MARDI Res. J. 18(2) 1990: 245–249

Semen characteristics in caseous lymphedenitis (CLA) affected goats

[Ciri-ciri mani kambing yang dijangkiti penyakit caseous lymphedenitis (CLA)]

M. Murugaiyah*, S. Abdul Wahid* and H. Rozimah**

Key words: semen, caseous lymphedenitis, goats

Abstrak

Kesan caseous lymphedenitis (CLA), satu penyakit yang disebabkan oleh organisma *Corynebacterium pseudotuberculosis* terhadap mutu air mani kambing telah dikaji. Enam ekor kambing jantan yang dijangkiti CLA dan enam ekor kambing jantan yang tidak dijangkiti telah digunakan bagi memperoleh air mani untuk mengkaji isipadu, jumlah sperma, pergerakan mani, pergerakan sperma, dan peratus sperma yang hidup dan yang tidak. Tiada terdapat perbezaan yang ketara (p <0.05) pada kesemua ciri mani antara kedua-dua kumpulan. Oleh sebab itu, mutu air mani tidak terjejas walaupun baka jantan dijangkiti CLA. Berasaskan maklumat ini, baka jantan yang dijangkiti CLA boleh diambil maninya, disejukbekukan dan digunakan untuk permanian beradas. Ini boleh dilaksanakan dengan mengambil langkah-langkah tertentu untuk mencegah jangkitan penyakit ini pada ternakan lain. Kajian lanjut perlu untuk menentukan kadar kesuburan di ladang.

Abstract

The effect of caseous lymphedenitis (CLA), a disease caused by *Corynebacterium pseudotuberculosis*, on the semen quality of bucks was examined. Six CLA-affected bucks and six normal bucks had their semen collected and examined for volume, total sperm count, mass motility, progressive motility, percentages of live sperm and abnormalities. None of the seminal traits examined showed any significant difference (p <0.05) between the affected and non-affected animals. Hence, the semen quality is not affected though the bucks are infected by CLA. Based on these results, CLA-affected bucks can have their semen collected, frozen and used for artificial insemination. This can be implemented by taking certain precautions to prevent the spread of such disease to other livestock. Further studies are needed to determine the actual fertility rate in field trials.

Introduction

During the routine examination of the flock with abscesses, a number of bucks were found to be affected with CLA. It is a disease caused by *Corynebacterium pseudotuberculosis* and characterized by caseous lesions of lymph nodes, lungs and other visceral organs e.g. testis.

This disease affects sheep, goats and deer. A study of 926 adult merino sheep examined at slaughter in Western Australia indicated that 58% of the sheep had lesions of CLA (Nairn et al. 1977). The most commonly affected areas were the

*Livestock Research Division, MARDI, P.O. Box 12301, 50774 Kuala Lumpur, Malaysia
**Institut Haiwan, Beg Berkunci 520, 86009 Keluang, Malaysia
Authors' full names: Murugaiyah a/l Marimuthu, Abdul Wahid Sulaiman and Rozimah Hamzah

superficial cervical, subiliac, internal iliac, mediastinal and bronchial lymph nodes. Seddon (1965) noted a low prevalence of inguinal lymph node infection and scrotal involvement in CLA. Further, Williamson and Nairn (1980) reported that abscess as a result of *C. pseudotuberculosis* did not affect the ram semen quality and the disease organism was not shed in the semen as well. There are no reports or information on the effects of CLA on the reproductive system of the local animals. Since the CLA is a contagious disease, the usual practice by the veterinarian is to isolate or cull the infected animal irrespective of its breeding usefulness. This has resulted in the loss of valuable males whose semen could have been used for breeding through artificial insemination.

This study was undertaken to determine if the presence of CLA in the animals would affect semen quality.

Materials and methods

Forty bucks of kambing Katjang crossbred, about 14 months of age, with palpable lesions were detected during the examination of the flock at Institut Haiwan , Keluang, Johore. These were the progenies from the crosses between Feral goats (imported from Australia), and Katjang goats. Incidence of CLA was reported sporadically, especially after the presence of feral goats in the farm. Blood samples were collected and the serum was tested by gel diffusion technique to identify positive cases of CLA. Fifteen bucks were found to be positive and was confirmed through bacteriological examination of the exudate from the abscesses in blood agar medium. Subsequently, for this experiment, six bucks infected with CLA (group I) and six bucks without lesions and free from CLA (group II) were selected for semen evaluation.

