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**RABBIT CONTROL AT ERLDUNDA STATION IN CENTRAL AUSTRALIA
THE STATION AND THE REGIONAL LEVEL.**

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ABSTRACT

Erlunda Station has long been known as the centre of rabbit distribution in the Northern Territory. An estimated 23,000 warrens exist on the 2932km² Station, 7.8/km². Patchy distribution of suitable habitat and warrens and infrequent favourable breeding periods at the northern edge of rabbit distribution in Australia suggested localised eradication of patches by ripping and fumigation could be practical and economic. After 4.5 years over 4000 warrens have been ripped on 270 km² of preferred cattle and rabbit habitat by Station staff. The costs of ripping were about \$250/km². In 1990 rabbit numbers after three good years were 208/km² in untreated areas and 1.1/km² in treated areas. Drought conditions in 1990 and 1991 with a heat wave in January 1991 caused rabbit numbers on untreated areas to decline to about 1/km², similar to the estimated 2/km² on treated areas. Initial success and assessment of the enormosity of the task prompted development of a cooperative program whose aim was to demonstrate the feasibility and economic benefits of large scale localised eradication and the advantages of cooperative effort. A 10 year project coordinated by the CLMA plans to eradicate rabbits and monitor costs, success and benefits on a 250 km² area on adjoining Erlunda, Lyndavale and Mt Ebenezer Stations. Pastoralists provide equipment and staff, NSCP funds for fuel and labour, and NT Government Depts. monitor the program. Baiting and ripping of the 250km² area began in November 1990 and were completed in 15 months. Initial follow up fumigation was mostly complete by April, 1992. Cost of ripping over 3500 warrens was calculated at \$474/km². Administration costs, clearly identifiable in the larger project, are not normally recognised in small scale projects. On-going costs will mainly be annual fumigation of active rabbit warrens by Pastoralists. Baseline vegetation survey of selected sites in ripped and untreated areas was completed in 1991 and will be repeated annually. Economic data gained over 10 years will assess cost of increased production of both vegetation and stock as well as ecological recovery.

Integration of warren ripping with natural or introduced biological control of rabbit populations should allow long term reduction of rabbits and regeneration of pasture and habitat in some land systems. Anticipated biological and genetic controls may be required for land systems where warren destruction may not be economically possible.

INTRODUCTION

Practicality and economics of ripping warrens to control rabbits is being assessed on cattle stations at the centre of rabbit distribution in the N.T. The preferred grazing lands on Erlunda Station in central Australia have been heavily used by rabbits and cattle since the turn of the century and, particularly around restricted watering points, perennial grasses are severely reduced and dominated by unpalatable species. When the Station was purchased in 1987, the owners decided on several strategies to restore large areas to higher productivity. These were to reduce the stocking rate, obtain better dispersal of cattle by increasing the number of watering points, controlling rabbits and establishing Buffel Grass. In this paper we will look at rabbit control on Erlunda Station in the regional context of a joint rabbit control program involving adjacent Lyndavale and Mt. Ebenezer Stations.

Rabbits in the N.T. are at the northern edge of their range in Australia. They are mainly restricted to calcareous and sandy habitats with a relatively shallow water table, consequently their distribution is quite patchy. Erlunda Station in the Southern N.T. is known for high rabbit populations, but even here the distribution is patchy, related to suitable habitat in the mostly

open shrubby grassland. Warren frequency in land systems on Erldunda Station had previously been assessed (Low 1983). Analysis of air photos (1:50 000 colour, 1986) combined with land system evaluation indicated that about 23,000 warrens exist on the 2932 km² Station, about 7.8 warrens/km². Warrens are clumped in favoured sites mainly in Ebenezer, Lindavale, Kalamerta and Amadeus Land Systems. These Land Systems make up 65% of the Station (Dept. of Primary Production 1983). The first three Land Systems have the highest carrying capacity, 2.3, 1.5 and 1.7 beasts/km² and also carry the most rabbits, 9.3, 11 and 22.5 warrens/km², but Amadeus L.S. with its shallow water table and 6.5 warrens/km² is important to rabbits for drought survival.

Prospects for control by ripping and fumigation are reasonable in the first three of these land systems but low in Amadeus L.S. Eradicating rabbits from the sand dune and flood plain margins of Amadeus L.S. will be difficult and integration with other techniques such as using European Rabbit Fleas to spread myxomatosis, poisoning, shooting and fumigation may be necessary until biological control techniques become available.

Several biological control agents including the Spanish Rabbit Flea for spreading disease, Viral Haemorrhagic Disease and genetic reproduction inhibitors are being tested or developed that promise to be useful. However, it may be several years before they are available. Thus conventional ripping and fumigation techniques that are currently available and known to be successful, even if costly, (Wood 1985) were chosen. In the N.T. in addition to patchy distribution we also have the advantage of irregular rainfall to assist in long term control.

