



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

by

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TABLE OF CONTENTS

	Page
Title page	
Table of contents	i
Summary	iii
Declaration	x
Acknowledgements	xi
I. INTRODUCTION	1
II. LITERATURE REVIEW	8
A. The effect of season, the presence of rams, nutritional status and body size on the occurrence of oestrus in ewes	8
1. Introduction	8
2. Oestrus and season	9
(a) Introduction	9
(b) Daylength	10
(c) Inherent rhythm	13
(i) Continuous and long-day light	14
(ii) Equatorial light	14
(iii) Short-day light	16
(d) Temperature	18
(e) Atmospheric pressure	19
3. Oestrus and the presence of rams	19
(a) Length of the breeding season	19
(i) Continuously associated with rams	20
(ii) Suddenly associated with rams	21
(iii) Separated from rams	21
(b) Synchronisation of oestrus	21
(c) Nature of synchronisation effect	23
4. Oestrus and nutritional status	25
5. Oestrus and body size	28
6. Oestrus among Koonoona strain Merino ewes	29

	Page
B. The effect of nutritional status, season and body size on ovulation in ewes	31
1. Introduction	31
2. Ovulation and nutritional status	32
(a) Introduction	32
(b) Liveweight	33
(i) Liveweight at ovulation	34
(ii) Liveweight change shortly preceding ovulation	36
(iii) Liveweight in preceding seasons	39
(c) Body condition	39
(i) Body condition at ovulation	40
(ii) Body condition change preceding ovulation	41
3. Ovulation and season	42
4. Ovulation and feed quality	43
5. Ovulation and body size	48
6. Within-flock relationships	49
7. Ovulation among Koonoona strain Merino ewes	50
C. Body composition of live sheep	53
1. Estimation of body composition in live sheep	53
(a) Total body water and its measurement	53
(b) Relationships between TBW, fasted liveweight and body components	55
(c) Assumptions and reliability of prediction equations	56
2. Nutrition and season effects on body composition	58
3. Body composition in the present study	61
III. EXPERIMENTAL	62
1. Basic design	62
2. Aims	62
3. Materials and method	65
(a) Location and environmental conditions	65
(b) Animals	65
(c) Randomisation	65
(d) Treatment groups	66
(e) Feeding of penned ewes	68
(f) Liveweight measurements	69

	Page
(g) Body size measurements	70
(h) Oestrus	71
(i) Ovulation	72
(j) Body condition index	73
(k) Body composition and water turnover	74
(l) Statistical analysis	79
IV. RESULTS AND DISCUSSION	81
A. Oestrus	81
1. Results	82
(a) Effect of treatment (within time of joining)	82
(b) Effect of time of joining (within treatment group)	87
(c) Effect of treatment (pooled over all times)	93
(d) Effect of time of joining (pooled over all treatments)	93
(e) Specific comparisons	94
(i) Constant low and constant high liveweight	94
(ii) Constant and changing liveweight (both in pens)	94
(iii) Changing liveweight in pens and in the field	96
2. Discussion	96
(a) Specific comparisons	97
(i) Low and high constant liveweight	97
(ii) Constant and changing liveweight in pens	101
(iii) Changing liveweight in pens and in the field	102
(b) Practical implications of different patterns of oestrus	104
3. Summary	105
B. Ovulation	107
1. Results	108
(a) Effect of treatment (within time of joining)	108
(b) Effect of time of joining (within treatment group)	109
(c) Effect of treatment (pooled over all times)	109
(d) Effect of time of joining (pooled over all treatments)	111

	Page
(e) Specific comparisons	111
(i) Constant low and constant high liveweight	113
(ii) Constant and changing liveweight (both in pens)	113
(iii) Changing liveweight in pens and in the field	113
(f) Adjustment for difference in liveweight	113
(i) Effect of treatment (within time of joining)	114
(ii) Effect of time of joining (within treatment)	114
(iii) Specific comparisons	115
(g) Wool-free, fasted liveweight and body condition index	115
2. Discussion	119
(a) Incidence of anovular ewes	119
(b) Incidence of multiple ovulation	121
3. Summary	124
C. Seasonal variation in body composition and water turnover	127
1. Results	128
(a) Mean wool-free, fasted, liveweight	128
(b) Estimates of body components	128
(c) Seasonal pattern of change in body components	128
(d) Assessment of seasonal patterns of change in body components	135
(e) Water turnover	136
(f) Incidence of multiple ovulation and oestrus	138
2. Discussion	141
3. Summary	144
D. Within-flock relationships with ovulation rate	146
(a) Live-weight, body size and body condition	146
1. Results	146
(a) Data grouped into octiles (grouped data)	146
(i) Wool-free, fasted liveweight	146
(ii) Body size	148
(iii) Body condition	150
(iv) Interrelation of LW, BS and BC	150
(b) Data for individual ewes (ungrouped data)	157
2. Discussion	157

	v.
	Page
E. Within-flock relationships with ovulation rate	162
(b) Water turnover	
1. Results	162
(a) Water turnover and level of ovulation	162
(b) Consistency of rate of water turnover throughout the experiment	164
2. Discussion	166
3. Summary (within-flock relationships with ovulation rate)	173
V. GENERAL DISCUSSION	175
(a) Oestrus and season	175
(b) Oestrus and treatment	178
(c) Ovulation and treatment	179
(d) Dynamic response to flushing and feed quality	182
(e) Ovulation and season	187
(f) Liveweight, body condition, body size	188
(g) Conclusions	189
VI. BIBLIOGRAPHY	193
VII. APPENDICES	206
Tables	206
Figures	218.

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 multiple 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 insignificant 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.

Ian N. Cutten

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