

CASE REPORT

Epididymitis Caused by *Brucella ovis* in a
Southern Ontario Sheep Flock

BRIAN C. BUCKRELL, SCOTT A. McEWEN, WALTER H. JOHNSON AND NEALE C. SAVAGE

*Theriogenology Section, Department of Clinical Studies
(Buckrell, Johnson, Savage) and Department of Pathology (McEwen),
Ontario Veterinary College, University of Guelph,
Guelph, Ontario N1G 2W1*

Abstract

Epididymitis was diagnosed in three rams in a commercial sheep flock in southern Ontario. The affected rams had palpably enlarged epididymides and two rams had semen which contained inflammatory cells and was of poor quality. Serum complement fixation titers for *Brucella ovis* were 1:20, 1:80 and 1:90. Five other rams in the flock were clinically normal and without titers. Two of the affected rams had lesions similar to those produced by experimental infection with *B. ovis*. The infection in the rams had no apparent effect on ewe performance. The source of the infection remains unknown, but the rams were purchased from a flock which had imported ewes from the western U.S.A.

Key words: Sheep, epididymitis, ram, brucellosis, *Brucella ovis*.

Résumé

Épididymite due à *Brucella ovis*, dans un troupeau de moutons du sud de l'Ontario

Les auteurs ont diagnostiqué une épididymite, chez trois béliers d'un

troupeau commercial de moutons du sud de l'Ontario. L'hypertrophie des épididymes de ces béliers les rendait facilement palpables; le sperme de deux de ces mâles était de mauvaise qualité et contenait des cellules inflammatoires. L'épreuve de la déviation du complément démontra des titres d'anticorps sériques respectifs de 1:20, 1:80 et 1:90. Cinq autres béliers du troupeau semblaient normaux et ne possédaient pas d'anticorps contre *Brucella ovis*. La nécropsie de deux des béliers malades révéla la présence de lésions compatibles avec une brucellose expérimentale. L'infection des béliers ne sembla pas affecter la performance des brebis. La source de l'infection demeure inconnue, mais les béliers provenaient d'un troupeau dont le propriétaire avait importé des brebis de l'ouest des États-Unis.

Mots clés: moutons, épididymite, béliers, brucellose, *Brucella ovis*.

Introduction

Brucella ovis is a major cause of epididymitis in rams throughout the world (1,2,3). In North America, the

incidence is highest in the mid-western regions of the United States and the western provinces of Canada (4,5,6). The disease has not been diagnosed in southern Ontario in recent years (Hutchings D, personal communication), however concern about it has grown due to the increased use of out of province rams and the possibility of exposure at the provincial ram testing stations. Ovine brucellosis is not a zoonosis and is not reportable in Canada.

Brucella ovis is readily transmitted through the mucosa of the vagina, rectum, prepuce and conjunctiva (4,7,8). In the ram, the infection localizes primarily in the epididymis producing epididymitis, scrotal adhesions and reduced fertility. In chronic cases sperm granulomas and testicular degeneration occur. Transmission between rams occurs during homosexual contact (1,2,6). Ewes are usually infected by rams shedding the organism in semen; ewe to ewe transmission rarely occurs. The organism is trophic for placental and fetal tissues causing placentitis, abortion and infected weak lambs. The infection is shed with fetal membranes so that

most ewes are free of the disease a few weeks postpartum (2,3,6,7,8).

Poor ram fertility, increased abortion rates, stillbirths and the birth of weak lambs may seriously reduce the lamb yield of an affected flock (4,8,9).

Diagnosis of *B. ovis* infection is based on serological tests, bacteriological sampling and demonstration of typical lesions in infected animals. Complement fixation, indirect hemagglutination, ELISA, indirect fluorescent antibody, gel diffusion and agglutination serological tests have been used, with complement fixation (CF) being the principal test used at present (2).

False positive and false negative reactions may occur with the CF test. However, titers greater than 1:20 are considered diagnostic when associated with clinical disease and the typical necropsy findings (2,5,10,11). The organism may be cultured from semen and aborted material, but bacteria are shed only sporadically (2,4,5,10,11).

There is no treatment for ovine brucellosis. Infected rams should be culled. With good postlambing hygiene the problem is self limiting in the ewe flock (1,6,7).

Case History

In January 1984, two yearling Polypay rams were admitted to the Ontario Veterinary College with a history of abnormal testicular conformation. The flock included six other rams servicing approximately 300 commercial ewes. The affected rams had been purchased six months earlier from a flock in Quebec which had imported their dams the previous year from Idaho. Flock performance was normal. However, in the previous lambing season, an outbreak of enzootic (chlamydial) abortion had occurred.

