Infertility in rams

J. Craig

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REALISING that good rams play an important role in flock improvement, the wise flockowner selects his rams after careful consideration of their breeding, type, conformation, fleece characters or potential meat-producing qualities. These points are undoubtedly important, but the essential feature of any ram is its ability to get lambs and, for this reason, the intending purchaser should also make certain that the animal is free from genital defects.

Field observations have shown that genital defects are not uncommon among rams in Western Australia. In other States, mass surveys have disclosed that approximately one of every ten rams examined has been so affected.

Impaired fertility and lowered lambing percentages often result from genital defects. Admittedly, such defects are not confined to the sires and, infertility may affect either sex but as we usually mate two to three rams with 100 ewes it is obviously important to ensure that the sires used are normal and possess high fertility levels.

Lowered lambing percentages are not always the result of low fertility in the rams. For instance, the incidence of “clover disease” led to a dramatic fall in lambing percentages, particularly in the 1940-50 period. Malnutrition and faulty flock management can affect lambing percentages, but generally speaking, temporary or permanent infertility in rams is the main cause of low lamb numbers.
**CAUSES OF TEMPORARY INFERTILITY**

Temporary infertility refers to any condition from which the ram will eventually make a recovery. The extent of this type of infertility is difficult to assess but is probably fairly common.

One of the main causes of temporary infertility in the ram is the variation in the quality of the semen produced by healthy rams. Semen is the male sexual fluid which carries the spermatozoa (sperms) of the male; fertilisation takes place when a sperm fuses with the ovum (egg) of the female.

The manufacture of sperms by the male genital organs can only take place when the temperature of the testicles is below that of the body, and in all the domesticated animals the testicles are so placed as to make this possible. If for any reason, the temperature of the testicles becomes the same as, or rises higher than that of the body, sperm production ceases and the animal is rendered sterile.

Good quality semen contains a large quantity of healthy sperms, but poor quality semen contains only a few sperms or abnormal, dead and inactive ones; these differences can of course only be detected by microscopical examination. Many factors can cause degenerative or abnormal changes in the semen. Under Australian conditions, poor quality semen is commonly associated both with high body temperatures produced in rams by high summer temperatures i.e. when the atmospheric temperature remains over 90°F, for more than a few days at a time and is accompanied by hot nights; and also with the poor quality of the native pastures during the dry period. These environmental conditions would apply particularly to the pastoral areas of the State, and it seems probable that the poor lambing percentages in the northern sheep areas may be attributed to a combination of these factors.

High body temperatures in the ram may also be a sequel to blowfly strike, abscesses, large suppurating wounds and infectious diseases such as footrot and foot abscess. There is some evidence too, that even dipping and jetting with standard arsenical preparations can cause a temporary degeneration of the semen. For this reason, it is unwise to dip rams closer than two months prior to mating. Other incidental factors such as internal parasitism may at times also have an important effect on semen production.

The recovery from specific ailments such as those described does not immediately restore the quality of the semen. In fact an interval of two to three months may elapse before the semen once more becomes normal. A similar period must pass before the semen again becomes normal after the extreme heat of summer or after the pastures have once more become green.

A low Vitamin A diet causes a marked reduction of sperms and it has accordingly been suggested that Vitamin A deficiency may be an important factor in inducing infertility in rams. Since green feed is rich in this vitamin it was believed that poor dry pastures devoid of Vitamin A might be responsible for a poor output of sperms. It is well known however, that the liver of sheep is able to store sufficient Vitamin A secured during the green feed period of the year, to last for four to five months; it is not considered therefore that
a deficiency of Vitamin A sufficient to cause infertility in rams, is likely to be found in areas other than those of the pastoral north and east of Western Australia, where prolonged drought conditions are more likely to occur.

In general, the seasonal excellence of the semen of rams corresponds to the periods in which a high proportion of the ewes in that district come into oestrus (heat), and it is thus obvious that this is the ideal time for mating to take place. When most of the rams in a flock refuse to work, the cause is more likely to be due to the absence of heat in the ewes rather than any lack of sexual desire on the part of the ram; on the other hand, when only a few rams fail to work the fault is likely to lie with the rams. Some rams may show a lack of desire to mate and this may be a serious cause of infertility in certain individuals; this specific type of infertility may respond to certain hormone injections. By contrast, vigorous servers are not necessarily highly fertile.

