

SEASONAL CHANGES IN THE TESTICULAR SIZE OF GRAZING RAMS

David G. Masters* and H.E. Fels**

SUMMARY

Studies over 3 years showed that testicular volume falls during summer and autumn when forage quality and availability decline and when rams are mating. Loss in testicular size may also occur in summer in the absence of mating activity and at a greater rate than loss in live weight. The results suggest that mating and nutrition may override the influence of photoperiod on testicular size and that loss in testicular volume occurs at a time when requirement for semen is at its highest.

INTRODUCTION

Testicular size and production of semen have been shown to be controlled by intake of protein and/or energy (Salamon 1964; Braden et al. 1974) and by season (Ortavant et al. 1964). In the Australian Merino, testes seem to be particularly sensitive to changes in nutrition and rams may gain or lose testicular volume at a greater rate than live weight (Oldham et al. 1978). Both photoperiodic and nutritional influences on growth of testes appear to be mediated by changing the frequency of pulses of LH (Lincoln 1979; Sutherland and Martin 1980). In Western Australia mating usually takes place in summer and autumn, when day length is decreasing and therefore when photoperiodic stimuli should increase testicular size. However, at this time grazing sheep are also subjected to reduced quality and availability of pasture.

This paper reports observations on the changes in testicular size and live weight of grazing rams associated with season, nutrition and mating activity, and evaluates the hypothesis that mating activity and nutrition or nutrition alone override the testicular response to photoperiod.

MATERIALS AND METHODS

Mature mated rams

Six mature Merino rams were selected on each of six farms in the south west of Western Australia. Every 6 weeks for 3 years the rams were weighed and testicular size was estimated by comparative palpation (Oldham et al. 1978). Groups of observations in winter, spring, summer and autumn were averaged for comparative purposes. All rams were mated in accordance with the normal procedure on each property. Mating commenced between November and March and continued for 6 to 12 weeks depending on the property.

Young unmated rams

Forty-nine Merino ram lambs aged between 7 and 8 months were kept isolated from ewes and maintained in one paddock for 13 months. Live weight and testicular size were measured every 7 to 8 weeks.

Both young and mature rams grazed the pastures and crop stubbles that were available and may have received some conserved fodder or grain to limit the loss of live weight.

*Dept Animal Science, University of Western Australia, Nedlands, W.A. 6009.

**W.A. Dept of Agriculture, Jarrah Road, South Perth, W.A. 6151.

RESULTS

Mature mated rams

Over the 3 years liveweights of the rams were always lowest in summer or autumn and highest in spring. The same trend was observed in testicular volume. Mean testicular volume decreased by approximately 50% between spring and autumn. During the same period, liveweights declined by approximately 20-25% (Fig. 1).

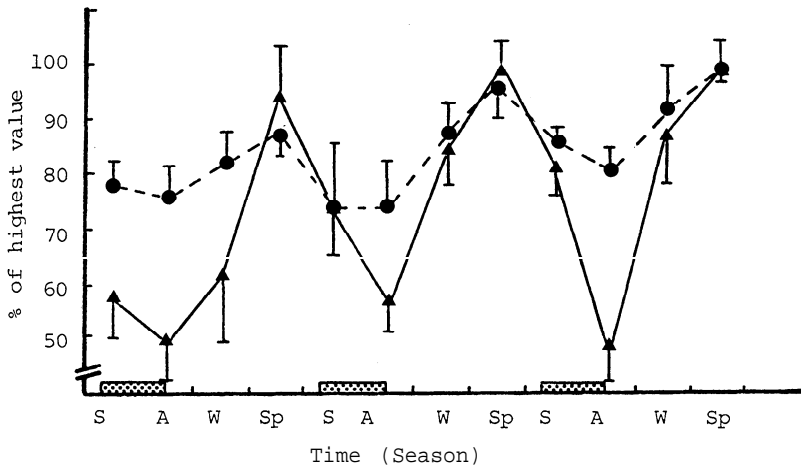


Fig. 1. Seasonal changes in liveweight (●---●) and testicular volume (▲---▲) of mature Merino rams (mean \pm SEM). Shaded areas indicate time of mating

Young unmated rams

Changes in live weight and testicular size were related to the time of year. Rams were heaviest and had the largest testes in November and December. In the 3 months from December to March of the 2nd year, liveweights fell by 14% whilst during the same period testicular size decreased by 60% (Fig. 2).

DISCUSSION

The results demonstrate that testicular size is drastically reduced in grazing rams during summer and autumn and that rams gained and lost testicular size at a greater rate than liveweight. Some loss in testicular size is expected in mated rams due to sexual activity (Knight, 1972). However, mating activity alone does not account for all these results. The young rams (Fig. 2) lost 60% of their testicular weight during summer and autumn in the absence of mating. This decline in testicular volume coincides with a decline in forage availability and quality. Mediterranean annual pastures and crop residues are mature, dry and low in digestibility during summer. Intakes of energy by grazing sheep under these conditions are usually inadequate for the maintenance of liveweight (Allden 1982). Nitrogen content of these pastures may be as low as 0.7 to 2.0% (Fels et al. 1959) and the grazing ram may ingest only 3 to 14 g nitrogen/day; this is far less than is required for maximum testicular growth (Braden et al. 1974; Oldham et al. 1978). Both energy and protein values continue to decline from summer to autumn and until new pasture growth increases in winter.

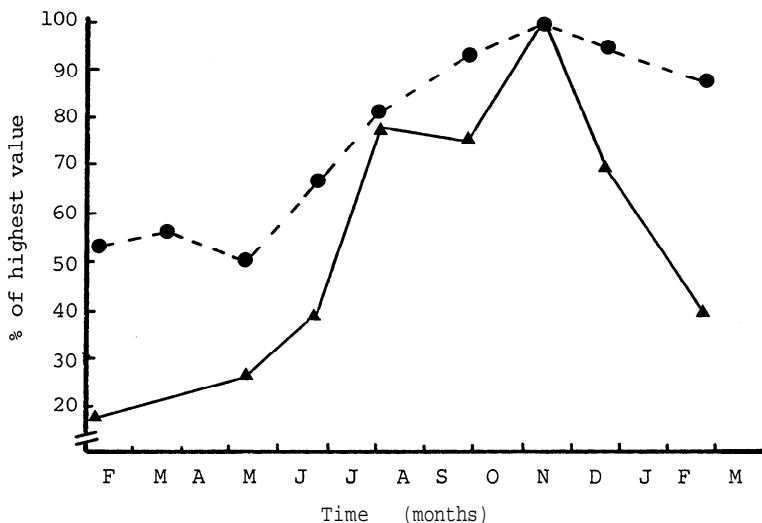


Fig. 2. Changes in liveweight (●---●) and testicular volume (▲—▲) in young unmated rams. The standard errors ranged from 1.4 to 3.2% and 0.8 to 1.5% for testicular volume and liveweight respectively

The reserves of sperm in the testes and epididymides of a ram at the time of mating will be an important factor in determining the number of ewes that the ram can successfully fertilise (Knight 1973). Therefore the loss of testicular volume and sperm-producing tissue in the grazing ram occurs at a critical time, when the requirement for semen is at its highest.

Under constant nutritional conditions, rams in Europe have heavier testes in autumn than in spring (Ortavant et al. 1964). In the current observations well-fed rams in spring had heavier testes than poorly-fed rams in autumn. The results therefore show that the effects of mating and poor nutrition or poor nutrition alone may override the influence of photoperiod.

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