ANIMAL PRODUCTION AND REPRODUCTION IN THE MULGA ZONE OF WESTERN AUSTRALIA

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ABSTRACT

The results of observations on some Western Australian mulga zone sheep flocks are presented for wool production, ovulation rates, mating patterns, returns to service and lambing. Wool production can vary between 2.7 and 4.4 kg per head for ewes. Ovulation rates can vary from 0 to 1.5. Ninety per cent of ewes are mated in most years during a ten to twelve week mating period. Returns to the first service can be as high as 70% and lambs marked can be as high as 85%.

INTRODUCTION

Mulga zone pastures in Western Australia have been described by Mabbutt et al (1958). The species listed for the Wiluna-Meekatharra area are representative of the whole of the Western Australian Mulga Zone.

Mulga is sparse except in run-on areas. Due to both the small number of trees present and the inaccessability of the foliage, mulga can contribute little to the diet of the grazing animal. The annual grasses and herbs together with perennial shrubs and grasses growing in association with the mulga produce the bulk of the forage used for animal production.

The average rainfall is 200 mm with equal winter and summer incidence. The winter rainfall is more reliable in occurrence than that in the summer which occurs as irregular and very heavy cyclonic rain. The distribution of annual rainfall is skewed towards below average falls.

The major enterprise in the area is sheep raising. There were 2,630,000 sheep in 1970. Few animals are sold out of the zone and lambing percentages tend to be low. The total number of animals varies greatly with time. The present population has risen from 2,000,000 in 1956 (Anon 1956) and is on a downward trend following low rainfall in 1970 and 1971.

Animal production research with sheep commenced in 1965 and has been concerned with feeding supplements to offset drought or with investigating the factors which contribute to low lamb marking percentages. The parameters of sheep production and reproduction recorded in these investigations are outlined.

MATERIALS AND METHODS

Four investigations were conducted between 1965 and 1972. These were:

(1) A trial to study the value of supplementary feeding sheep was carried out at Lake Way Station, near Wiluna. The results presented are for the unsupplemented control flock. This flock maintained itself between 160 and 200 ewes through the years. Lambs were weaned in December and all the ewe progeny were returned to the flock the following December for mating.

The stocking rate varied between 1 sheep to 22 ha and 1 sheep to 27 ha. Measurements were obtained of mating behaviour, returns to service, body weight change, lambs marked, lambs weaned and wool production for 6 years, 1965-1970 inclusive.

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(2) A study of reproductive failure in sheep was conducted at Yoothapina Station, near Meekatharra, to characterise the components of reproductive wastage. Three hundred and sixty ewes stocked at 1 sheep to 14 ha were confined to a securely fenced paddock which permitted complete management of breeding. The following measurements were made:

(a) Body weight change
(b) Mating behaviour
(c) Returns to service
(d) Ovulation rates
(e) Twinning rates
(f) Pregnancy rates
(g) Lambs born
(h) Lambs marked
(i) Lambs weaned.

The study commenced in 1972 and is proceeding.

(3) A reproductive wastage trial, similar to the trial at Yoothapina, was run at Brickhouse Station near Carnarvon. Five hundred and sixty ewes were confined to a secure 4,900 ha paddock and records, similar to the Yoothapina trial, were collected. This work commenced in 1972 and is proceeding.

(4) In order to study ovulation rate, the ovaries of ewes were examined at slaughter at Jingemarra and Woolgarong Stations in the lower Murchison and at Brickhouse Station at Carnarvon.

RESULTS

Wool Production

Wool production varies greatly between individual animals within a flock. There is also wide variation in the total wool produced by the same flock in different seasons.

Figure 1 shows the distribution of wool cut per head within a flock of 360 Merino ewes from Yoothapina Station. This flock consisted of equal proportions of ewes aged 2, 3, 4 and 5 years at shearing.

