

APPLICATION ABSTRACTS

The effects of burning, fertilizing and clipping on populations of *Aristida armata*, *Thyridolepis mitchelliana* and *Monachather paradoxa* in a mulga woodland pasture

R.F. Brown

Increasing numbers of *Aristida* spp. in native pastures is a serious problem in Australian rangelands. To investigate potential means of controlling this trend, the effects of burning, clipping, fertilizing with nitrogen, and protection from grazing on the weedy invader *Aristida armata* (wiregrass), and two desirable species, *Thyridolepis mitchelliana* (mulga grass) and *Monachather paradoxa* (mulga oats) were evaluated over four years near Charleville. Rainfall had a major effect on plant death and seedling regeneration. Burning and repeated clipping both reduced the numbers of *A. armata* plants but the reductions were offset by subsequent seedling regeneration. Fertilizing had no effect on pasture composition. Protection from grazing improved pasture composition but further work is needed to see if this offers a long-term solution.

Effect of grazing on chemical and physical properties of an earthy sand in the Western Australian mulga zone

R.B. Hacker

Relatively few studies have investigated the changes in soil chemical and physical properties which accompany overgrazing of Australian rangelands, despite their likely importance in limiting forage production and prospects for regeneration. In this paper the chemical and physical changes associated with overgrazing on an earthy sand in the Western Australian mulga zone are reported.

Chemical changes were limited to the surface (0-2 cm) layer where reduced levels of organic C, total N and available P were evident. However, over all the sites studied, chemical changes did not provide a sensitive measure of grazing impact.

The major physical changes associated with overgrazing related to the water absorbing capacity of the soil surface and were apparently mediated partly through changes in the properties of the soil crust. Field observations suggest that these changes have little effect on site stability, as even badly degraded sites showed no evidence of increased run off or accelerated water erosion.

The extent to which these chemical and physical changes limit the regeneration of degraded sites cannot be determined from the present study. Such investigations are considered to be an important avenue for future research.

Dynamics of perennial plants in the mulga (*Acacia aneura* F. Muell) zone of Western Australia I Rates of population change

H.G. Gardiner

Freedom from kangaroo grazing during a post-drought period is crucial to the re-establishment of palatable perennial plant species.

The study detailed here showed that grazing by kangaroos after the removal of livestock affected the rates of change in the size of populations of six perennial plant species from the arid zone of Western Australia.

It was found that their mortality and/or recruitment was affected by rainfall patterns as well as grazing by kangaroos. The results of the study have shown that an understanding of the population dynamics in arid zone shrub pastures will only be derived from long-term studies involving frequent recordings, especially if the fluctuations in plant populations due to seasonal conditions are to be adequately separated from other long-term changes due, for instance, to grazing.

Dynamics of perennial plants in the mulga (*Acacia aneura* F. Muell) zone of Western Australia

II Survival of perennial shrubs and grasses

H.G. Gardiner

Grazing by kangaroos following the removal of livestock affected the survival of three of six perennial species examined at Yeelirrie station in the mulga-zone rangelands of Western Australia. One species desirable for livestock grazing, wire wanderrie grass, had its survival severely reduced on areas subject to kangaroo grazing. Poverty bush and *Frankenia*, species undesirable for livestock grazing had higher survival rates on areas grazed by kangaroos.

Climatic conditions, principally rainfall, and site factors were also shown to affect the survival of perennial species significantly. Recovery of degraded rangeland will be maximized by removing livestock only if kangaroo use of affected areas is also controlled.

Licensed kangaroo shooting in New South Wales: the people, the money they make and the animals they shoot

M.D. Young and R.J. Delforce

Professional kangaroo shooters have social characteristics which are similar to Australian farmers and farm workers. Like farmers, nearly 70% are married, and had left school before they were 16 years old. Most (72%) are over 30 years of age. Shooting strategies vary considerably between shooters, but over half attempt to husband the populations they shoot by selectively shooting bucks before does and by attempting to ensure that joeys survive to adulthood. Shooters are, however, inconsistent in their perception of the survival prospects of joeys (pouch young) which they can see in the pouch and have varying theories about the productive potential of the does they leave to raise more kangaroos.

Generally the average income which can be derived from kangaroo shooting is low. Almost all shooters have found it necessary to develop and maintain other sources of income in order to obtain an adequate lifestyle. That they have done this in preference to shooting within areas of low kangaroo density seems consistent with other evidence that those species of kangaroo which are taken for commercial purposes are in no threat of extinction.

