

## INTRODUCED PASTURE SPECIES ON THE CENTRAL PLATEAU

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### INTRODUCTION

Parts of the Central Plateau have been used for pastoral purposes for over 100 years, but little attention has been given to introduced pasture species because of the rigours of the environment, the lack of suitable species and of experience relevant to the area, and the absence of any incentive to change the traditional system of open-range summer grazing of the natural vegetation. (Some background on the use of the Central Plateau by pastoralists is contained in a paper by Rayner and Smith (1970), as well as in the contribution by Shepherd (1973) in the present volume). With increasing awareness of the problems on the Plateau, however, and controversy over its future use, coupled with the improved technical background of landholders, more interest is now being shown in the possible role of introduced herbaceous species as well as in various aspects of general management.

Small-scale investigations have been carried out in recent years, particularly by the Tasmanian Department of Agriculture near the Lagoon of Islands at an altitude of about 2,500 ft (c. 760 m). Some of the common pasture species, in particular perennial ryegrass (*Lolium perenne*), cocksfoot (*Dactylis glomerata*) and white clover (*Trifolium repens*), were established in 1967 and have grown and persisted very well. In the same year, the landowner at this site established 150 acres (60 ha) of ryegrass/white clover pasture, which has been topdressed with superphosphate and stocked with sheep in subsequent years. In 1972, this pasture carried the equivalent of about 10 sheep per acre (25 per ha) from January to May, 3 to 4 sheep per acre (c. 8 per ha) from May to August, and was then spelled for three months before being stocked again at 10 sheep per acre (25 per ha) in December. At Wihareja (altitude about 3000 ft [915]), a ryegrass/white clover mixture has been grown and grazed successfully for some years, while on a neighbouring property, regular application of superphosphate on

old marshland has encouraged active growth of naturalised and artificially seeded white clover. Near Miena at the southern end of the Great Lake (altitude 3,400 ft [1035m]), small areas of ryegrass/white clover have been established and have persisted reasonably well for several years under grazing, although fairly seriously invaded by weeds.

It is not unusual at lower elevations to find pockets of introduced herbaceous species which have become established fortuitously around homesteads, stockyards and other places frequented by stock, e.g. in the vicinity of Bronte (altitude about 2,200 ft [c.670 m]), and to a lesser extent near Lake Sorell (about 2,700 ft [820 m]). Of rather more interest are the patches of Kentucky bluegrass (*Poa pratensis*) at several points across the windswept Liawenee Moor and adjoining areas west of the Great Lake (3,400 to 3,500 ft [c. 1050 m]). The grass has established and persisted in this exposed area without conscious assistance from man, often under intensive grazing by rabbits.

Thus there is sufficient evidence to suggest that certain introduced pasture species can be established and will persist under the environmental conditions prevailing on many parts of the Central Plateau, and this evidence is supported, of course, by experience on the Australian mainland and overseas. There are two potential roles for such species on the Plateau:

- (i) stabilising the country against soil erosion
- (ii) improving animal production.

The emphasis on one or other of these roles will vary from place to place depending on previous history, altitude, topography, and conditions with respect to climate and soil.

#### EROSION CONTROL

As has been pointed out elsewhere in this volume (Edwards 1973; Shepherd 1973), erosion is a common feature on the Central Plateau, apart from the dramatic and very obvious effects of construction works and along roadsides and stock routes. For example, much of Liawenee Moor shows a mosaic pattern of bare ground and weakened herbaceous or low shrub vegetation, and a large tract of country in the

vicinity of Pillans Lake has suffered severe loss of both vegetation and soil. The relative importance of causative factors is uncertain, although the destructive fire of 1961 was undoubtedly the greatest single factor in the Pillans Lake area. Uncontrolled burning, grazing and treading by domestic stock, the activity of rabbits, water and wind action, and frost-heaving on bared areas are all involved in a complex situation.

