight, T.W. 1977. Methods for the indirect estimation of testes weight and sperm numbers in Merino and Romney ewes. *N.Z. J. Agric. Res.* 20:291-296.
3. Knight, T.W. 1984. Testicular growth and size in rams from flocks of different reproductive potential. *N.Z. J. Agric. Res.* 27:179-187.
4. Lino, B.F. 1972. The output of spermatozoa in rams. II. Relationship to scrotal circumference, testis weight, and the number of spermatozoa in different parts of the urogenital tract. *Aust. J. Biol. Sci.* 25:359-366.
5. Notter, D.R., J.R. Lucas and F.S. McClaugherty. 1981. Accuracy of estimation of testis weight from *in situ* testis measures in ram lambs. *Theriogenology* 15:227-234.
6. SAS. 1989. SAS User's Guide: Statistics. SAS Inst. Inc. Cary, NC.
7. Wiemer, K.E. and J.L. Ruttle. 1987. Semen characteristics, scrotal circumference and bacterial isolates of Fine Wool range rams. *Theriogenology* 28:625-637.
8. Wildt, D.E., E.J. Bass, P.K. Chakraborty, T.L. Wolfe and A.P. Stewart. 1982. Influence of inbreeding on reproductive performance, ejaculate quality and testicular volume in the dog. *Theriogenology* 17:445-452.

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9. Yarney, T.A., L.M. Sanford and W.M. Palmer. 1990. Pubertal development of ram lambs: Body weight and testicular size measurements as indices of postpubertal reproductive function. *Can. J. Anim. Sci.* 70:139-147.