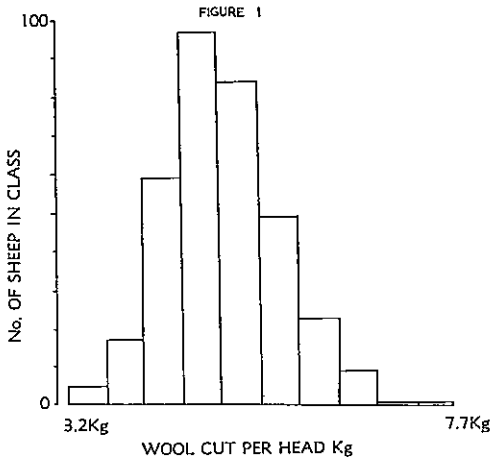

FIGURE 1
Distribution of wool cut per head within a flock of merino ewes from Yoothapina station

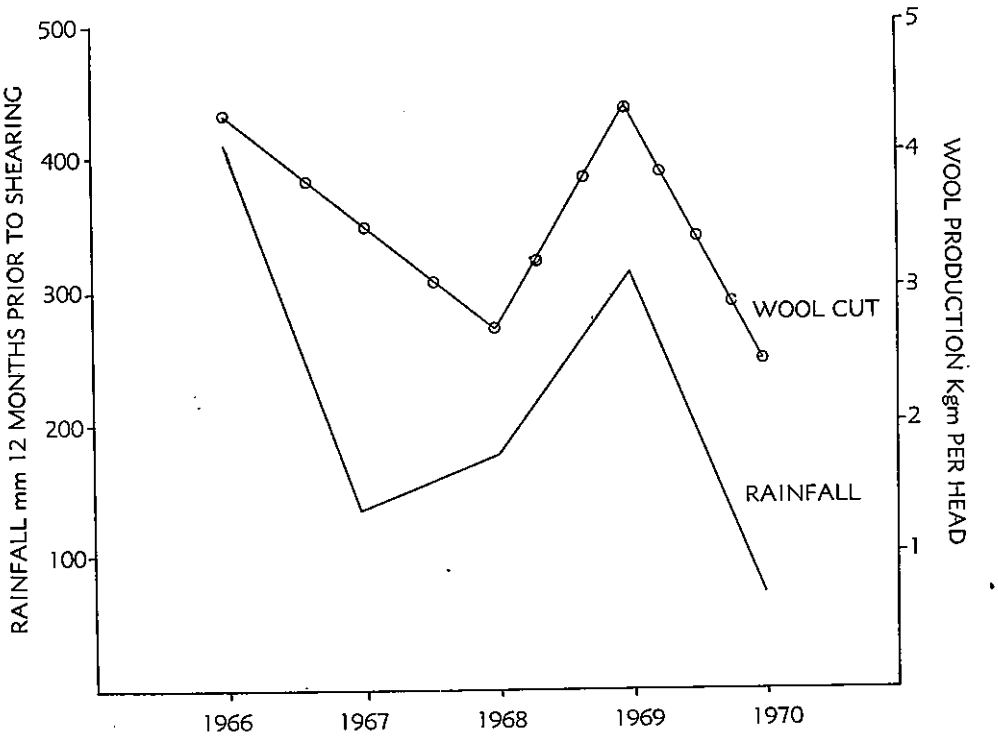

FIGURE 2
Variation in average wool cut per head from merino ewes over five years at Lake Wary station

Figure 2 shows the variation in the average cut per head for a flock of Merino ewes over a five year period. Also shown is the rainfall for the 12 months period prior to shearing. These results were recorded in the Lake Way Station flock.

Reproduction

(a) *Oestrus and ovulation*

In the period November 1969 to March 1972, the ovaries from 602 ewes were examined either at slaughter or at laparotomy. The results from Carnarvon, R. O'Farrell (priv. comm.) and for the Lower Murchison and Meekatharra, are summarised in Table 1.