Reports by shooters to the National Parks and Wildlife Service vary in accuracy and hence caution must be exercised in drawing conclusions from shooters' returns. Information presented in shooters' returns about the weight and number of kangaroos they have shot appears to be reliable. Information about the sex of kangaroos shot and about shooting times, however, is often made up.

A comparative study of sheep grazing a semi-arid saltbush pasture in two condition classes

R.D. Graetz

Saltbush (*Atriplex vesicaria*) country is highly valued by the pastoral industry but it has been difficult to determine the contribution that saltbush itself makes to wool and body weight growth of sheep. In this experiment the productivity of sheep was compared at two different stocking rates on two different pastures across a station boundary near Broken Hill, N.S.W. One pasture was very dense saltbush, the other had only about a third as much saltbush present. The experiment ran for five years, 1976-1981.

The wool production of both pastures was high and the presence or absence of saltbush or different stocking rates had no significant effect. The sheep ate mostly the herbage species, rarely the copper burs, and saltbush constituted 50% of the diet during the dry period. No significant changes in the pasture occurred, even though quite high stocking rates (0.6 sheep/ha) were used.

The results of the experiment support the pastoral wisdom; saltbush country is good sheep country. However the contribution of the saltbush to this high animal productivity appears small in most years.

Mapping and forecasting soil erosion patterns from Landsat on a microcomputer-based image processing facility

G. Pickup and V.H. Chewings

Most techniques for predicting soil erosion are useful only in croplands because they require too much data and do not produce results at the large scale needed in arid grazing lands. This paper describes a method for determining the distribution of erosion risk in large areas. This information is useful for paddock planning, watering point location and fenceline location. Future developments include integrating the method with animal behaviour models so that both erosion risk and grazing pressure distribution can be evaluated.

The methods described require the ability to process and display data from the Landsat Multi-Spectral Scanner. The cost of computer hardware to do this is normally prohibitive. A low-cost image-processing facility has therefore been developed based on an industry-standard microcomputer making it possible to decentralise the technology from large centrally-based computers to branch offices. The computer hardware and software can be obtained as a commercial package supported by instruction manuals and recipe books for inexperienced users. Data will soon be easily obtainable since the Australian Landsat Station plans to market it on floppy disks in a compatible format.

Survivorship of the grass *Enneapogon purpurascens* in the Victoria River District, north-west Australia

M.H. Andrew

Enneapogon purpurascens (limestone grass) is a short-lived but desirable pasture species of the tropical north-west. It is easily grazed out, which then puts the soil at a high erosion risk. Most plants at one study site lived for less than one year, and most never flowered, at least when ungrazed. This finding has implications for the development of an ecologically sound grazing management system for limestone grass pastures.

Digestibility of alpine pasture on the Bogong High Plains of Victoria

W.R. Gwaiseuk, H. van Rees and J.H.G. Holmes

Steers grazing the Bogong High Plains from December 1982 to April 1983 at a low stocking rate were able to select a highly digestible diet (>70%) until mid-March, despite the steady decline in quality of the forage on offer. The crude protein content of the diet declined from 10% to 6%. In late March, when the cows were drying off and calves were about to be weaned, their inability to select a high quality diet would not be a disadvantage. When only cattle nutrition factors are considered, there is no reason to modify the timing of the present grazing season.

The composition of phytobezoars (felt balls) from sheep in Western Australia

D.D. Blackshaw and A.J. Oliver

Felt balls are frequently found in the digestive tracts of sheep in Western Australia. Usually there are no externally visible symptoms of their presence, but from time to time affected animals may die, following blockage of the gut by felt balls. In the extensive management regimes usual in rangelands there is no practical treatment for affected animals. In areas where felt ball disease is of economic significance it may be possible to control the incidence of the condition by grazing management. For this purpose it is necessary to identify the plant fibres of which the felt balls are composed.

Felt balls from two different locations in Western Australia were examined microscopically. Fibres in felt balls from Jeedamya station were compared with fibres from plants collected on the station and from other parts of the pastoral areas. We suggest that felt balls from sheep at Jeedamya station are composed mainly of fibres from *Acacia ramulosa*.

Fibres in felt balls from a 10 week old lamb from York were indistinguishable from those from Jeedamya. The source of these fibres was not identified but is almost certainly not the same as at Jeedamya, because the two areas have very dissimilar vegetation.