Case report: Breeding soundness examination of 12 native Omani bulls

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Summary

Breeding bulls strongly affect the reproductive efficiency of cattle herds, irrespective of whether they are used for natural breeding or artificial insemination. The purpose of this case was to evaluate the reproductive potential of native Omani bulls using criteria established by the Society for Theriogenology for breeding soundness examination (BSE). Twelve bulls, 2-4 years old were evaluated. The bulls were weighed and assigned a body condition score (BCS) on a scale ranging from 1 through 9. Scrotal circumference (SC) was measured and semen was collected with an elctroejaculator. Semen was evaluated for sperm mass activity, individual sperm motility, sperm concentration and morphology. Two bulls were declared unsatisfactory owing to azoospermia (ejaculate devoid of sperm) in one and a scrotal hernia in the second.

Key words: Omani bull, breeding soundness examination, reproductive evaluation

Background

The Sultanate of Oman is located in southwest Asia on the southeast coast of the Arabian Peninsula. It borders the United Arab Emirates on the northwest, Saudi Arabia on the west and Yemen on the southwest. Oman is a leading livestock producer in the region with goats being the most numerous (15,571,148), followed by sheep (351,066), cattle (301,588), and camels (117,299).[1] The majority of cattle (173,892) are found south of the Dhofar Mountains. Because of the influence of the monsoon this area has the only natural pasture in Oman.[1] The coast-facing mountain slopes behind the coastal plain are traditional cattle-breeding areas of the Jabali tribesmen. Until recently, the Jabali reared cattle only for their milk. Currently with good road communications to northern Oman where demand for beef is increasing, the Jabali are being encouraged to export their cattle to the north. In the north, the native Omani cattle are raised primarily for beef. The native cattle breed has some phenotypic similarity to other zebu cattle found in other countries in the area (Fig 1).

At present, breeding bulls in Oman are selected only by physical appearance. No BSE is performed before animals are used for breeding purposes on the government farms or sold to private farm owners for improvement of their livestock.

Bulls strongly affect the reproductive efficiency of breeding herds, irrespective of whether they are used for natural breeding or artificial insemination. Thus, impairment of bull fertility results in great economic loss. Therefore, it is essential that bulls be examined both before and during their use in breeding programs in order to identify and remove any individuals with potentially low fertility.[2]

Case presentation

Twelve Omani bulls, 2-4 years old from the northern region of the country were evaluated at the Animal Production Research Center, Ministry of Agriculture, Rumais, Sultanate of Oman following the guidelines established by the Society for Theriogenology.[3] Each bull was weighed, scored for body

Fig. 1. Native breed bull from Oman. The phenotypic characters of dark brown color, a small hump, medium size dewlap, and wide forehead appear to have some influence from other zebu breeds found in countries in the area, e.g. Red Sindhi in Pakistan.

condition (1-9)[4] and the scrotum was examined for presence of two normal testes with firm consistency. Scrotal circumference was measured using a scrotal tape (Nasco, Ft. Atkinson, WI) at the widest mid-scrotal point. The accessory sex glands were examined by palpation per rectum. Semen samples were collected using an elctroejaculator (Standard Precision Electronics, Denver, CO) as described by Chenoweth and Osborne.[5] Sperm mass activity, motility and sperm morphology were evaluated.[6] Sperm mass activity was evaluated by placing a drop of undiluted semen on a pre-warmed microscope slide and wave motion was evaluated at 100x magnification. The mass activity was graded from 0 to 3 (0=no activity, 1=slow/irregular wave motion, 2=moderate wave motion, and 3=fast wave motion). For determination of sperm motility, an aliquot of semen was diluted 1:10 with normal saline and a drop of diluted semen was placed on pre-warmed microscope slide, covered with a coverslip and assessed by estimating the percentage of sperm moving forward in a progressive manner. Sperm concentration in each ejaculate was measured by diluting the semen 1:100 (BD Unopette™ reservoir #365854, Becton-Dickinson, Franklin Lake, NJ) and sperm were counted using a Neubauer chamber (Bright Line™ hemacytometer, Exodus Breeders Corporation, York, PA). To determine sperm morphology, a drop of semen was placed close to one end of a microscope slide and mixed with a drop of eosin-nigrosin stain (Society for Theriogenology, Montgomery, AL) and a smear was made. The smear was air-dried, and sperm were evaluated under oil immersion (1000x). Two hundred sperm were evaluated and abnormalities were classified as described by Barth and Oko.[7] Primary abnormalities included sperm head abnormalities, proximal cytoplasmic droplets, abnormal midpieces, and coiled tails, while secondary abnormalities included distal cytoplasmic droplets, bent tails, and loose heads.