The 1969/70 Carnarvon results show low numbers of ewes displaying oestrus with no multiple ovulations until the end of January. In February and March over 90% of ewes were in oestrus and multiple ovulation increased. The March ovulation rate was between that reported by Dun et al (1960) and Fletcher and Geytenbeek (1970). The trend in multiple ovulations from January to March is in accord with the observation of Dun et al (1960). The proportion of ewes in oestrus in early summer is closer to the level of Fletcher and Geytenbeek (1970) than to that of Dun et al (1960).

The low ovulation rate displayed by the old, cull ewes at slaughter under poor seasonal conditions on the Lower Murchison properties in the 1969/70 summer, may indicate the occurrence of nutritional anoestrus in these ewes. However, the low number of ewes examined at the time reduces the reliability of this estimate.

TABLE 1
Location, body weight and ovulation rates of Mulga Zone ewes

Location and description of ewes		Ovulation rate (Mean number of eggs per ewe)					
		Oct.	Nov.	Dec.	Jan.	Feb.	Mar.
Murchison 1969/70	Ewes in poor condition		0.5	0.75	0.2	0.33	0.00
Carnarvon 1969/70*	Carcass wt 16 kg		0.125	0.325	0.70	1.21	1.49
Carnarvon 1970/71*	Carcass wt 19 kg		1.29	0.42		0.93	
Carnarvon 1971*	Carcass wt 18 kg	1.3					
Carnarvon 1972**	Body wt 45.5 kg				1.4†	1.2	1.5†
Meekatharra 1972***	Body wt 45.5 kg				1.0†	1.0	1.1†

* R. O'Farrell—unpublished data.
** R. O'Farrell, Dr. R. J. Lightfoot and D. G. Wilcox—unpublished data.
*** J. G. Morrissey, D. G. Wilcox and Dr. R. J. Lightfoot—unpublished data.
† Ovulation rate of mated ewes only, not whole flock.

September 5, 1972

The high ovulation rates in November 1970 and October 1971 at Carnarvon are peculiar in two respects:

(1) They occurred during the usual trough of seasonal anoestrus.
(2) Only 80% of the ewes displayed oestrus yet they had a very high incidence of multiple ovulations.

The ovulation rates at Meekatharra are relatively low and are in line with the rates in the West Australian wheatbelt (Lightfoot priv. comm.). The youth of the Meekatharra flock would also contribute to a low ovulation rate (Turner & Dolling 1965).

(b) *Mating Patterns*

Table 2 shows the mating pattern for five years at three centres. Mating was recorded at fortnightly intervals. In all cases 4% of rams were used, except at Carnarvon, where only 3% of rams were used.

The rams were joined for 12 weeks during the period January to April.

TABLE 2
Ewe body weights and pattern of service at 3 sites in Western Australia between 1967-72

Year and location	Body weight (kg)		% Ewes at first service for 6 consecutvie fortnights						Total served
	Start	Finish	1	2	3	4	5	6	%
1967 Wiluna	34.0	37.0	16.7	46.5	20.7	3.0			87.4
1968 Wiluna	29.5	34.1	1.1	17.7	13.1	36.6	22.9		90.9
1969 Wiluna	45.5	45.5	54.4	32.3	6.3	0.6	0.6		94.3
1970 Wiluna	27	26.4	10.3	10.7	9.4	12.0			42.4
1972 Meekatharra***	45.5	45.5	43.2	41.8	3.8	0.5	0.5		89.5
1972 Carnarvon**	45.5	45.5	35.6	33.7	6.2	7.5	3.4	2.1	88.6

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(c) *Returns to Service*

The joining period was divided into fortnight periods numbered serially 1 to 6 for the 12 week joining. Table 3 shows the percentage of ewes returning to their first service allocated according to the fortnight period in which their first service took place.

