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FOOD AND OTHER RESOURCES OF THE  
WILD RABBIT *Oryctolagus cuniculus* (L.)

by

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A thesis submitted to the University of  
Adelaide in part fulfilment of the  
requirements for the Degree of  
Doctor of Philosophy.

May 1974.

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### SUMMARY

The numbers of rabbits in a natural population in an arid part of South Australia were recorded over a period of six years. During the first two years, the population increased rapidly but a crash followed in which over ninety-percent of the rabbits died. As the population fell, rabbits sought water at bores and ate atypical foods such as twigs from shrubs. Any of three factors, namely, the numbers of rabbits and shortages of food or water, could therefore have caused the population crash.

It became apparent however that the crash was not an outcome of the social friction which results from crowding. Instead it seemed that rabbits were simply too numerous for a resource such as food or water.

Field experiments in which supplementary water was provided for the rabbits showed that the additional water could substantially reduce the loss of weight shown by many rabbits during the drought which followed the population crash. However, it seems that the crash was not caused by shortage of water alone because at the time of the crash the rabbits were forced to eat indigestible, perennial vegetation to obtain their water and as a result they had a low intake of energy. The advantage of supplementary water apparently lay in enabling the rabbits to eat more of the dry, marginally better annual vegetation than they could when they had to obtain their water from coarse vegetation.

To further investigate the importance of environmental factors such as the weather and grazing on the availability of water for the rabbit, the moisture content of the more

common species of plants was determined at regular intervals. In addition a soil-moisture model was developed to estimate periods when growth of plants might occur and drought prevail. Since this model proved useful in predicting the water content of ungrazed or lightly-grazed plants it could be ascertained that, at the time of the initial population crash, sufficient water for the rabbits should have been available in the pastures if they had not been heavily over-grazed.

A survey of the literature showed that plants likely to be useful to the rabbit were those which contained less than forty-percent fibre. Consequently, chemical analyses of plants from the study area showed which species were potentially useful to the rabbit and these results were supported because the major concentrations of rabbits were found where such plants grew most densely.

Changes in the abundance of vegetation were recorded by photographing clearly defined quadrats at regular intervals. The index of abundance of vegetation so obtained was then divided according to the fibre contents of the pasture species to provide an index of the abundance of food for the rabbit as distinct from the abundance of vegetation in general.

Between 1969 and 1972 there were three periods when food was in short supply. The first corresponded to the major crash in the rabbit population and was almost certainly caused because the unusually large numbers of rabbits ate most of the available food. The second food shortage occurred when the larvae of the moth *Loxostege affinitalis* ate most of the soft plants in the pasture. Drought and heavy grazing by sheep caused the third period of food shortage. The number of rabbits in the population fell whenever food became scarce

and rose some time after food became more plentiful again.

By analysing the contents of rabbits' stomachs it was ascertained that the food eaten by rabbits always contained adequate nitrogen but fibre appeared to be limiting. A strong correlation found between the quality of food eaten and the amount of food available to the rabbit was compared with similar data obtained from studies on sheep. The comparison produced some evidence that shortage of food prevented rabbits from reaching their full potential of reproduction and growth in most seasons.

Multiple regression analyses showed that the availability of food and water could explain much of the variability observed in the weights of the rabbits' gonads. Furthermore, because gonad weights could be readily related to function, the availability of food and water was obviously related to reproductive success. The influence of water was thought to be indirect however and probably acted by influencing the growth of plants rather than by limiting the supply of water for the rabbits.

To complete successful reproduction a continued supply of food for weaned kittens was necessary because growth rates of the young were strongly correlated with the availability of food.

Although these results show that food shortage probably limited the capacity of the rabbit population to increase, one major short-coming of the study is that the causes of death of the rabbits remain unknown. Except in unusual circumstances, starvation was not observed but it is possible that predators or disease could cull rabbits debilitated by food shortage.

In general, the influence which other species of

animals have upon the rabbit population, by competing for limited supplies of food or through their predatory or pathogenic actions, remains the greatest obstacle to a full understanding of the dynamics of populations of wild rabbits.