Between mid-1988 and late 1989 approximately 850 warrens averaging about 22 warrens/km² had been ripped in three localised populations on Erldunda. Control was effective but persistent monitoring of ripped warrens was required where only part of a patch had been ripped to prevent reinvasion from other warrens in the patch. Forage growth from destocked areas where rabbits had been controlled was impressive compared to destocked areas where rabbits had not been controlled.

The massiveness of the warren ripping project on Erldunda and the anti-cipated improvement in rangeland quality suggested a large scale ripping program would allow the Station to realise its goals within a reasonable time frame. Assistance from government was sought to coordinate a large scale, regional cooperative effort. Financial and logistic assistance from the N.T. Feral Animal Committee and N.T. Soil Conservation Advisory Committee permitted development of a proposal which the newly formed Centralian Land Management Association used to apply to the National Soil Conservation Program for financial assistance during the first year of the Federal Government's decade of land care. The project aimed to demonstrate that rabbits could be controlled and over a 10 year period it could be economically as well as ecologically sound. CLMA coordinated the program which involved equal contribution from pastoralists, NSCP and N.T. Govt. Pastoralists provided equipment, maintenance, staff, and organisation and NSCP provided funds for fuel and labour. N.T. Govt. Depts. would provide staff for monitoring rabbit numbers, vegetation recovery and economic aspects including animal production. An area of approximately 250km² at the junction of Erldunda, Lyndavale and Mt. Ebenezer Stations on calcareous Earth soils in Ebenezer L. S. was chosen for the demonstration trial.

This report presents results of control of rabbits on Erldunda in two facets: control by the Station itself and control by the CLMA cooperative demonstration program (CLMA 1991).

METHODS

Erldunda Station

Warrens were ripped as opportunity permitted and aimed to rip all warrens in particular patches. However, the tractor was frequently required for other jobs on the station and partly ripped patches developed over the Station. Restricted breeding opportunities reduced the possibility of reinvasion before a whole patch was treated. Most warrens were ripped with a John Deere 2140

4-wheel drive tractor with four 750mm tynes on a "Chris Grow" ripper but some were ripped with a Kubota M6950 4WD 60 HP tractor or D4 Caterpillar. Warrens were cross-ripped to 500mm. Special attention was paid to outlying holes around the warrens. Buffel Grass seed was hand sown over the warren.

At opportune times following ripping, warrens were inspected for open holes and fumigated with phosphene tablets and closed with dirt or re-ripped if needed. If rabbits were seen in areas that had been ripped, warrens were checked as soon as possible. The relatively open nature of the country made this a useful technique for follow up control.

Costs of ripping and fumigating were kept by logging the time spent and calculating the cost of operation of the tractor and manpower and materials using standard costs and depreciation. Inevitably some of the work time was not recorded. The number of warrens ripped was estimated on the basis of Land System treated. Consequently, work time is probably under-estimated, but so too would numbers of warrens ripped be underestimated. The area treated was calculated from 1:100 000 maps.

CLMA Demonstration Area

The methods were basically the same as on Erldunda Station except that 1080 baiting using two free feeds of oats was done by CCNT Wildlife Section prior to ripping. Spotlight counts of rabbits were made before and after baiting. Ripping was done with a minimum of three tractors and bulldozers from the three properties all ripping to a nominal 500mm. Species composition and vegetation production (White in CLMA 1991) and accounting for costs and gains (Cann in CLMA 1991) resulting from the project were monitored by DPIF. Vegetation monitoring sites were established in treated and untreated areas in "slightly undulating plains on gravelly red calcareous earths" land unit 3.2 mapped by CCNT Land Conservation Section (Grant and Whittard in CLMA 1991).

RESULTS

Erldunda Station

In 4.5 years about 267km² have been ripped and fumigated in 14 locations. Most have been in Ebenezer and Kalamerta L.S.'s, and the total number of warrens ripped is estimated at 3926 (Table 1). Cost of ripping and fumigating these warrens is estimated at \$250/km², including tractor time, labour, travel time, maintenance and depreciation. Follow-up fumigation has not been costed as it is done opportunely during short time periods.

Table 1. Area by Land System and estimated number of warrens ripped on Erldunda Station between 1988 and mid-1992.

Land System	Area Treated	Warrens /km ²	number of warrens
Kalamerta-2	45.2	22.5	1017
Lindavale	11.	11.	121
Ebenezer-1	177.9	15.	2669 (1155) ^a
Amadeus	3.3	6.5	21 (5.2) ^a
Simpson	29.4	3.3	97 (44) ^a
Singleton	0.7	0.8	1
Total	267.4		3926

Note ^a Included here is 77km² carrying 1203 warrens ripped as part of the CLMA demonstration project. This area is not included in the calculation of costs for the Station.

Effectiveness of the warren control program is shown by the spotlight counts of rabbits on the Knob Plain on Erldunda which was ripped in 1988 (Table 2). Rabbits crashed in January 1991 during hot weather but prior to that had been increasing steadily over 3 years in areas which had received favourable rains in the southern N.T. Mt. Cavenagh Station is 80km south of Erldunda and Owen Springs is 160km north.

Table 2. Density of Rabbits (no./km²) with standard error at 4 sites in southern N.T. 1988 to 1991.

