THE EFFECT OF STOCKING RATE DURING THE SPRING ON WOOL PRODUCTION AND LIVESTOCK GAIN

A. H. BISHOP,* H. A. BIRRELL* and A. TEW*

Summary

The extent to which pastures can sustain very high stocking rates in the spring could operate to limit the level at which fodder conservation can be applied. Data relating to large numbers of sheep grazing pastures at a wide range of stocking rates have been examined to elucidate this situation. The wool production per sheep and liveweight gain during the spring are closely related to spring stocking rate. The penalties associated with higher spring stocking rates, resulting from fodder conservation, are indicated for the conditions studied.

I. INTRODUCTION

The application of fodder conservation to a grazing system in which a constant number of sheep are wholly maintained year round on pasture has the effect of raising the stocking rate on the grazed portion during the spring. As stocking rates rise, the proportion of the area to which fodder conservation can be applied will be limited by the extent to which the corresponding spring stocking rates can be sustained by the pasture. There is little information regarding the performance of animals at the very high spring stocking rates which may be involved.

II. MATERIALS AND METHOD

The observations, made in 1964, arose from a stocking rate-fodder conservation experiment carried out at Hamilton on an established perennial rye grass (*Lolium perenne* L.) and subterranean clover (*Trifolium subterraneum* L.) pasture. Mean annual rainfall at Hamilton is 27 inches (69 cms) and the climate is Mediterranean in type. Spring rainfall for 1964 was above average.

Three-year-old Corriedale-Polwarth cross wethers were allocated to groups of 12 at random after ranking for liveweight within greasy fleece weight classes. They were introduced into the experiment on September 9, 1964, three weeks after shearing (August 11) at stocking rates ranging from 4 to 12 sheep per acre. Prior to this date the experimental area had been grazed in common by the wethers used for three months at approximately 6 sheep per acre. When portions of the plots were closed for haymaking (October 3, 1964), the range of stocking rates was in effect extended from 4 to 26 sheep per acre. The conserved areas were mown on November 30, 1964, and baled on December 14, 1964. After the baled hay was removed the mown areas were released to grazing on January 6, 1965.

*Department of Agriculture, Pastoral Research Station, Hamilton, Victoria.
Fig. 1.—Liveweight gain and wool production plotted against spring stocking rate. Each symbol represents mean data of twelve sheep. Regression lines for each variable are fitted.

The sheep were shorn on December 11, 1964, and mean greasy fleece weights for the groups were calculated for the 17 week interval between shearings. The mean liveweight gain (L.W.G.) for each group was expressed as the difference between the weighings on August 31, 1964, and December 1, 1964, a period of 13 weeks.

III. RESULTS

Mean liveweight gain (L.W.G.), in kg, and greasy fleece weight (G.F.W.), in kg, are plotted against stocking rate (S.R.) in Figure 1.

Cubic regression equations \( y = a + bx + cx^2 + dx^3 \) of liveweight gain and greasy fleece weight on stocking rate were fitted using a step-wise multiple regression computer programme. The resulting equations are:

\[
\text{L.W.G.} = 13.51 - 0.0204 (\text{SR})^2 \\
\text{G.F.W.} = 2.05 - 0.00062 (\text{SR})^2,
\]

stocking rate accounting for 83.1% of the variance in liveweight gain and 57.2% of the variance in greasy fleece weight. These curves are also plotted in Figure 1.

In this analysis the \((S.R.)^2\) term was first selected as being most highly correlated with the dependent variables, and the \((S.R.)\) and \((S.R.)^3\) terms were not then introduced since they did not contribute significantly to further prediction.

IV. DISCUSSION

Although the periods to which the observations on the variables refer do not coincide, the differences which applied during September are likely to be relatively unimportant. The very wide range of stocking rates and the large number of groups for which data are available more than compensate for these
differences. As the statistical analysis indicates, stocking rate has a major effect on the performance of the sheep, being strongly associated with both liveweight gain and wool production. The relations are expressed by regression equations which have a curvilinear form.

This is consistent with the “diminishing returns” type of response which has been demonstrated by other workers. Ferguson, Carter and Hardy (1948) demonstrated this type of response in wool production for increasing levels of intake for pen fed sheep. Willoughby (1958, 1959) working at Canberra showed that a curvilinear relation existed between pasture availability and liveweight gain in young Merino sheep grazing pasture. Williams (1964) working with a range of semi-arid pastures near Deniliquin proposed a curve for the relation between wool production and the availability of green forage per sheep.

For stocking rates up to 8 sheep per acre, the effect on wool production and liveweight gain are negligible. Compared with 4 sheep per acre, stocking rates of 12 to 15 per acre resulted in a decline in wool production of 0.11 kg, and 3.6 to 4.5 kg less in liveweight gain. The extremely high stocking rate of 26 per acre was required before liveweight gain in the spring was prevented.

The results are derived from one year only, and application to other years and locations would have limited validity. However, for similar environments, the results could be used to estimate the extent to which the application of fodder conservation at any particular stocking rate is likely to involve a penalty in the form of lower production during the spring. In accord with the curvilinear relation, this penalty can be expected to accelerate with stocking rate. The data suggest, however, that for the environment studied, and at stocking rate likely to apply in the industry, it is likely to be small.

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VI. REFERENCES


