

THESIS SUMMARY

Merino sheep and the intrapaddock patterning of herbaceous species on the Northern Tablelands of New South Wales, Australia

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This thesis describes both the sites and the patterning about sites used by domestic sheep for 'camping' or resting on the Northern Tablelands of New South Wales. Some of the factors involved in the creation and maintenance of sheep camps were examined and the implications of the camping related vegetation differences discussed in terms of animal production. The approach was exploratory and hypothesis-generating rather than experimental and hypothesis-testing.

A survey of the shade and nocturnal camps in a large paddock provided criteria for distinguishing between these two types of camp. A subsequent survey of the occurrence, distribution and characteristics of nocturnal camps showed that these could be distinguished in all paddocks grazed by sheep but that they were most conspicuous in native and natural pasture paddocks grazed by Merinos. In small experimental plots, camps were usually contiguous and apparently located so as to form the largest possible aggregation of sheep. In large commercial paddocks Merinos consistently camped at or about the highest, reasonably open locations. These camps were rarely associated with either water or shelter, but a high proportion of them had a north-easterly aspect.

A short term, small scale experiment on the camping and related behaviour of Merinos was conducted on a paddock without an established camp. By monitoring sheep activity and distribution, herbage mass and faeces weight changes over time, it was shown that the greater part of the animal's day was spent camping and that the highest point in the paddock, and not the water point, was the focus of sheep activity. The distribution of faeces across the paddock was related to camping behaviour and thus proved a very poor index of herbage removed by defoliation and/or treading. The larger intrapaddock floristic and productivity differences observed were created by trampling and nutrient enrichment, through faeces and urine return; less so by grazing.

From the literature, survey and behavioural observations, an anti-predator hypothesis was derived to explain the closer aggregation of flocks at night, dusk movements and sheep camp location. The implications of the hypothesis were that the options for altering the tendency of a Merino flock to form large aggregations and/or camp at high sites, were limited.

Species presence was recorded over a grid of quadrats across an established fertilizer by grazing experiment. The arrangement of plots within the trial had a marked influence on the botanical consequences of the imposed treatments. Irrespective of stocking rate, the natural pasture plots were relatively more heterogeneous and so more strongly patterned than the improved pasture plots. The pattern of species distribution in the natural pastures was shown to be associated with the distribution of sheep faeces. In terms of species richness and floristics, the vegetation on the sites in a natural pasture with a high concentration of faeces, was more akin to that of the improved pastures than to the vegetation that constituted the balance of the area of the natural pasture. The value of random sampling in such situations was questioned.

The greatest intrapaddock differences in species richness, floristic composition and green herbage mass in the plots of a grazed natural pasture experiment were found to be associated with the highest intrapaddock locations and the heaviest concentration of sheep faeces. The pattern of species distribution was only partly explained by differences in the soil chemical properties. By comparison with the greater proportion of most plots, the camps and camp margins were floristically impoverished and dominated by introduced species that remained green in the winter/early spring period; the most critical period for animal production on the Northern Tablelands. There were large differences in the floristic composition of camps and camp margins which suggested that there may be scope for manipulating the floristic composition of sheep camps.

In a large native pasture, the major differences in species richness and floristic composition as well as a source

of palatable and highly nutritious green forage in late winter/early spring, were shown to be a function of the camping behaviour of Merino sheep. The camp area in this situation was considered to be analogous to a small patch of improved pasture within the native pasture and thus of potential benefit to the grazing animal.

In conclusion, analogies were drawn between the patterning about sheep camps on the Northern Tablelands and water points in the arid zone. A case was outlined wherein significant increases in animal production were achieved for no monetary outlay by manipulating the floristic composition and area of camp in a natural pasture. Recommendations were made for research to better understand the processes involved in sheep camp creation and maintenance in particular and plant/animal relationships in general.