Testicular size as an indicator of poor sperm output in white-tailed (*Odocoileus virginianus*) and mule (*Odocoileus hemionus*) deer bucks

N. Sugai[a], C.F. Shipley[a], R.E. Ellerbrock[b], J.L. Stewart[a]
[a]College of Veterinary Medicine, University of Illinois Urbana-Champaign, Urbana, IL
[b]College of Veterinary Medicine, University of Georgia, Athens, GA

With rising popularity of cervid hunting, there is an increased demand for epididymal harvesting as a final option to preserve genetics of valuable bucks. While seasonality plays a crucial role in reproductive characteristic fluctuations in bucks, little is known about minimal testicular volume and sperm output.[1] Here we describe morphological and histological characteristics of abnormal testes from captive white-tailed deer (WTD) and mule deer (MD) bucks and a normal white-tailed deer (CONT) in rut.

All three testicle pairs were obtained postmortem examination during peak rut (Oct to Dec) and shipped overnight on ice for routine epididymal sperm harvest. Cauda epididymis and vas deferens were removed, dissected, and flushed with Optixcell extender (IMV Technologies). The CONT flush yielded a total output of 2.5 billion sperm with 56% motility. In comparison, the WTD flush yielded dilute semen (<10 million sperm/mL) with 50% motility. The MD flush revealed no mature spermatozoa, but numerous spheroids. Testes measurements were used to estimate testicular volume, as shown in the table. The CONT testes exceeded the minimum recommended volume of 25 cm^3, whereas the WTD and MD testes were subpar.

Testes were fixed in 10% formalin, paraffin-embedded, and stained with hematoxylin and eosin and Masson's trichrome. The WTD testes had marked collagen and connective tissue present within interstitial spaces. Additionally, there was reduced spermatogenesis within seminiferous tubules compared to CONT. The MD testes showed no evidence of spermiogenesis within the seminiferous tubules and increased collagen deposition and disorganization within the interstitial space. Lack of spermiogenesis in the MD suggests potential hereditary hypoplasia, whereas the WTD may have been undergoing testicular atrophy.[2] Though different etiologies, both findings indicate that testicular size can be useful as an indicator of sperm output and a predictor of sub- or infertility in WTD and MD. Establishment of minimal testicular volume necessary for a successful epididymal flush would prevent unnecessary shipment of unusable testes.

Table. Testicular volume estimation ($TV=0.5236\times L\times W^2$; L=length, W=width)[1]

	CONT WTD		**WTD**		**MD**	
	Left	Right	Left	Right	Left	Right
Length (cm)	7.8	7.5	3.9	4.5	4.4	3.8
Width (cm	3.7	4.5	2.5	3.2	2.0	2.0
Volume (cm^3)	55.91	79.52	12.76	24.13	9.21	7.98

Keywords: Cervidae, epididymal sperm harvest, hypogonadism, semen quality

References

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