Although the temporary forms of ram infertility may be responsible for low lambing percentages, they may also affect the lambing in other ways, for example, the onset of lambing may be delayed, or having once started, it may be interrupted with the result that lambing may be extended over a considerable period.

CAUSES OF PERMANENT INFERTILITY

Permanent infertility in rams may be caused by a number of conditions; this type of infertility is one from which the affected ram does not recover, although in many instances such a ram may not necessarily be completely infertile. For all practical purposes however, a ram affected with the testicular abnormalities described should be culled from the flock, and any such ram should be rejected at the time of purchase. These abnormalities can be detected fairly readily by manual examination of the ram and are as follows:

1. Epididymitis (Inflammation of the epididymis).
2. Orchitis (Inflammation of the testicle).
3. Hypoplasia (Degenerated or underdeveloped testicle).
4. Hyperplasia (Overdevelopment of the testicle).
5. Cryptorchidism (Failure of the testicle to descend).
6. Hernia (Rupture).
7. Varicocele (Varicose veins).

Epididymitis is the commonest and most important cause of permanent infertility in rams. It is usually of bacterial origin i.e. caused by the micro organisms Brucella ovis (mainly) and Corynebacterium ovis (the “cheesy gland” germ). The low position of the epididymis in relation to the ground renders it especially liable to damage from mechanical causes e.g. due to its striking the ground, rocks or some other elevated object, and a non-infectious epididymitis of this type may result. (See Fig. 5.)

Epididymitis is usually detected as an enlarged and hardened tail of the epididymis at the base of the testicle, but it may sometimes occur in the head or body of that organ. By the time epididymitis can be easily seen and felt, the disease process has reached an advanced state and is incurable; but by contrast, it may be difficult or even impossible to locate the early stage of this condition. When both sides are affected, rams are completely infer-
Hypoplasia describes a condition in which the testicle becomes atrophied and fails to reach normal size. Such small undeveloped organs cannot produce sperms, and in adult rams this should be regarded as a serious fault. It may also occur when a chronic or long-standing epididymitis is present, the gross enlargement of the epididymis leading to a corresponding secondary shrinkage of the testicle of the same side. (See Figs. 3 and 7.)

Hyperplasia refers to an over-development of the testicle. When one testicle only descends into the scrotum, the descended testicle commonly becomes affected with hyperplasia, a compensatory response to the absence of its fellow.

Cryptorchidism, a failure of the testicles to descend into the scrotum, may effect one or both testicles, i.e., it may be monolateral or bilateral. Although a ram with only one testicle may be quite fertile, the condition is hereditary and affected rams should be culled for that reason. Since the manufacture of sperms can only take place when the temperature of the testicles is below that of the body, a bilateral cryptorchid is completely sterile.

Hernia may be inguinal or partial when a portion of bowel occupies the inguinal canal in the groin region, or complete when the loop of bowel descends to occupy the scrotum. These forms of hernia may be congenital that is, existing at birth; or acquired, when it occurs later in life. The latter form is mainly due to accidents such as kicks, falls or blows.

Varicocele is the term used when the veins within the spermatic cords above one or both testicles become greatly distended. It is more common in older rams; a ram so affected has an uncomfortable gait and an unwillingness to work.

