CLIMATE CORRECTIONS TO THE SEASONAL WOOL GROWTH RHYTHM OF SHEEP GRAZING IN A SOUTHERN AUSTRALIAN ENVIRONMENT

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Summary

Substantial rhythms in clean wool, wax and suint production have been observed for dry, spring-shorn Merino ewes maintained on a uniform plane of nutrition in exposed pens. Changes can be related directly to mean daily temperatures.

Reversed rhythms were recorded for dry, spring-shorn, grazing sheep where both nutrition and climate were changing. Thus climate corrections would enhance the nutritional component of the latter.

I. INTRODUCTION

Substantial seasonal rhythms in wool-growth rates have been reported for grazing sheep in southern Australia (Marston 1948; Schinckel 1956; Hutchinson and Porter 1958; Stewart, Moir and Schinckel 1961). For healthy sheep these rhythms represent overall responses to changes in nutrition, temperature, light, and possibly shearing time. Hutchinson and Wodzicka (1961) have reviewed the effects of climate variables on wool growth.

The rhythms recorded at Roseworthy appear to be mainly determined by changes in nutrient intake (Hutchinson and Porter 1958; and unpublished data). In this Mediterranean environment, however, the seasonal effects of climate and nutrition would be confounded due to the fact that nutrient intakes are highest in the winter and early spring, when temperatures are low and day lengths are short, and the reverse is true for the summer months.

Climate corrections are required to isolate nutritional effects. To obtain these, sheep have been maintained on a uniform plane of nutrition in exposed pens and their monthly wool-growth rates measured. The rhythm recorded has been compared with data from grazing sheep which experienced seasonal changes in both nutrition and climate.

II. EXPERIMENTAL

(a) Uniform Diet Group

(i) Sheep--Eight, dry, strong-woolled Merino ewes were selected at 21 months of age.

(ii) Accommodations and Hygiene—Sheep were housed individually in unshaded pens with brick-red coloured concrete floors. Each pen was 40 square feet in area. The sheep were dosed with phenothiazine every three months.

(iii) Diet—The daily offering per sheep was 800 g of air dry meadow hay. Feed moistures were determined periodically, and the dry matters of the residues were determined at the end of each monthly period.

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Fig. 1—Comparing the seasonal rhythms recorded in clean wool and skin secretions for dry ewes exposed to climate changes on a uniform diet versus dry ewes at pasture where both climate and nutrition are changing.

(iv) Pre-experimental—The diet was introduced in January, 1959. Observations commenced in April, when it appeared that the sheep were approaching equilibrium in body weight.

(v) Experimental Periods—These were based on calendar months from April 1959 to April 1960.

(vi) Shearing—Sheep were shorn in August 1958 and shorn again on October 1, 1959.
(vii) **Bodyweights**—These were determined at the end of each period and corrections made for fleece carried.

(viii) **Wool-growth Rates**—A **midside** patch of approximately 120 cm² was tattooed on each sheep. Patches were close clipped (Oster) at the end of each period.

(ix) **Raw Wool Constituents**—The raw wool from each patch clipping was weighed _ex_ 95°C. Wax was estimated by weight loss after Soxhlet extraction with CC₄. Each degreased sample was then well washed with distilled water with detergent added to the first wash. The washings were filtered to obtain the weight of dirt. Clean wool weight was determined _ex_ 95°C. Suint estimates were obtained by difference.

(x) **Day Temperatures**—Data for maxima and minima shade temperatures were available.

(xii) **Group at Pasture**

For comparative purposes data have been taken from a group of five, dry, spring-shorn, strong-wooled, Merino ewes grazing at Roseworthy on annual pastures in 1959-60. Unshaded paddocks were used to avoid gross differences in micro-climate between the two groups.

### III. RESULTS

(a) **Uniform Diet Group**

The group maintained a uniform intake, viz., a mean for periods of 700 ± 27 g of dry matter per sheep per day. Mean body weight declined gradually from 43 kg in April 1959 to 39 kg in November, after which it remained steady.

The rhythms in mean clean wool, wax and suint production are presented in the accompanying figure. For the uniform diet group the extent of the rhythm in clean wool production can be calculated* as 48 per cent which is in agreement with other published work (Hutchinson and Wodzicka 1961). These data are related directly to mean shade temperatures. It appears then that climatic influences on wool growth in spring-shorn dry ewes can be scaled against mean shade temperature. It must be remembered, however, that temperature and day-length are correlated in this environment.

(b) **Group at Pasture**

The accompanying figure shows an 83 per cent rhythm in clean wool production for this group. Seasonal data for clean wool, wax and suint production are related conversely to mean shade temperature. These trends for grazing sheep have been confirmed by data from other years and appear to be directly related to seasonal changes in nutrient intake (author-unpublished data).

### IV. DISCUSSION

It would appear that the application of climate corrections to seasonal wool growth data from dry, spring-shorn Merino ewes grazing in this environment would considerably increase the nutritional component of the rhythm. These results emphasise the sensitivity of wool production responses to nutritional changes. Further experiments are in progress using high and low uniform planes of nutrition and studying possible differences between sexes and shearing times.

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* \text{Rhythm} = \frac{H - L}{H + L} \times 100 \text{ where } H \text{ and } L \text{ represent the highest and lowest values}
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(Hutchinson and Wodzicka 1961).
REFERENCES