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STUDIES ON DURATION OF GRAZING AND DEFOLIATION
IN LUCERNE

*a thesis presented in partial fulfilment of the
requirements for the degree of Doctor of
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*Alfalfa, whose luxuriant herbage feeds
The lab'ring ox, mild sheep, and fiery steeds:
Which ev'ry summer, ev'ry thirtieth morn,
Is six times re-produced, and six times shorn.*

Old Andalusian Poem transcribed
by Rev. Harte, 1764

ABSTRACT

A project was conducted to study the influence of grazing duration (GD) on lucerne *Medicago sativa* L. 'Wairau'. GD was defined as the period of defoliation or grazing before regrowth to the early flowering stage was again permitted.

A field trial conducted for eight months from spring to autumn examined three grazing durations (GDs), 2-4, 15 and 30 days, using sheep as the grazing animal. Following this, three studies in controlled environment rooms using simulated grazing techniques allowed a more detailed study of the influence of GD and also provided an insight into the interaction of GD with climate.

In both the field and the controlled environments, total herbage production for the full duration of each of the studies was always greatest under the shortest GD (0-3 days) and least under the longest GD (30 days). In the field, total herbage production was reduced by 14% under the 15 day GD system and 29% under the 30 day GD system. However in all the studies the differences in total herbage production were generated almost entirely by differences in stem yield - there were generally no treatment differences in the total production of non-stem (leaf and new shoot) material.

The studies in the controlled environment rooms indicated that GD had less effect on lucerne herbage production under dry conditions than under moist conditions favouring rapid growth.

Detailed shoot population studies in which large numbers of shoots were individually tagged as they arose, demonstrated the impact of shoot decapitation, the relative contributions of the different shoot types and the importance of the time of shoot appearance in relation to grazing.

Differences in the immediate growth rate of the herbage following the different GDs were noted. Maximum herbage growth rates in this period followed the intermediate GDs (10-15 days) with lower growth rates after both the very short (0-3 days) and the very long (30 day) GDs. The initial regrowth inertia following the very short GD was attributed to the low number of basal shoots on this treatment at the start of the regrowth period.

However the initially reduced herbage growth rates following the 30 day GDs seemed to result from an 'earlier' partitioning of assimilate to the roots in the first half of the regrowth period following this treatment. It was postulated that this partitioning effect was generated by the 'sink' effect of the depleted root system (lowest root weight, and root TNC and starch concentrations) measured at the end of a 30 day GD.

The project has indicated that under active growth conditions, while GDs of 2-4 days will give maximum herbage production, GDs of 10-15 days will have little significant effect on the performance of mature sheep. Under dry conditions, or when grazing young lambs, even longer GDs of up to 30 days are unlikely to seriously affect stock production.

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