OVINE BRUCELLOSIS (EPIDIDYMITIS IN RAMS)

The term epididymitis describes a condition that affects only a specific part of the genital organs of rams. Although this abnormality has long been known to occur in rams, it has only comparatively recently shown to be of bacterial origin. As indicated previously, the germ causing epididymitis belongs to the Brucella group of organisms, Brucella ovis, a germ which is similar but not identical to Brucella abortus, the cause of contagious abortion in cattle (bovine brucellosis).
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<table>
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<th>Furrow</th>
<th>Price (£)</th>
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<td>10</td>
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<tr>
<td>12</td>
<td>261 7</td>
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<tr>
<td>14</td>
<td>309 15</td>
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</table>

Prices for Wiles Monarch Heavy Twin Disc Ploughs—

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<th>Price (£)</th>
</tr>
</thead>
<tbody>
<tr>
<td>16</td>
<td>369 0</td>
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<tr>
<td>18</td>
<td>455 0</td>
</tr>
<tr>
<td>20</td>
<td>493 10</td>
</tr>
</tbody>
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Brucella ovis infection is known to cause not only epididymitis in rams in Australia and New Zealand, but in New Zealand it is also responsible for abortion in ewes. A better term for the disease, implying its wider distribution within the animal body, would therefore be ovine brucellosis.

As far as can be ascertained there has been no case of abortion in Australia which has been traced to the germ Brucella ovis, but since it is known that ewes may be harbouring these bacteria without showing any obvious symptoms, they may therefore constitute an important reservoir of infection.

It is known that the bacteria may be present in the semen of an infected ram and therefore the disease may be spread venereally i.e. from an infected ram to a ewe during the act of service, and thence to another ram. Unmated rams may also contact epididymitis, although there may have been no contact with other known infected rams; in these circumstances the infection may have been acquired from pastures contaminated with the microorganisms; whilst the germ Brucella ovis has also been recovered from the colostrum (first milk) of ewes.

In the first instance, a diagnosis of epididymitis can be made by handling the affected testicles, although this does not identify the exact cause of the inflammation. This can only be done in one of several ways—by collecting a sample of semen from rams, often a very difficult task, and following this up by examination at the laboratory; or by obtaining blood samples from rams or ewes and submitting these to a blood test, the complement-fixation test. At the present time, no satisfactory blood agglutination test such as we have for brucellosis in cattle, has as yet been evolved.

Despite the fact that mass surveys of rams have been carried out only in two States, ovine brucellosis is known to be present in all States, and it is likely to have much the same type of age and breed distribution in Western Australia as elsewhere. Although epididymitis may be detected by palpation of the genital organs in very young rams, even as young as five months of age, it is more usual to find this disease increasing with advancing age; and it does moreover appear to be more common in British breeds of sheep than in the Merino.

In Queensland, the incidence of clinically detectable epididymitis was 6.7 per cent. among 16,665 Merino rams. In South Australia, the incidence was 7.5 per cent. among 4,550 rams of mixed breeds.

In Queensland, the age incidence among 7,500 rams was as follows:

<table>
<thead>
<tr>
<th>Age</th>
<th>No. of epididymitis</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>24</td>
<td>0.32</td>
</tr>
<tr>
<td>2</td>
<td>67</td>
<td>0.89</td>
</tr>
<tr>
<td>3</td>
<td>78</td>
<td>1.04</td>
</tr>
<tr>
<td>4</td>
<td>31</td>
<td>0.41</td>
</tr>
<tr>
<td>5</td>
<td>65</td>
<td>0.87</td>
</tr>
<tr>
<td>6</td>
<td>24</td>
<td>0.32</td>
</tr>
<tr>
<td>7</td>
<td>21</td>
<td>0.28</td>
</tr>
<tr>
<td>Older</td>
<td>20</td>
<td>0.27</td>
</tr>
<tr>
<td>Total</td>
<td>330</td>
<td>4.40</td>
</tr>
</tbody>
</table>

In South Australia, there was the following age incidence among 2,774 rams:

<table>
<thead>
<tr>
<th>Age</th>
<th>Lambs.</th>
<th>2T.</th>
<th>4T.</th>
<th>6T.</th>
<th>F.M.</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of epididymitis</td>
<td>1</td>
<td>31</td>
<td>22</td>
<td>26</td>
<td>127</td>
<td>207</td>
</tr>
<tr>
<td>Percentage</td>
<td>0.036</td>
<td>0.112</td>
<td>0.79</td>
<td>0.94</td>
<td>4.58</td>
<td>7.5</td>
</tr>
</tbody>
</table>

In South Australia, the breed incidence among 4,550 rams was as follows:

<table>
<thead>
<tr>
<th>Breed</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Merino</td>
<td>1.8</td>
</tr>
<tr>
<td>Dorset Horn</td>
<td>13.7</td>
</tr>
<tr>
<td>Suffolk</td>
<td>8.0</td>
</tr>
<tr>
<td>Southdown</td>
<td>17.8</td>
</tr>
<tr>
<td>Border Leicester</td>
<td>4.2</td>
</tr>
<tr>
<td>Other Breeds</td>
<td>5.7</td>
</tr>
</tbody>
</table>

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In commercial flocks, provided 2½ to 3 per cent. of rams are used in mass matings, the lambing percentages may be quite good and the flock owner may have little or no idea that some of his rams may be infertile; in most instances, the normal sound rams would cover up for the others.

In stud properties by contrast, epididymitis can have serious effects where single matings are carried out. Furthermore, the return of affected rams after purchase, would be detrimental to the reputation of the stud.

METHODS OF EXAMINATION FOR GENITAL DEFECTS

This can be carried out either with the ram held by the head and standing in the normal position, or the animal can be held in the sitting position as for shearing. To begin with, the area above the testicles is examined for varicocele, hernia or abscess formation ("cheesy gland"). This is done by grasping the spermatic cords between the thumb and fingers of each hand. (See Fig. 4.)

The hand should then be passed down the testicles so as to identify any abnormalities there, such as may be due to adhesions between the purse and the testicles, to undue firmness or lumps within the testicles, or to enlargement of the head or body of the epididymis. Finally at the base of the testicles, any variation in the size or texture of the tail of the epididymis can be felt.

The head of epididymis is long and curves over the upper end of the testicle and down the upper third; the body is narrow and lies lateral and posterior. The tail is large and is attached closely to the lower end of the testicle.

The normal tail is fairly soft and has a well-defined neck. If this neck cannot be clearly identified, such a ram should be suspect, since with a well-marked epididymitis, the base of the testicle and the epididymis itself appear to be one solid structure.

The testicles vary in size from ram to ram, but unduly large or small testicles should be regarded as faulty, especially if they do not correspond with their fellows. The testicles should feel relatively firm, not unduly soft or flabby, and not very hard; and on handling they should move freely within the skin of the scrotum.

Clearly then, a definite routine should be followed when examining rams and constant practice with normal rams, in order to learn what is abnormal, is extremely important.
Fig. 7.—A gross enlargement of the testicle on the right, with corresponding atrophy of the organ on the left.

GENERAL RECOMMENDATIONS

It is possible to avoid the conditions associated with, or leading to, temporary infertility by carrying out sound animal husbandry practices. Wherever possible, rams should be kept in shaded well-grassed paddocks with easy access to water. At mating time rams should be in good but not over-fat condition, and driving during the heat of the day should be avoided. Modern blow-fly control measures should be a flock routine and dipping with arsenical solutions should not be carried out close to mating. Finally, since young rams are more vigorous and more fertile than older rams—the ram flock should be regularly replaced by young rams.

Genital abnormalities leading to permanent infertility can only be diagnosed if the flock owner is willing to handle his rams and eliminate any faults that may be detected. The most important of these is of course epididymitis and for the control of this the following routine should be carried out:

1. Dispose of any ram affected with epididymitis—for slaughter.
2. Examine rams prior to purchase and reject any abnormal ram.
3. Check rams before mating and again after mating; cull for epididymitis and any other genital abnormalities.
4. Keep the ram flock young.
5. Keep young rams separated from older rams.

Lastly, it should be remembered that there are certain basic procedures in flock husbandry which should be followed in order to gain satisfactory lambing percentages.

These include:

a. A sudden improvement in the nutrition of ewes prior to mating (“Flushing”).

b. The use of $2\frac{1}{2}$-3 per cent rams at mating time, so as to provide a margin for any possible ram infertility.

c. The placing of one-third of the rams (1%) with the ewes in the first instance, and the remaining two-thirds of the rams (2%) two weeks later. It is possible of course to obtain this same effect by the use of “teaser” rams turned in with the ewes two weeks before the fertile rams.

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