Preliminary report on scrotal circumference and semen parameters in fertile adult Omani rams

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Abstract

Sheep are one of the important livestock species in the Sultanate of Oman. There is one major breed of sheep in Oman. At present, the breeding rams are selected on the basis of physical appearance. No breeding soundness examination (BSE) is performed before animals are used for breeding. The objective of the preliminary study was to evaluate reproductive potential of Omani rams utilizing established criteria for BSE. Eleven rams one to five years old were evaluated for breeding soundness, including physical examination, body weight (BW), scrotal circumference (SC), semen collection and evaluation. Scrotal circumference (25.50 ± 1.52 cm) of rams weighing 54.9 0kg (± 1.70) was smaller than reported in other breeds. Semen parameters including volume (0.84± 0.12 ml), sperm mass activity (2.64±0.17 of 3.0), sperm motility (76.82 ± 2.05%), sperm concentration (1.91± 0.31 billion/ml), and normal sperm (97.18 ± 0.33%) were within normal range. Study of larger number of rams is needed to establish the minimum and maximum BSE criteria for Omani rams.

Keywords: Omani rams, breeding soundness examination, reproductive evaluation

Introduction

Sheep are one of the important livestock species in Oman; the second in number (351,066), after goats (15,571,148), followed by cattle (301,588), and camels (117,299) in the Sultanate of Oman.[1] There is one major breed of sheep in Oman[2]. They are predominantly black but some white sheep are observed. They are thin-tailed, small in size; males are mostly horned and females polled.[3] Evaluation of the male for breeding soundness is an important part of reproductive management of a flock. Breeding soundness evaluation also is a first step in semen preservation for a long-term preservation of genetic material and preservation of biodiversity. Evaluation of the male for breeding soundness is based upon SC, sperm motility and morphology of semen. It has been shown that highly fertile rams settled ewes earlier in the breeding season resulting in producing more twins. The quality of rams' semen was significantly correlated with the twinning rate.[4] Since a large number of high quality spermatozoa is necessary for successful breeding in sheep,[5] ewe fertility is closely related to sperm production in the ram.

Currently, in Oman, the breeding rams are selected only on basis of physical appearance. Taller and heavier rams are preferred. No BSE is performed before rams are used for breeding on the government farms or sold to private farm owners for improvement of their sheep production. The Society for Theriogenology (SFT) has recommended measurable BSE criteria, including SC, sperm motility and sperm morphology in the bull and the ram.[6,7] Based upon SFT criteria, bulls are declared satisfactory, questionable and unsatisfactory potential breeders. Although limited information is available on various aspects of BSE of different sheep breeds, no reports are available on Omani rams.

The objectives of the current preliminary study were to evaluate reproductive potential of native Omani rams utilizing established criteria of BSE. To the best of our knowledge, this is the first report on BSE of the native Omani rams.

Materials and methods

Eleven fertile adult rams one to five years old were evaluated for breeding soundness. The rams were a part of the flock used for breeding ewes on two farms. The rams were weighed and the scrotum was examined for presence of two normal testes. Scrotal circumference was measured using a standard scrotal metal-tape (Nasco, Ft. Atkinson, WI) at the widest mid-scrotal point. Semen was collected using an electroejaculator (EE; Standard Precision Electronics, Denver, CO) as described earlier.[8] Semen volume and sperm mass activity, motility and morphology were evaluated by established techniques.[8,9] In summary, sperm mass activity was evaluated by placing a drop of undiluted semen on pre-warmed

microscope slide and evaluated for wave motion under a microscope. The mass activity was graded from 0 to 3 (0 – no activity, 1 – slow/irregular, 2 – moderate, 3 – fast wave motion). For sperm motility, a small portion of semen was diluted 1:10 (semen: normal saline). A drop of diluted semen was placed on pre-warmed microscope slide, covered with cover slip and evaluated under microscope as percentage of sperm moving in forward progressive manner. Sperm concentration in each ejaculate was calculated by utilizing dilution pipettes (Platelett Unopette®, B-D #5855, Becton, Dickinson and Company, Franklin Lake, NJ) and a hemocytometer (Exodus Breeders Corporation, York, PA) and the number of sperm per ml was calculated. For sperm morphology, a drop of semen was placed close to an end of a microscope slide and mixed with a drop of eosin-nigrosin stain (Society for Theriogenology, Montgomery, AL) and smear was made. The smear was air-dried, and sperm were evaluated under an oil immersion lens of a microscope at 1000x. Two hundred sperm were evaluated and abnormalities were classified according to Barth and Oko.[10] The primary abnormalities were considered as sperm head abnormalities, proximal cytoplasmic droplet, abnormal mid-piece, and tightly coiled tails; while the secondary abnormalities included distal cytoplasmic droplet, bent tails, and loose heads.

Results

Table 1 summarizes the mean (± SE) BW, SC and semen evaluation parameters (semen volume; sperm mass activity, motility, concentration, and normal sperm). The semen parameters represent all semen samples collected by EE.

Table1. Breeding soundness examination parameters of 11 native Omani rams

	BW (kg)	SC (cm)	S. Vol (ml)	S. MA (0-3)	S. Mot (%)	S. Conc (Bill/ml)	N. Sperm (%)
Mean	54.90	25.50	0.84	2.64	76.82	1.91	97.18
SE Mean	1.70	1.52	0.12	0.17	2.05	0.31	0.33
Minimum	47.20	23.50	0.30	1.50	65.00	0.50	95.00
Maximum	62.50	29.00	1.60	3.00	90.00	3.60	99.00

SC= Scrotal circumference, BW=Body weight, S. Vol=Semen volume, S. MA=Sperm mass activity, S. Mot=Sperm motility, S. Conc=Sperm concentration, N. Sperm=Normal

Discussion

The average SC (25.50 ± 1.52 cm) of rams weighing 54.90 ± 1.70 kg were smaller than reported in other breeds,[11,12] however the SC shows marked variation in seasonal breeds. Differences of up to 30% in testicular volume have been reported between spring and autumn.[13] No seasonal effect on reproduction is reported in Omani rams. Scrotal circumference greater than 33 cm is recommended for adult rams.[11] Others have recommended SC greater than 36 cm for shearlings and 32 cm for ram lambs.[14] However, minimum values for classifying an animal based upon SC are controversial, as they can vary due to age, season, breed and individual variation.[15] Smaller SC found in this study may be appropriate for Omani rams, as they were with flocks of ewes which were pregnant. Studies with larger number of rams are needed to establish the minimum and maximum SC in Omani rams.

Semen parameters, including volume (0.84± 0.12 ml), sperm mass activity (2.64±0.17 of 3.0), sperm motility (76.82 ± 2.05%), sperm concentration (1.91± 0.31 billion/ml), and normal sperm (97.18 ± 0.33%) were within normal range as found in previous studies.[4,5,7]

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