The animals were confined under the shed and fed ad libitum with chopped Napier grass. Salt lick and water were available at all times. A formulated feed concentrate containing 150 g crude protein/kg DM and 11 MJ/kg DM was fed at the rate of 0.25 kg/ animal as a standard feeding practice. Before the commencement of the experiment, the bucks were trained to mount the teasers. Semen samples were collected indoors using an artificial vagina, in graduated centrifuge tubes and measured to the nearest 0.1 mL. A drop of semen was examined for mass motility (scale 0-5), and the percentage of motile spermatozoa was estimated using a warmed microscopic stage. The percentages of live and morphologically abnormal spermatozoa were determined from smear stains with eosin and nigrosin before examining under a phase contrast microscope. Abnormal spermatozoa count included the various abnormalities of the head, mid-piece and tail. Spermatozoa concentration was calculated by using improved Neubauer haemocytometer. A total of 216 ejaculates were collected for 3 days in a month for 6 consecutive months. Analysis of variance was used to show significance between the group means for various semen traits (Steel and Torrie 1980).

Results and discussion

Volume

The volume of the ejaculate ranged from 0.7 mL to 1.5 mL with a mean of 1.08 $\pm$ 0.06 mL for group I animals while in group II the range was 0.78-1.6 mL with a mean volume of 1.07 $\pm$ 0.38 mL. There was no significant difference between the two groups (p <0.05). The values obtained in this study were within the range quoted by Blockhuis (1962) i.e. 0.2-5.0 mL in unspecified breeds. Mann (1964), also working on unspecified breeds, reported the volume to be from 0.2-5.0 mL. However, reports by Tewari et al. (1968) indicated that there was no significant difference between the breeds with regard to the volume.

Concentration

Mean total count or mean total spermatozoal concentration was 2.41 $\pm$ 0.62 x 10^9/mL for group I and 2.38 $\pm$ 0.46 x 10^9/mL for group II *(Table 1)*. Similar values of 2.50 x 10^9

Table 1. Mean values of seminal traits for CLA- affected and normal bucks (± SE)

Seminal trait	CLA-affected	Normal
Volume	1.08 ± 0.06	1.07 ± 0.38ns
Total count (x 10⁹ Spermatozoa/mL)	2.41 ± 0.62	2.38 ± 0.46ns
Live sperm (%)	75.00 ± 1.43	78.00 ± 0.48ns
Mass motility (0-5)	3.81 ± 0.12	3.88 ± 0.22ns
Progressive motility (%)	80.50 ± 0.58	85.60 ± 0.18ns
Total abnormalities (%)	14.38 ± 1.65	12.42 ± 0.65ns

CLA = caseous lymphedenitis
ns = non-significant at $p < 0.05$

Table 2. Morphological abnormalities of the spermatozoa in CLA-affected and normal bucks (± S.E.)

	CLA-affected	Normal
Primary abnormalities (%)		
Narrow head	1.46 ± 0.12	1.24 ± 0.01
Head narrow at base	0.70 ± 0.02	0.82 ± 0.01
Giant head	0.66 ± 0.03	0.52 ± 0.02
Small head	1.24 ± 0.98	1.01 ± 0.40
Secondary abnormalities (%)		
Proximal cytoplasmic droplets	0.52 ± 0.01	0.58 ± 0.01
Abaxially attached midpiece	0.41 ± 0.02	0.31 ± 0.03
Tertiary abnormalities (%)		
Tail tightly coiled below the head	3.84 ± 0.10	3.12 ± 0.10
Tail tightly coiled around the head	4.12 ± 0.28	4.21 ± 0.25
Total abnormalities (%)	14.38 ± 1.65	12.42 ± 0.65ns

CLA = caseous lymphedenitis
ns = non-significant ($p < 0.05$)

spermatozoa per mL have been reported by Ott and Memon (1980). Although the means for both groups were within the range as quoted by Patel (1967) and Austin et al. (1968), there were numerical differences in the concentration between the individuals in their respective groups. These differences can be attributed to the hormonal influence (pituitary and testicular) in the process of semen generation within individuals and this in turn is influenced by certain climatic factors such as high temperature and humidity (Moule and Waites 1963).

Motility

The mass motility (gross motility) which was rated between 0 and 5 showed good wave movements for both groups. The average value recorded was 3.81 ± 0.12 for group I and 3.88 ± 0.22 for group II. The mean individual motility of the sperms in group I was 80.5 ± 0.58% and 85.6 ± 0.18% for group II. The high mass motility value was due to the high concentration and high individual motility of the sperm. Results obtained in this study are higher than 72.3, 80.0 and 60.9% as reported by Jelam and Nambiar (1965), Austin et al. (1968) and Kalaimathee (1984) respectively.

Sperm morphology

Morphological abnormalities observed in the two groups were not significantly different ($p < 0.05$) *(Table 2)*.

The abnormal sperm morphology can vary from individual to individual, breed to breed and season to season (Bordoloi and Sharma 1983). A reduction in fertility occurs when the morphologically abnormal sperms exceed 20-25% (Blom 1973; Foote 1974;

Bongso and Jainudeen 1979). Blockhuis (1962) while working on goat semen reported that every ejaculate of semen could be expected to have morphologically abnormal sperms in the range of 8-10%. In this study, the total abnormalities observed were 14.38 ± 1.65% and 12.42 ± 0.65% for group I and II respectively *(Table 2)*. There were large number of sperms with tails coiled below or around the heads in group I. This in turn contributed to the high percentage of abnormality. Earlier, Hatijah (1982) reported that local Katjang x German Fawn goats had 17.26 ± 0.65% total abnormalities. However, in this study the abnormalities observed could either be due to genetic or environmental effect but not to CLA, since no significant difference between the two groups was seen.