The rams were in excellent condition. Ram A had a scrotal circumference of 28 cm with an uneven scrotum caused by an enlarged tail of the left epididymis which occupied almost 50% of the left side. The left testicle was firm and one-half the length of the right testicle. The right testicle was of normal size but soft on palpation. The right epididymis was slightly enlarged. Both testicles were freely movable within the scrotum and discomfort could not be elicited.

Ram B had a scrotal circumference

of 28 cm with a pointed appearance to the base of both sides but in which a distinct epididymis was not palpable. The testicles were freely movable within the scrotum and pain was not detected.

Serum was obtained from both rams and was submitted to Animal Diseases Research Institute, Nepean, Ontario for serology. Semen was collected by electroejaculation and epididymal aspiration for evaluation and for bacterial and mycoplasma cultures.

The semen from ram A had a volume of 2 mL with a concentration of 4×10^9 mL, poor gross and individual motility and 80% morphologically normal sperm. Many neutrophils were present but the cultures were negative. The epididymal aspirate contained large numbers of sperm, many neutrophils and lymphocytes and the culture was negative. The serum from ram A had a titer of 1:90 for *B. ovis*.

The semen volume, concentration, motility and morphology from ram B was within normal limits. Inflammatory cells were not present and bacterial and mycoplasma cultures were negative. Serum from ram B was seronegative for *B. ovis*.

A diagnosis of *B. ovis* epididymitis was made in ram A. The rams were returned to the owner with the recommendation that all breeding be stopped and that ram A be removed from the flock. A flock visit was made during which the six other rams were examined. Serum was obtained from all rams and from 25 ewes to which rams A and B had been exposed.

Of the six additional rams in the flock, five were normal and one had soft testicles and an enlarged left epididymis (Ram C). The serum collected that day had titers to *B. ovis* as follows: Ram A 1:64, ram B negative and ram C 1:20. One additional ram (Ram D) had a titer (1:80) but no palpable abnormalities.

Rams A and B were returned to OVC where they underwent further semen evaluations. Semen was collected every second day for five collections. These semen evaluations, approximately four weeks after the first collection, revealed a marked reduction in semen quality and concentration for ram A. *Brucella ovis* was not recovered from any of the semen samples. Ram B showed little

change in semen quality from the first collection. *Brucella ovis* was not recovered from any semen samples from ram B.

Rams C and D were also admitted to OVC for examination. Over a two week period, five semen samples were collected for evaluation and bacteriological culture. Ram C had normal semen parameters. Ram D had developed palpable reproductive tract abnormalities since first examined on the farm six weeks before. Both testicles were soft and pulpy and both cauda epididymides were enlarged. Semen quality was poor and many neutrophils were present. *Brucella ovis* was not recovered from any semen samples submitted from rams C or D.

Rams A, B, and D were euthanized and submitted for necropsy.

Necropsy Findings

Ram A — Gross lesions were restricted to the reproductive tract. In cross-sectional diameter the left and right testes were about 56 mm and 62 mm respectively. The tail of the left epididymis had a granular serosal surface and was 38 mm in cross-sectional diameter (Figure 1). The tail of the left epididymis contained several 2-10 mm diameter spermatoceles separated by fibrous connective tissue. The right epididymis was 24 mm in cross-

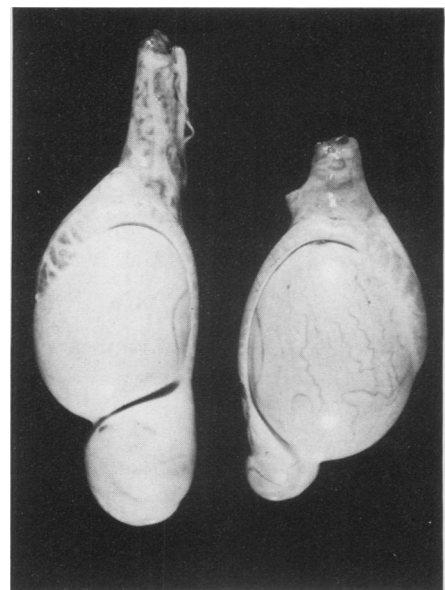


FIGURE 1. Left and right testes, ram A. Tail of the left epididymis is enlarged and has a granular serosa. Bar equals 2 cm.

sectional diameter and had a smooth serosa.

Ram B — Both testicles were elongated. Gross abnormalities were not present.