Some of the affected areas would recover if all stock were removed and fires rigidly excluded, but it would be a slow process, and although the idea may seem fanciful at the moment, the danger of a really devastating fire could be increased if vegetation were allowed to grow unchecked (Cameron 1970). What limited experience is available on the Plateau, however, suggests that some areas may have reached the stage where they will not recover under "natural" conditions, and positive action will be required, e.g. re-seeding and possibly re-shaping of the ground surface, construction of contour banks etc. Seed of native plants is generally not available for this purpose and introduced species must be used.

Herbaceous vegetation is extremely effective in binding the soil, increasing infiltration and controlling run-off, and hence preventing soil loss and subsequent siltation of streams and dams as well as giving a more even distribution of water yield. Experience on the mainland has shown that even completely bare areas at high altitude can be stabilised by seeding with introduced grasses and legumes (e.g. Clothier and Condon 1968). In the worst situations, where access is difficult, where large areas of bare soil or deep gullying are present, and where complete mulching and heavy fertiliser application are required, the process can be very costly, but it is precisely in these situations where delay may lead to further deterioration and increased sedimentation, and an even more costly operation in the end. There are many areas on the Central Plateau, however, where the situation is not so extreme, and a less costly operation should be effective.

The damage done by rabbits in some localities is not always appreciated and requires proper documentation, but more effective control measures may be required, whether or not introduced pasture species are established and whether or not domestic stock are removed.

### GRAZING AND ANIMAL PRODUCTION

Costin (1973) has rightly stated that grazing must have a low priority in Australian high country generally, although it is worth pointing out that the importance of this type of country for grazing, relative to the availability of other areas, is probably greater in Tasmania than in N.S.W. and Victoria. Even the 130,000 sheep estimated to be on the upper and mid sections of the Plateau in 1971 (Shepherd, 1973) represent some 3% of the total Tasmanian flock, but the main value of the area to the graziers involved is as an "insurance asset" against dry seasons and expensive fluctuations in stock numbers on lowland properties.

Opinions will vary as to whether grazing by domestic stock should be allowed to continue on the Central Plateau, or more correctly, on which sections should grazing be permitted and from which sections should it be excluded. There can be little doubt that stock should be removed from areas where the existing vegetation has particular intrinsic value (for utility purposes or as a reserve), or where management and remedial action are likely to be most difficult and least effective. In practice, this probably means excluding stock from much of the higher elevations (but the actual line of demarcation may depend on other factors), from rugged terrain highly susceptible to soil erosion, and from places such as bogs where the very specialised vegetation is particularly valuable, easily damaged and difficult to replace. On the other hand, it would be quite unnecessary to prohibit grazing at the lower elevations with no particular erosional hazards. The extensive areas in between these two extremes are where much of the controversy exists, and where a general ban on grazing, while being the simplest and administratively easiest procedure, may not provide the most equitable or "best" solution, nor in the long term perhaps the situation easiest to manage from the point of view of fire and rabbit control.

But the guiding principle should be that of efficient land use, which, from the point of view of the true agriculturist as well as the straight ecologist, means maximising "returns" while still conserving resources and the "productivity" of the land. This concept can be applied to any form of land use and to areas of multiple uses, but

with respect to grazing management, it implies obtaining the maximum output of animal products consistent with maintaining the soil-plant-animal balance so that no deterioration of these components occurs. If introduced plants are more productive and persistent under grazing than native species, and management is correct, then establishment of sown pastures should make possible an increase in output without any loss of soil or plant cover.

The ecological approach to land use is important in any situation, but assumes particular importance where the environment is more severe, e.g. because of low rainfall or extremes of temperature, and there is a more delicate balance between components of the ecosystem. These matters have been discussed more fully with respect to grazing management and the Central Plateau in an earlier symposium (Yates 1970).

At this stage, little more than informed guesses can be made as to whether properly managed animal production is feasible on many parts of the Plateau, particularly if improved pastures can be established, and the potential production is virtually unknown. The indications from lower elevations are favourable, but extrapolation in these circumstances is hazardous, and the economics of the process, bearing in mind the relative isolation and the fundamental need to establish and/or maintain plant cover in a difficult environment, are likely to be quite different. But these are problems which require investigation rather than peremptory "solutions".

