

SOME EFFECTS OF TREADING BY SHEEP ON PASTURES IN
A MEDITERRANEAN ENVIRONMENT OF SOUTH AUSTRALIA

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A thesis presented in partial fulfilment of the
requirements for
the Degree of Master of Agricultural Science
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by

Thambiappah Sivalingam B.Sc. Hons. Agric. (Poona)

Department of Agronomy
Waite Agricultural Research Institute
University of Adelaide
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SUMMARY

Two field experiments were undertaken at the Waite Agricultural Research Institute, near Adelaide, to study the influence of intensity and frequency of treading by sheep on pasture density and tillering, pasture growth, seed production, pasture regeneration, and on the soil. The technique described by Edmond at Palmerston North, New Zealand, was used to study the effects of treading per se on plant and soil. The studies were of short duration (two to three months of treading) to fit into the rainfall pattern of the environment.

Studies were made during three main phases - the treading phase, the recovery phase and the pasture regeneration phase. During the treading phase the direct effects of treading on the plant-soil interface were studied, while the residual effects of treading were assessed during the recovery phase and the regeneration phase.

In Experiment 1, the effect of intensity and frequency of treading was studied using three densities of a mixed pasture of subterranean clover and annual ryegrass. The low density pasture suffered most treading damage. The influence of treading on the pasture was shown by decreased pasture density and tiller number, depressed pasture yield and poorer pasture regeneration the following year. Treading intensity had a greater effect than

treading frequency on all these variables. Greater treading intensity and more frequent treading caused the greatest damage to the pasture.

In Experiment 2, the effect of intensity and frequency of treading was studied with five pasture swards (subterranean clover, annual ryegrass, a mixture of these two species, cluster clover and perennial ryegrass) with and without defoliation. An increased treading intensity had the greatest influence on the swards: there was a decrease in plant density, pasture yield and in the plant number at pasture regeneration. Of the swards perennial ryegrass showed the greatest tolerance to treading. In general the grass species were more tolerant of treading than the legumes. Cluster clover was more tolerant of treading than subterranean clover. Defoliated pasture was more sensitive to treading damage than the undefoliated trodden sward.

In both experiments the residual influence of treading persisted during the recovery phase, and during the pasture regeneration phase in the following season. The effects on the pasture were more pronounced than the effects on the soil.

Investigation into the effects of treading on the soil were concentrated on the estimation of soil compaction. Soil bulk density, total porosity, penetrability and soil moisture percentage were determined to assess the degree of soil compaction. There

was evidence of soil compaction as shown by the increase in the penetrability values, which appeared to be a more sensitive index of soil compaction in this study than the bulk density, total porosity or the soil moisture values.

Despite the time limits of these experiments and the limitation set by the climatic conditions, it is concluded that the effects of treading on the pasture are far greater than the effects on the soil. Finally, the overall influences of treading on the annual pastures in this Mediterranean environment appear to be similar to those observed on perennial pastures in temperate climatic zones.

STATEMENT

This thesis contains no material which has been accepted for the award of any other degree or diploma in any University and, to the best of my knowledge and belief, contains no material previously published or written by another person, except when due reference is made in the text.

T. Sivalingam