Outcome

All bulls responded adequately to electroejaculation. The ejaculate of one bull was devoid of sperm. Semen collection from this bull was attempted twice at an interval of several days with the same results; therefore the bull was declared to be azoospermic (Fig 2) and data from this bull were removed. Another bull was found to have a scrotal hernia (Fig 3). Both bulls were declared unsatisfactory potential

breeders and removal from the breeding program was recommended. The average body weight, SC, semen volume, sperm mass activity, sperm motility, number of sperm per ejaculate and percent of normal sperm are shown in Table 1.

Discussion

The bulls examined were from northern Oman, however, the majority of Omani cattle, primarily the Dhofari breed, are found south of the Dhofar mountains.[1] Scrotal circumference, as a measure of testis size, has been positively associated with sperm production in beef bulls with correlations estimated to be as high as 0.81(see review by Rusk[8]). The mean SC in the bulls examined for this report was greater than that found by others who examined *Bos indicus* (Nelore) or Canchim bulls (*Bos indicus* x *Bos taurus* crossbred).[9] The sperm motility and percentage of normal sperm were also higher in these bulls than in those examined by Brito, et al.[9] The bull with a scrotal hernia was declared unsatisfactory for breeding due to the possible heritable nature of the condition.[10] The bull with azoospermia was unsatisfactory for breeding due to lack of sperm in his ejaculate. It was our purpose to demonstrate that BSE of Omani bulls before breeding or purchase would enable the veterinarian to remove bulls with inadequate semen quality, poor BCS or physical characteristics that interfere with satisfactory breeding performance.

Learning points

- BSE of Omani bulls before breeding or purchase will enable the veterinarian to remove bulls with marginal or poor semen quality or physical conditions which compromise breeding performance.
- Bulls with scrotal hernias and other potentially hereditary conditions can be detected by BSE.
- Infertile or sterile bulls with azoospermia or oligospermia may be detected by BSE and removed from the breeding herd.

Acknowledgements

The study was conducted during the first author's Fulbright Fellowship at Sultan Qaboos University (SQU), Oman. The authors are grateful for valuable support provided by Prof. Osman Mahgoub, Prof. E. Johnson and their staff; SQU Agriculture Experiment Station; the Department of Animal and Veterinary Sciences; the Ministry of Agriculture, Oman; and the staff at the Animal Production Research Center, Rumais, Oman.

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Table 1. Mean (± S. D.) of reproductive parameters of eleven 2-4 year old Omani native bulls

Reproductive Parameter	***Mean ± S.D.***
Body weight (kg)	360.2 ± 41.4
Scrotal circumference (cm)	28.2 ± 1.6
Semen volume (ml)	4.8 ± 2.7
Sperm mass activity (0-3 grade)	1.8 ± 1.1
Sperm motility (%)	55.5 ± 13.5
Total sperm number (10^9)	869.8 ± 39.4
Normal sperm (%)	89.1 ± 13.8

Fig. 2. Ejaculates from two native Omani breed bulls. Ejaculate with no sperm (l) and normal milky white color semen (r).

Fig 3. Scrotum with normal testes (l), scrotal hernia (r) of native Omani breed bulls.