Lesions

Forty bucks had palpable lesions on various parts of the body. However, the lesions were mainly found on cervical (prescapular) and subiliac (prefemoral) regions. Two animals had abscesses high in the neck of the scrotum. The lesions were 2-6 cm in their largest dimension and were firm, generally ovoid and smooth. Although 40 bucks were observed to have had abscesses, only 15 were confirmed positive for CLA, indicating that the rest had abscesses due to any other infection, except CLA. As a precaution it would still be necessary to undertake bacteriological examination on the semen collected prior to its use. In particular this should include screening for *C. tuberculosis* and *Pseudomonas pseudomallei* at least.

Conclusion

Although the semen quality was not affected in the bucks with abscesses caused by *C. pseudotuberculosis,* the use of these infected and valuable bucks had to be monitored very closely since the disease is an infectious one. When valuable bucks with abscesses are to be used for semen collection, it is important to distinguish between those lesions caused by *C. pseudotuberculosis* and other non-infectious causes. If the lesions are found in the scrotum of bucks, they may be due to epididymitis, spermatocoeles and varicoeles which affect semen quality.

Acknowledgement

The authors would like to extend their gratitude to the Director of Institut Haiwan, Keluang, Johore for allowing this study to be conducted on the premises of the Institute.

References

Austin, J. W., Leidy, R. B., Krise, G. M. and Hupp, E. W. (1968). Normal values for semen collected from Spanish goats by two methods. *J. App. Physiol. 24:* 369

Blockhuis, J. (1962). Artificial insemination in goats. In *The semen of animals and artificial insemination* (Maule, J. P., ed.) p. 89. Farnham Royal, Bucks: Commonwealth Agricultural Bureau

Blom, E. (1973). The ultrastructure of some characteristic sperm defects and proposal for a new classification of the bull spermiogram. *Nordisk. Vet. Med. 25:* 383-5

Bongso, T. A. and Jainudeen, M. R. (1979). The karyotype of the crossbred between the Murrah and Malaysian swamp buffalo *(Bubalus bubalis). Kajian Vet. 11:* 6-9

Bordoloi, R. K. and Sharma, P. K. (1983). Variation in the percentage of abnormalities of live spermatozoa in different breeds of goats. *Indian Vet. J. 60:* 455-6

Foote, R. H. (1974). Artificial insemination. In *Reproduction on farm animals* (Hafes, E. S. E., ed.) p. 67. Philadelphia: Lea and Febiger

Hatijah, Y. (1982). Kajian mengenai sifat-sifat air mani segar dan air mani yang dibekukan bagi kambing tempatan, kambing kacukan dan kambing Jerman. Thesis submitted as partial fulfillment of B.Sc. degree in Zoology, Faculty of Science, University of Malaya

Jelam, L. V. and Nambiar, K. G. (1965). Effect of diluents on the viability and biometrics of buck spermatozoa. *Kerala Vet. 4:* 1

Kalaimathee, K. (1984). Breeding soundness and effect of storage on semen quality especially in goats. Thesis submitted as partial fulfillment of B.Sc. degree. Dept. of Genetics and cell biology, Faculty of Science, University of Malaya

Mann, T. (1964). *The biochemistry of semen and of the reproductive tract* London, New York: John Wiley

Moule, G. R. and Waites, G. M. H. (1963). Seminal degeneration in the ram and its relation to the

temperature of the scrotum. *J. Reprod. Fertil. 5:* 433-6

Nairn, M. K., Roberson, J.P. and McQuade, N.G. (1977). Lesions caused by *Corynbacterium pseudo-tuberculosis* in the scrotum of rams. Cited by Williamson, P. and Nairn, M. E. (1980). *Aust. Vet. J. 56:* 496-8

Ott, R. S. and Memon, M. A. (1980). Breeding soundness examinations of rams and bucks. A review. *Theriogenology, 13:* 155-64

Patel, J. K. (1967). Artificial insemination in goats. *Indian Vet. J. 44:* 509

Seddon, H. R. (1965). Diseases of domestic animals in Australia. Part 5, Vol. 1: Bacterial Diseases. Canberra Commonwealth Department of Health Service Publication (Veterinary Hygiene) No. 9

Steel, R. G. and Torrie, J. H. (1980). Principles & procedures of statistics: a biometrical approach 2nd ed. New York: McGraw- Hill

Tewari, S. B., Sharma, R. P. and Roy, A. (1968). Effect of frequency of semen collection on seminal attributes and fertility in goats. *Indian J. Vet. Sc. 38:* 607-15

Accepted for publication on 11 April 1990