

### **Diet selection in two native and two introduced herbivores in an Australian rangeland region**

Beverly Ann Ellis (nee Sharland)

*School of Zoology, University of New South Wales, 1975, pp. 198 Awarded M.Sc.*

In western New South Wales red kangaroos are common on the plains, euros and goats are found in hilly regions and sheep are widely grazed. Comparisons of the food plants selected by these animal species were investigated under different seasonal conditions.

A technique of botanical micro-analysis suitable for all four animal species was developed to compare proportions of different food plants in the digestive tracts. A modified point quadrat method of pasture analysis was used to compare estimates of cover of pasture plants available at different sampling periods. From the comparison of estimates of the proportions of food plants in the stomach with their proportions in the pasture, diet selection was considered for four sampling periods over two years.

Much of the study was carried out in extremely good seasonal conditions. Because of the extremely large number of plant species that grew in response to these conditions, diet selection was considered at the level of the homogeneous plant group, not at the level of individual species. Both kangaroo species and sheep selected grasses and forbs when they were readily available. As pastures deteriorated in quantity and general quality of available plants, sheep selected mainly flat chenopod shrubs whereas kangaroos selected mainly grass, with varying quantities of both flat and round chenopod plants. Although few results were obtained from goats, because they were not commonly available, they ate mainly trees and non-chenopod shrubs.

Euros were concluded to be the most selective eaters; they ate grass even when it was at very low levels in the vegetation. Potential overlap in diet between kangaroos and sheep was greatest under good pasture conditions, and least under the poorest. Through their evident selection for flat chenopods during poorer conditions, sheep would be capable of pasture degradation under unwise management. There was little evidence for separation of the two kangaroo species through food selection at the level of plant groups.

### **Long term changes in arid zone vegetation at Koonamore, South Australia**

Michael D. Crisp

*Department of Botany, University of Adelaide, 1975 Awarded Ph.D.*

The investigations at Koonamore Vegetation Reserve is known world-wide as a long and comprehensive study in vegetation change. Two neglected areas of this investigation were developed for the present studies. The first of these was cross-fence comparisons between the Reserve (grazed by sheep from 1870-1925; ungrazed i.e. protected from 1925) and South Lake Paddock (grazed continuously from 1870). The second area concerned under- and un-evaluated data records, especially photographs, which had accumulated since 1925.

Initial cross fence comparisons revealed significant compositional differences in all strata of the vegetation examined, namely soil cryptogams, ephemerals and low shrubs. Irrigated small plots were used to investigate possible mechanisms of development of the observed differences between the two sites in two ephemeral grasses. Abundance of *Stipa nitida*, as measured by biomass, density of plants and density of seeds in the soil was greater in the protected area, and abundance of *Schismus barbatus* by the same criteria was greater in the grazed area. The soils in the protected area were more fertile, less compacted, apparently higher in organic matter content, and had a better developed lichen crust than the grazed area. Except for the lichen crust these differences were slight. The difference in *Stipa* was attributed to direct grazing selection and in *Schismus* to physical or chemical lichen crust properties retarding its germination and growth.

The irrigated plots were used also to make a study of seasonal pattern in several ephemeral species. Most species

were capable of germinating and establishing in most seasons except mid-summer and mid-winter.

Using the unevaluated data records, longevity and survivorship of three perennials were examined. *Atriplex vesicaria* lives to a maximum age of 30 years, *Acacia aneura* to 300 years and *Kochia sedifolia* to an unknown maximum of hundreds of years. In the latter two species mortality exceeds replacement even in the protected area, and it is predicted that under grazing they will ultimately be eliminated from the landscape.

The value of long term investigations and the future of the one at Koonamore are discussed in relation to my studies.