Ram D — The tail of the left epididymis was 30 mm in cross-sectional diameter, the right was 24 mm. Several fibrous adhesions were present between the visceral and parietal vaginal tunic of the left testis and epididymis. A few small fibrous tags were present on the visceral vaginal tunic of the right testis and epididymis. Gross lesions were not detectable in the testes and epididymides on cut section. Several well-encapsulated abscesses, 1-3 cm in diameter, were present in lung, bronchial lymph nodes and liver. *Corynebacterium pseudotuberculosis* was recovered in pure culture from a pulmonary abscess.

Histopathology

Ram A — Lesions were restricted to the reproductive tract. The testes and heads of the epididymides were normal. The tail of the left epididymis contained several sperm granulomas surrounded by dense fibrous connective tissue. The ductal lumen of the tail of the left epididymis contained sperm and a few lymphocytes, neutrophils and sloughed epithelial cells. The ductal mucosa contained a few neutrophils and lymphocytes. The submucosa was edematous and had a mixed mononuclear cellular infiltrate, especially prominent around blood vessels (Figure 2). The submucosa of the body of the left epididymis was infiltrated with a few plasma cells and neutrophils. The lumen of the left ductus deferens contained sperm with a few neutrophils and lymphocytes and a submucosal infiltrate of mixed mononuclear inflammatory cells was present. The tail of the right epididymis had a mild submucosal mixed inflammatory cell infiltrate.

Ram B — A small sperm granuloma was present in the head of the right epididymis.

Ram D — Lesions present in the tails of the epididymides were similar to those in ram A, except that there were no sperm granulomas present, more

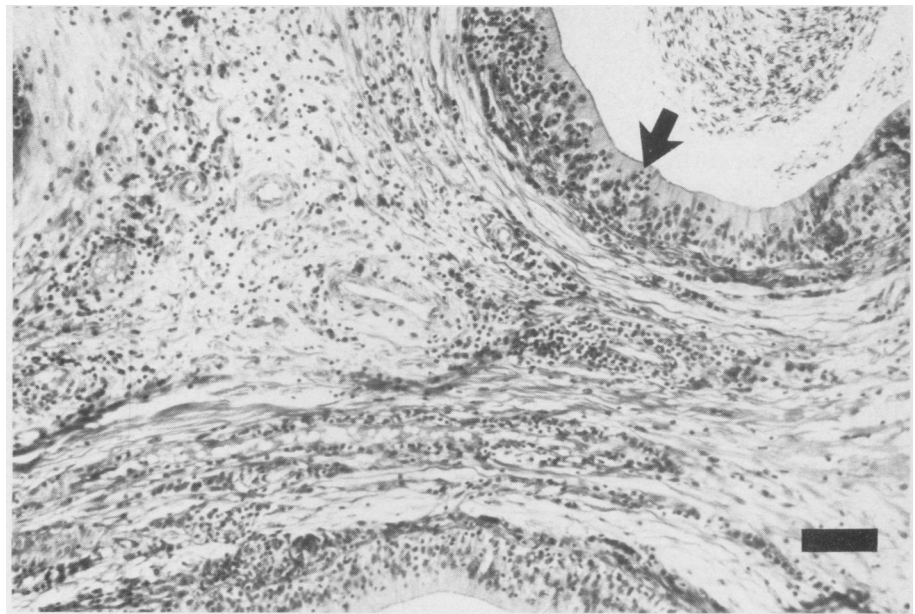


FIGURE 2. Tail of the right epididymis, ram D. Mixed mononuclear infiltrate of submucosa with extension into mucosa (arrow). Bar equals 100 μ m.

neutrophils were found in the ductal lumen and intraepithelial microabscesses were present in the ductal mucosa. The lesions found in the ductus deferens and body of the epididymis in ram D were similar to those in ram A. The testes, heads of the epididymides and bulbourethral glands were normal.

Samples of testes and epididymides from rams A, B and D were submitted for bacteriological examination. No bacteria were recovered.

Discussion

The diagnosis of *B. ovis* infection in sheep is based on the demonstration of typical lesions, serological testing and culture of the organism (2,5,6,10). The reproductive tract lesions described in rams A and D are consistent with those described in rams experimentally infected with *B. ovis* (6). These lesions, however, are not specific for *B. ovis* infection. *Actinobacillus seminis* and *Histophilus ovis* have produced similar lesions (2).

Serologically, rams A and D had high titers (1:90 and 1:80 respectively) to *B. ovis* while ram C had a titer of 1:20. The serological results together with the necropsy findings are diagnostic for *B. ovis* infection. The failure to culture *B. ovis* from the semen and

at necropsy was disappointing but not unusual (3).

The origin of the infection in the flock is unknown. The source flock of rams A and B was tested serologically and found to be negative for *B. ovis*. The ewes imported from Idaho were seronegative for *B. ovis* prior to importation.