#### EXPERIMENTAL WORK WITH INTRODUCED SPECIES

Small-scale experimental plots of introduced pasture species were established at three sites on the Central Plateau in the 1970/71 growing season. Near the Penstock Lagoon (altitude about 3000 ft [915 m] on heavy peat soil on old marshland), and on the Stone Hut property, about 2½ miles (4 km) west of the southern end of the Great Lake (altitude about 3,400 ft [1035 m] on reddish-brown alpine humus soil on solifluction deposits), 24 grasses and 16 legumes are being examined for persistence and growth following establishment on cultivated land. Also on Stone Hut, and at the third site near Lake Augusta (altitude about 3,775 ft [1150 m] on similar alpine humus soil), an attempt has been made to establish small plots

of a grass/legume mixture on bare, eroded ground without cultivation. Some tentative conclusions can be drawn at this stage: There are several species, both grasses and legumes, which will establish and grow fairly strongly (with fertiliser and protected from rabbits and stock) in this environment, and it may well be possible to improve on the standard ryegrass/white clover mixture used in low-land areas. Grasses and legumes can be established on uncultivated bare areas, when a straw mulch is used in addition to fertiliser, and rabbits and stock are excluded. Some plots on uncultivated land were not protected from rabbits and stock, and although the plants established satisfactorily and have persisted for two years, they are continually grazed very close to the ground (mainly by rabbits) and their long-term persistence may be affected. Finally, it would appear that a mulch is not essential for establishment on cultivated ground at 1035 m altitude, but this conclusion is based only on plots from which rabbits and stock were excluded.

The next step is to study some of the introduced species under continuous grazing by sheep during the summer. This will test not only the ability of the species to persist under grazing, but also the hypothesis that the grazing animal can be included as a component of a stable system in this environment, given the necessary inputs. Larger areas of cultivation will be required, and the work should be carried out in both the presence and absence of rabbits to assess their effects and determine whether some form of control is essential to the long-term success of such work. When satisfactory species have been selected, alternative techniques of establishment must be studied, e.g. minimum "scratching up" of bare areas without destruction of existing vegetation, the use of chemical herbicides, the effectiveness of different forms of mulching, and rates of seed and fertiliser required. A relatively inexpensive method will be necessary if it is to be used on a large scale by either conservationists or graziers.

The overall program of work, then, should have several aims:

- (a) To select species of grasses and legumes which will hold the soil against erosion, the selection to be made if possible under grazing.

- (b) To determine whether the grazing animal can be included as a component in a stable soil/plant/animal system.
- (c) To study the effects of rabbits in the system.
- (d) To develop techniques for establishment and maintenance which may permit of wide-scale application on parts of the Central Plateau.
- (e) Consequent on a favourable outcome of (b) and (d), to determine potential animal production from areas of pasture established with varying levels of inputs.

It is obvious that there are many unknowns and uncertainties to be elucidated, from "straightforward" questions such as optimum rates of seed and fertiliser to the complex problems of systems' management. As yet there has been no definition, except in a very general way, of the areas to which the results of the proposed work may be applicable, nor the variation in species and techniques likely to be required. Climatic conditions, elevation, slope and general nature of the terrain, susceptibility to waterlogging during winter, existing vegetation and degree of erosion, accessibility and the need to preserve some areas in an entirely natural condition will all have an important bearing on what can or should be done.

#### CONCLUSION

Introduced pasture species are likely to have an important role to play on parts of the Central Plateau, whether one thinks only of stabilising the soil against further erosion, or of the potential for animal production in a soil/plant/animal system.

With respect to grazing, there are areas where domestic animals should be excluded, and others where there is no sound reason for doing so. For the extensive areas in between these extremes, it would seem more logical to determine objectively whether or not the grazing animal can be included in a stable system based on introduced pasture species, and the economics of this system, rather than to summarily exclude grazing and graziers without further trial. In these areas, exclusion of domestic stock could at best

provide only a partial solution to the problem of deteriorating land surfaces, and at worst could lead to further difficulties in the effective management and preservation of the Plateau.

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