<u>Location</u>	<u>1988</u>	<u>s.e.</u>	<u>1989</u>	<u>s.e.</u>	<u>1990</u>	<u>s.e.</u>	<u>1991</u>
Erlidunda							
uncontr	97	24	165	39	208	23	1
ripped	n.e.		0		9	5	2
Mt. Cavenagh	159	48	427	78	338	64	-
Owen Springs	13	6	36	20	4	1	-

CLMA Demonstration Area

In the 15 month period from November 1990 an estimated 3645 warrens in the 250km² area have been ripped by tractor or bulldozer. All three Stations have extended the ripped area outwards toward natural boundaries of rabbit distribution so that well over 4375 warrens in 304km² have now been treated. Intensive spotlight counts by CCNT before and after baiting showed baiting reduced rabbit numbers by 55 to 85% and ripping further reduced it by 94 to 98%. Most rabbit baiting on the demonstration site took place after a heat wave reduced numbers to about a quarter. Comparison of the counts on conventional transects in the demonstration site showed rabbits at about 15 to 35/km² before the baiting and ripping and 1 to 13 after ripping where they had been over 200/km² during winter, 1990.

The cost of baiting, ripping and fumigating assessed by DPIF show the cost to be \$474/km². This cost comprises 1080 \$81/km², Ripping \$238, seeding \$24, follow-up monitoring and fumigation \$31, sundry management \$50 and capital expenditure \$50.

DISCUSSION

The difference in cost for rabbit control on the Station as compared to the CLMA demonstration reflects the difference in intensity of approach. Station figures are less accurate but they do not include management and capital expenditure or baiting cost. The larger and more intense operation of the CLMA project had extra maintenance costs due to staff turnover with consequent operator inexperience and less dedication. The CLMA project highlights the administration cost usually absorbed into normal Station costs. Baiting with 1080 was done by CCNT and the cost of poison and labour was an extra option of the project. During the first two months of the program baiting was useful in reducing the high population of rabbits, eg 1956/km² to 501/km² (Berman and Clarke in CLMA 1991). However the heat wave in early January in a droughted land reduced the number of rabbits from 1956/km² in Dec. to 571/km² in January. Baiting could have ceased at this stage thus reducing cost by \$80/km².

Follow-up monitoring and fumigation has been costed in this project at \$31/km². Long term monitoring of ripped areas may present a real problem for pastoral properties such as Erlidunda due to the large area involved. However, effective initial ripping minimises the monitoring required (Mutze 1991) and even if opened warrens are closed only every two or three years control of rabbits should be maintained.

It is worrying that the natural crash in populations resulted in the same numbers as the treatment. (Mutze 1991) has shown that rabbit re-invasion is retarded where warrens have been ripped and it is anticipated that with the return of good seasons rabbits will remain low in treated areas while they increase in areas not treated.

Spreading Buffel Grass seed has been costed at \$24/km². Native grasses such as Desert Blue Grass, *Bothriochloa ewartiana*, may be useful in clayey red calcareous Earths on Erlidunda (Kube pers. comm. 1990). Re-establishment of a perennial grass that can take advantage of storms would enhance productivity.

The CLMA project ripped nearly 4000 warrens in 15 mo. compared to the Station effort where 3900 warrens were ripped over 4.5 years. The quicker control of rabbits in the CLMA project allows three and a half years earlier recovery for vegetation and animal production to offset additional costs resulting from the

larger scale of operation. The increased net benefits may be equivalent to 2 cattle/km² (Foran *et al.* 1985) or \$99/km² (Cann 1991). The early drought cost in loss of forage, forced cattle sales and pressure on shrub and perennial grass species is enormous. Rabbits have kept *Acacia kempeana*, an important top feed from regenerating on most of Erldunda. Control of rabbits to below 2 rabbits/km² should permit recovery of these shrubby grasslands. The improved carrying capacity should be used to improve growth rates, reduce death rates, allow greater flexibility in marketing and reduce handling costs of cattle.

CONCLUSIONS

The prospects demonstrated by ripping warrens on Erldunda are good. Additional stresses imposed here at the northern edge of their range are important in reducing the density within occupied areas or the area occupied.

Economic evaluation of the cost of rabbit control must be looked at over the long term, 10 to 20 or even 50 years, not the short term unfortunately dictated by interest rates. The economic benefits of, for example, having additional forage to carry stock through climatic as well as market droughts falls in the grey area of economics where analysis is not possible because long term data are not available (Cann 1991). However control of rabbits presents an opportunity for increased animal productivity as well for rehabilitation of lands, vegetation and fauna and we should attempt to take advantage of the opportunity. Fiscal policies, particularly in this decade of land care, should provide incentives to invest in our land.

The cooperative approach taken here by the CLMA project permits large areas to be treated in a short time thus reducing the possibilities of reinvasion. The possibility of mobile teams of three or four tractors or dozers from nearby Stations attacking large areas of warrens on particular Stations at opportune times would require difficult coordination but would likely pay economic and ecological dividends.

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