Brucella ovis infection is mainly transmitted ram to ram and its major effect is on ram fertility (3). Bacterins are available to help control the problem in the ram flock, however, as the incidence of the disease in Ontario is low, a test and cull policy was recommended (3,5).

The entire flock was serotested during the spring and summer of 1984. Two positive titers were found but were considered to be false positives (CF titers 1:10). The producer purchased two new rams and six ewe lambs from the same Polypay breeder in the spring of 1984. These animals were seronegative at the time of purchase and were held in isolation until being tested again in late summer before being introduced into the flock.

No effects from the infection were recorded in the ewe flock. The rates of abortion, stillbirths, and lamb survival were considered to be average by the producer.

The growth of the sheep industry in Ontario in the last decade and the increased numbers of rams imported from regions where *B. ovis* epididymitis more frequently occurs permits the opportunity for further spread of the infection in this province. Thorough palpation of the testicles and epididymides of rams combined with CF testing is essential to minimize the chance of introduction of the infection into a flock.

Acknowledgments

The authors wish to acknowledge the assistance of Dr. V. Gagnon in the

preparation of this case report and Drs. K. Currie and A. Farenhorst for the information provided.

References

1. BIBERSTEIN EL, MCGOWAN B, OLANDER H, KENNEDY PC. Epididymitis in rams. Studies on pathogenesis. *Cornell Vet* 1964; 14: 155-158.
2. BURGESS GW. Ovine contagious epididymitis: a review. *Vet Microbiol* 1982; 7: 551-575.
3. FIELDEN ED. Reproductive diseases of sheep and goats. *Proc 10th World Congress on Animal Breeding and A.I.* 1984: VII.40 — VII.42.
4. LIBAL MC, KIRKBRIDE CA. *Brucella ovis* induced abortion in ewes. *J Am Vet Med Assoc* 1983; 183: 553.
5. NILO L. Diagnosis of ovine brucellosis. *Can Vet J* 1984; 25: 118-119.
6. RAHALEY RS, DENNIS SM. *Brucella ovis* infection in sheep. *Compend Contin Educ* 1982; 4: 461.
7. HUGHES KL, CLAXTON PD. *Brucella ovis* infection. *Aust Vet J* 1968; 44: 41-46.
8. LAWRENCE WE. Ovine brucellosis. *Br Vet J* 1961; 117: 435-447.
9. HALL RF. Infectious abortion in ewes. *Compend Contin Educ* 1982; 5: 216-219.
10. WORTHINGTON RW. Serology as an aid to diagnosis. *NZ Vet J* 1982; 30: 93-97.
11. WORTHINGTON RW. The complement fixation test for *Brucella ovis*. *NZ Vet J* 1982; 30: 159-160.

BOOK REVIEW

Herd Health. O.M. Radostits and D.C. Blood. Published by W.B. Saunders, Toronto. 1985. 456 pages. Price \$69.95.

This is the first comprehensive book that has been published on herd health programs and the authors have done a commendable job. They state that the book is aimed at undergraduate veterinary students but it will be very useful to veterinary practitioners as well.

Following an introductory chapter dealing with the general principles of herd health, the book is oriented along species lines with seven chapters dealing with dairy cattle and one each on beef cow breeding herds, beef feedlots, swine herds and sheep herds. A concluding chapter discusses the role of computers in herd health programs.

Each chapter or group of chapters dealing with a species identifies the targets of performance that should be

monitored and the specific responsibilities of the veterinarian in a herd health program. In addition, strategies for the control of specific health related conditions are discussed. The information provided for each species is sufficiently detailed to serve as a basis for the implementation of a complete herd health program.

Extensive reading lists, including a list of appropriate review articles, are provided at the end of each chapter. The information in the book is current up to 1983 which means that in some of the more rapidly progressing areas of health management, some very recent advances are not included. An extensive index makes the book a useful reference source.

Perhaps the book's greatest weakness is the first chapter which discusses general principles. It contains very little information about the quantitative methods potentially useful in herd

health programs. As an example, there is little discussion about the importance of considering the variance (or other measures of dispersion) of productivity parameters along with the mean. Secondly, although there are many references throughout the book about the importance of benefit/cost analyses and partial farm budgets, these techniques are not explained anywhere. Finally, there is no mention made of the possible role of on-farm clinical trials as a useful diagnostic tool for herd problems or how to go about conducting one. The book would be greatly enhanced by inclusion of this sort of information.

Overall the book is well written and it is going to be an invaluable aid to teachers of herd health as well as practicing veterinarians wanting to initiate herd health programs or to expand existing ones.

Ian R. Dohoo.