

THE ECOLOGY OF FERAL HORSES IN CENTRAL AUSTRALIA

by

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ABSTRACT

Feral horses in central Australia spend most of their time foraging. There was no difference between nocturnal and diurnal time-budgets. However, horses were more likely to be seen walking to water and drinking in the afternoon or evening than at any other time of the day.

The overriding influence on pasture was the timing and amount of rainfall combined with the grazing of horses and cattle. The use of pastures by horses and cattle was affected by species composition of the pasture, distance from drinking water, elevation and time since the last rain-induced growth event. The extremely high variability in effective precipitation results in very unpredictable quality, quantity and location of resources for cattle and horses.

Horses consistently selected a higher quality diet with a higher proportion of monocot material than cattle. Cattle appeared to more readily take perennial grasses and non-grass material than horses.

Horses and cattle can both tolerate a broad range of habitats. Both show preferences for particular habitat types but in time virtually all habitats are used by both species. Flat areas with predominantly perennial pasture and frequent watering points appear more suited to cattle than horses, whereas hilly areas growing predominantly annual pasture appear better suited to horses than cattle.

Social organisation conformed with the basic pattern for horses studied elsewhere in the world. Harem groups maintained relatively stable adult composition. However, as dry weather continued and pasture became dry and sparse harem group size decreased.

Changes in the feral horse population predicted by a simple model based on birth, death and harvest rates corresponded well with population estimates determined by aerial survey.

Horses help denude large areas, force macropods from these areas, foul water-holes with carcasses and cause accelerated gully erosion. Managers require mustering, trapping and shooting for successful control of feral horses on central Australian properties. A sufficient reduction in population size can be achieved by harvest and sale of horses even in the most difficult areas. Shooting from helicopter is vital for control of horses where harvest has failed or a quick reduction in numbers is required to alleviate impact. All control operations must be well planned and their success monitored.

PREFACE

The work reported in this thesis was carried out by me partly to fulfil the terms of a contract under which the University of New England undertook to provide the Conservation Commission of the Northern Territory with specific research findings on the ecology of feral horses, and partly to fulfil the terms of another contract under which I undertook to supply further research findings on the ecology and management of feral horses. The first resulted in co-authored reports (Berman & Jarman, 1987, 1988), and the second in a co-authored report (Dobbie & Berman, 1990) to the CCNT. My role, and that of my co-authors may need clarification. In the first contracted study, Jarman was the staff member of the university responsible for completion of the study, was my academic supervisor, and took part in interpretation of the dietary analysis. In the second, Dobbie acted as a research assistant under my direction; Jarman was still my academic supervisor. All other help has been explained and acknowledged in the text. Unless otherwise indicated, all data and their analysis arise from work by me or carried out to my design and instructions, and all interpretations are by me.

I certify that the substance of this thesis has not already been submitted for any degree and is not being currently submitted for any other degree.

I certify that any help received in preparing this thesis, and all sources used, have been acknowledged in this thesis.



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SUMMARY

The purpose of this thesis is to describe the ecology of feral horses in central Australia and discuss the results in the light of knowledge of feral horses and other ungulates elsewhere. The activity, diet, habitat use, social organisation, population parameters and management of feral horses were studied on The Garden station 70 km north-east of Alice Springs in the Northern Territory.

Fortunately, during this project The Garden station experienced a period following a high summer rainfall (1984), a long period (27 months) with very little rain and a period of high winter rainfall (winter 1986). This provided me with the opportunity to sample the available vegetation and other factors relating to the ecology of horses and cattle under a variety of conditions from wet to dry, summer rains and winter rains.

By watching radio-marked horses and counting horses along ground-based transects I found feral horses in central Australia to spend most of their time foraging. There was no difference between sampled nocturnal and diurnal time-budgets. However, horses were more likely to be seen walking to water and drinking in the afternoon or evening than at any other time of the day. The proportion of time spent grazing did not appear to vary seasonally. Nevertheless, when forage was green and abundant the proportion of horses seen grazing during the day was markedly lower than when forage was dry and sparse.

