# THE INFLUENCE OF SEASON AND NUTRITION ON OESTRUS AND OVULATION IN SOUTH AUSTRALIAN STRONG-WOOL MERINO EWES

by

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## SUMMARY

This thesis reports a study of the effect of season, and hence level of nutrition and body composition, on the incidence of oestrus and multiple ovulation among Koonoona strain South Australian strong-wool Merino ewes in a Mediterranean type environment. Experimental aspects of the study were conducted at Turretfield Research Centre, Rosedale, South Australia.

Previous experiments had been conducted to investigate relationships between nutrition and both oestrus and ovulation among groups of ewes restrained in small yards and offered various amounts of a hay/grain ration. Seasonal fluctuations in liveweight were eliminated.

Several pertinent questions arise if the results of these experiments are to be applied to the commercial situation where it is clear that sheep do experience annual fluctuations in nutrition, liveweight and body condition. In particular, would ewes experiencing 'normal' fluctuations in liveweight applied in the pen situation perform similarly to ewes maintained at steady liveweight? And would these ewes experiencing fluctuating liveweight in pens perform the same as their counterparts grazing in the field?

The study consisted of four main areas of investigation: to repeat the previous study, conducted at steady liveweight in pens, in a second year; to investigate the two questions mentioned in the previous paragraph; and to consider within-flock relationships between

ovulation and water turnover, liveweight, body size and body condition.

The first area of investigation comprised a comparison, in autumn and spring, of the incidence of oestrus and ovulation of two groups of ewes offered a hay/grain ration and maintained throughout a year at a constant mean liveweight of about either 45 or 54 kg. In each group there was a clear annual fluctuation in the incidence of both oestrus and ovulation with a greater incidence occurring during autumn than during spring.

These findings not only confirm previous observations, made of similar ewes maintained at 49 kg, but extend them to cover the mean liveweight range between 45 and 54 kg. While this difference in liveweight did not affect the incidence of oestrus there was a greater incidence of multiple ovulation at the higher liveweight level.

The second area of investigation comprised a comparison of the performance of the two groups of ewes considered above with a third group of ewes offered a hay/grain ration, of the same composition, but of varying amount, such that they experienced an annual cycle of liveweight change. The change was similar to that commonly occurring among ewes grazing in the field in a Mediterranean environment. The oestrus and ovulatory activity of the fluctuating liveweight group, during both autumn and spring, was not significantly different to that of the appropriate sustained liveweight group of similar mean liveweight.

The third investigation comprised a comparison of the performance of the third hay/grain fed group of ewes with fluctuating liveweight with a fourth group of ewes grazed on pasture under commercial conditions and which experienced a similar fluctuation in liveweight. Both the oestrus and ovulatory performance of the groups was different. There was a lower incidence of oestrus during spring, and a greater incidence of multiple ovulation during autumn, among the ewes grazing pasture. The difference in the incidence of oestrus was less than may be expected for between-year variation and might not have represented a significant biological difference. The greater incidence of mutiple ovulation cannot be explained in a similar manner; nor can it be clearly explained on the basis of difference between the group means for body condition index or the body components fat, water, lean or protein.

However, in retrospect, there are three situations that indicate that the quality of the feed consumed may offer an explanation for the difference observed in multiple ovulation. Firstly, when compared over all treatments and seasons, there was a low but statistically significant correlation in the present study between the incidence of multiple ovulation and the estimated mean weight of body protein at ovulation. Secondly, a review of the literature concerning 'flushing' provided evidence that the so-called dynamic effect of flushing could be due to differences in feed quality and, thirdly, there have recently been reports that ovulatory performance of a group of ewes of given liveweight can be different depending on the quality of the feed consumed prior, and leading up, to ovulation. In some instances this difference has occurred without a concurrent

significant change in mean liveweight. Such a situation could have occurred in the present study, as during autumn the field ewes were grazing fresh green pasture. This was very likely of higher quality than the hay/grain feed on offer to the confined group.

If the difference in multiple ovulation observed during autumn was indeed attributable to feed quality as suggested above then clearly this is an additional factor that must be accounted for in predicting the ovulatory performance of grazing ewes.

The final area of the study revealed a significant, positive, within-flock linear correlation of ovulation rate with both liveweight and body condition index, but not with body size. However, the partial correlation with either factor was insigifncant when variation due to the remaining factor was removed. Ovulation rate was almost equally well correlated with either factor in autumn, but was better correlated with body condition than liveweight during early spring. The study did not provide significant evidence of a correlation between ovulation rate and the rate of water turnover.

## DECLARATION

This thesis does not contain any material previously presented or accepted for the award of any degree or diploma in a University. Nor, to the best of my knowledge, does it contain material previously published or written by any other person except where duly acknowledged.

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