TABLE 3
Percentage of ewes returning to first service. Allocated according to the fortnight in which the first service occurred

Year and location	Body weight (kg)		% returned to first service for 6 consecutive fortnights					
	Start	Finish	1	2	3	4	5	6
1967 Wiluna	34.0	37.0	48.5	35.9	19.5	16.6		
1968 Wiluna	29.5	34.1	50.0	74.2	69.6	39.7		
1969 Wiluna	45.5	45.5	57.0	68.6	40.0			
1970 Wiluna	27	26.4	34.8	54.2	32.2	3.7		
1972 Meekatharra***	45.5	45.5	35.0	28.3	57.1	100		
1972 Carnarvon**	45.5	45.5	41.5	39.7	57.1	52.4	26.3	

(d) *Percentage of lambs marked and weaned*

Table 4 includes some figures from the Wiluna flocks, for lambs marked and weaned. The low rainfall recorded in 1967 and 1969 produced little pasture growth and post-natal lamb losses were high. Conversely, in 1968 with high rainfall and more adequate nutrition, post-marking lamb losses at least were low. Following the good season in 1968 ewe body weights were high at mating in 1969. That year's lamb drop was the highest recorded in any of the flocks observed and this was probably the result of high pre-mating liveweight (Suiter 1970).

TABLE 4
Percentage of lambs marked and weaned

Year	Lambs marked	Lambs weaned	Rainfall (mms)
1965			441
1966	68.0	51.0	167
1967	35.5	10.0	178
1968	53.7	50.3	327
1969	84.8	41.1	137

DISCUSSION

The data presented above for wool production and for the components of the reproduction process display the wide variation that occurs in the W.A. Mulga Zone in these production characters.

The peaks and troughs in wool production are shown to be closely associated with rainfall during the wool growth period. The display of oestrus and ovulation rate does not show this association.

The mating patterns show an association with body weight. More ewes are mated in the first month of joining when body weights are high than when they are low. The number of ewes mated in the first fortnight of joining varies between 1.1% and 54.4%, but in none of the observations has it approached the possible 82% that could be achieved with a 14 day joining.

The total number of ewes mated in the whole of the joining period is remarkably constant and only in one observation did it fall substantially below 90%. On this occasion body weights were particularly low following a long dry period. A 90% fertilisation rate with a subsequent 20% loss of early embryos resulting in 30% return to service is commonly recorded in the West Australian wheatbelt (Lightfoot priv.

comm.). In the mulga zone flocks display returns to service often well in excess of this 30% level. High returns to service appears to be independent of rainfall or ewe body weight.

The survival of lambs after marking to weaning also shows an association with rainfall. In high rainfall years most lambs survive. In poor rainfall years losses are high.

REFERENCES

ANON. (1956)—Statistical Register for Western Australia. Government Printer, Perth, W.A.

BROWN, G. H., TURNER, HELEN NEWTON, YOUNG, S. S. Y., and DOLLING, C. H. S. (1966)—Vital statistics for an Experimental Flock of Sheep. *Australian Journal of Agricultural Research* **17**: 557-81.

DUN, R. B., AHMED, W., and MORRANT, A. J. (1960)—Annual Reproductive Rhythms in Merino Sheep related to a choice of mating time at Trangie, Central Western New South Wales. *Australian Journal of Agricultural Research* **11**: 805-26.

FLETCHER, I. C., and GEYTENBEEK, P. E. (1970)—Seasonal variation in the ovarian activity of the Merino ewe. *Australian Journal of Experimental Agriculture and Animal Husbandry* **10**: 267-70.

MABBUTT, J. S., LITCHFIELD, W. A., SPECK, N. H., SOFOULIS, J., WILCOX, D. G., ARNOLD, JENNIFER W., BROOKFIELD, MURIEL, and WRIGHT, R. L. (1958)—General report on the lands of the Wiluna-Meekatharra area, Western Australia. C.S.I.R.O. Land Research Series No. 7.

SUITER, R. J. (1970)—High Premating Liveweights improve the lambing performance of Merino ewes. *Western Australian Department of Agriculture Bulletin* No. 3760.

TURNER, HELEN NEWTON, and DOLLING, C. H. S. (1965)—Vital Statistics for an experimental flock of sheep. II. Influence of Age on Reproductive Performance. *The Australian Journal of Agricultural Research* **16**: 699-712.