The use of pastures by horses and cattle was affected by species composition of the pasture, distance from drinking water, elevation and time since the last rain-induced growth event.

Based on identification of plant fragments in faeces horses appeared consistently to select a higher quality diet with a higher proportion of monocot material than cattle. Cattle appeared to take perennial grasses and non-grass material more readily than horses. Permanent water is required by horses for survival during drought. Semi-permanent and ephemeral waters allow horses and cattle to utilise pastures at distances normally too far from permanent water.

Horses and cattle can both tolerate a broad range of habitats. Both show preferences for particular habitat types but in time virtually all habitats are used by both species. Flat areas with predominantly perennial pasture and frequent watering points appear more suited to cattle than horses, whereas hilly areas growing predominantly annual pasture appear better suited to horses than cattle. Both horses and cattle can inhabit flat or hilly country but would probably do better in all habitats without the presence of the other species.

There is great potential for competition between horses and cattle in central Australia since they eat similar species of plants and in time use the same habitat. Nevertheless the competition may not take effect until drought-time when forage is limiting. Further experimental investigation may be possible to demonstrate competition between horses and cattle, however, such work would be difficult. The mobility of horses allows them to use habitat further from water than cattle and in hills that cattle rarely use. Thus competition is probably minimised because of differences in mobility.

Using data from radio-tracking and transects I found the social organisation of feral horses in central Australia to conform with the basic pattern for horses studied elsewhere in the world. Harem groups maintained relatively stable adult composition. However, as dry weather continued and pasture became dry and sparse harem group size decreased. This decrease resulted at least in part from the loss of mares by stallions with more than 1 mare and the gaining of mares by bachelors.

The greatest proportion of harem groups occurred in habitat with a low proportion of alluvial country, plenty of hills or terraces with annual pasture and permanent water. Horses may require the stability of this favourable habitat for development of the strong bonds necessary for large harem formation.

Changes in the feral horse population predicted by a simple model based on birth, death and harvest rates corresponded well with population estimates determined by aerial survey.

Horses and cattle occur sympatrically over nearly all their ranges in central Australia. To look at environmental impact of horses alone, I selected an area near Kings Canyon, 250 km south-west of Alice Springs where there is a valley used by horses but not cattle. Results indicate that variation in vegetation, wildlife and soil erosion correspond with changes in grazing intensity. There was no chance to experiment so all conclusions are based on correlative evidence. High density of horse dung and tracks was associated with denudation, low density of macropod dung, water-holes fouled with horse carcasses and the greatest occurrence of gully erosion. Feral horses have the potential to exert impact on almost all areas of pasture in central Australia because they are able to walk up to 50 km from water and traverse hills which are barriers to cattle. Management of horses and cattle so that the grazing pressure is low enough not to deplete pasture close to permanent water may confine their impact to these areas. Fencing off water-holes may protect susceptible areas from the impact of feral horses.

Managers require mustering, trapping and shooting for successful control of feral horses on central Australian properties. A sufficient reduction in population size can be achieved by harvest and sale of horses even in the most difficult areas. Shooting from helicopter is vital for control of horses where harvest has failed or a quick reduction in numbers is required to alleviate impact. All control operations must be well planned and their success monitored. Control activities should be concentrated in source areas where long term survival of horses is greatest. Sink areas may be left untouched or left until source areas have been treated. Without a continuing influx of horses from source areas the population of sink areas should decline.

The mobility of horses is exhibited not only in their digestive system, feeding strategy and body structure, but also in their social system. Horses are able to utilise cellulose-rich, short grassy plant material and have evolved speed and a feeding strategy enabling them to evade predators and locate and utilise sparsely distributed food and water.

The understanding of feral horse ecology presented in this thesis should lead to improvement in the efficiency of management of feral horses.

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