



Rabbit Control Program Kanmantoo Copper Mine

Autumn 2015

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1 INTRODUCTION

The EBS Group was engaged by Hillgrove Resources Pty Ltd. to conduct a rabbit baiting program on northern sections of the mine lease as well as Significant Environmental Benefit (SEB) areas to the east of the mine lease. The European Rabbit (*Oryctolagus cuniculus*) is a serious environmental pest which causes devastating losses both on an environmental and financial basis. Their ability to dig warren complexes allows them to become established in environments which would be otherwise unsuitable and protects them from a wide range of predators.

Significant effort and resources are being spent on improving the vegetation condition through a range of means ranging from weed control through to extensive seeding and planting of ex pastoral land utilising seed production areas and nursery stock. To gain the maximum benefit from this work it is imperative that pest animal numbers are kept at minimum density levels to ensure the highest establishment rates for seeded and tubestock plantings are achieved.

1.1 Objectives

The specific objectives of the rabbit control program are as follows;

- Timed to coincide with periods of low food resources following extended dry periods
- Reduce the density of existing rabbit populations
- Increase success and efficiency of revegetation work
- Quantify success or otherwise through rapid density assessment techniques
- Remove dead rabbit carcasses post baiting program

1.2 Project area

The project area is located approximately 45 km south-east of Adelaide in the southern Mount Lofty Ranges of South Australia and 1.5 km south-west of the Kanmantoo township. The area is representative of a transitional zone on the eastern face of the Mount Lofty Ranges, between the Adelaide Hills woodland regions and the Murray River Plains mallee. It has a long term average rainfall in the range of 400-450 mm and encompasses a variety of soil types and geological structures conducive to a range of vegetation types and habitat niches.

The project area has been used previously for mining activities, the first during the mid nineteenth century, and then again from 1971 to 1976 (Hillgrove Resources 2007). Over the past 150 years, much of the Mine Lease Area (MLA) area has been extensively cleared for cropping, whilst the vegetated areas have been grazed by domestic stock. As a result, there are only small remnant patches of native vegetation remaining in the MLA area which have persisted, including native grasslands and woodland communities.





Figure 1. Location of proposed rabbit baiting program.



2 METHODS

The methodology has been designed using both a desktop assessment and through advice provided by Adelaide and Mount Lofty Ranges Natural Resources Management Board (AMLRNRM) authorised officer, Dwayne Godfrey at Mt. Barker.

2.1 Desktop assessment

2.1.1 *Quantifying actual rabbit density*

In order to measure the success of the rabbit baiting program, a means of quantifying the population density before and after the baiting program is essential. Survey methods for measuring rabbit density are notoriously difficult to assess either through the time required or inaccuracy due to the level of cover or ability to provide a visual analysis. Some camera trapping has been undertaken at the Kanmantoo mine in recent times and while rabbits were observed it is hard to determine whether there is repeat visits by one rabbit or many visits by separate individuals. Studies undertaken by Latham, Nugent and Warburton (2012), showed that camera trapping was a suitable method as long as the camera density was around 6-8 cameras /100ha and that a minimum of 5 consecutive days before and after were sampled.

A method recently published by Mutze et al. (2014) uses 0.1m² plots that count rabbit pellet density in a linear transect. This may prove hard to quantify density changes in the short term as rabbit pellets have been shown to have a life of around 12 months. A count using a transect with 200 0.1m plots will be used to calculate a general average rabbit density for the Kanmantoo mine.

2.1.2 *Control methods*

There is a variety of control methods used for rabbits. Manual intensive methods include shooting, ferreting, warren ripping, fumigation and trapping. Baiting is another method that provides rapid and widespread control over a large area with low inputs required. It is effective in that it can be used in semi rural areas where shooting may be an undesirable method. It is proposed that baiting be undertaken as the first step in an integrated management program which can then be followed up by warren ripping and fumigation where access is limited.

2.1.3 *Bait selection*

1080 and Pindone are the most commonly used baits in rabbit control. Pindone is often used in areas where there are urban zones in close proximity as there is an antidote and is slow acting so provides a lower risk for pets and accidental poisoning. Pindone is usually supplied in conjunction with oats or carrots. Oats have been shown to have higher uptake by non target species in areas where native fauna are present so carrots have been selected as the best bait.

2.1.4 Timing

The program has been timed to coincide with late March as this is the period when feed has typically been limited following the summer dry period and grazing from native and introduced species. Rainfall in this region that will sustain germination and establishment of annual grass and herbaceous species typically arrives around mid to late April so completion of the program prior to this period is ideal.

2.2 Bait laying methodology

2.2.1 Application timing and rates

The bait application program requires two free feeding periods spaced around three days apart. The suggested rate is 4.3 kg/ha laid in a furrow. This is followed by two baiting periods with a rate of half the free baiting rate spaced 3 days apart.

2.2.2 Off target minimisation

In order to limit the off target risk associated with native fauna it is suggested that a number of bait stations are used that restrict Kangaroos and Euros from accessing the carrots. Other species such as Brushtail possums will have limited access through not providing baits in close proximity to bushland areas. Close monitoring of the pre feeding baits may allow an insight into how much off target take up there is.

There may be potential for mesh canopies that exclude macropods but allow access to rabbits to be placed over bait stations if it is thought that excessive take up is happening from native fauna.

Carcass removal following a three day lag period before deaths start to occur will also be required to limit the likelihood of native fauna such as raptors from getting secondarily poisoned from dead rabbits.

2.2.3 Location

Rabbits are territorial and rarely move more than 200 metres from their warren complexes (AMLRNRM 2014). Rabbits do not however like feeding in the immediate area of their warrens and therefore baits should be placed in the prime feeding areas. This means that identifying and recording these positions plays an important role in the management and control of this species. A number of bait stations at intervals of a minimum of 30m from warren complexes as well as another 40m out from the 30m bait station.

Rabbits like disturbed soil and will investigate areas where soil has been moved. It is for this reason that a furrow is dug using a grubber or mechanical means to give a furrow 10cm wide and 2cm deep and baits placed in these (Pest Smart 2012). Baits should be laid in the evening.

Monitoring of the free bait utilised should occur to give the best indication of poison baits required. Sufficient bait is required to allow each rabbit to consume 15-30g of bait from each application. Adjust quantities so that no more than 20% of the bait remains the following day.

A standard operating procedure is to be adopted to ensure the consistency of baiting. This can then be tweaked to provide improved outcomes as results come to hand for following programs. At this point the SOP will be as follows;

- Bait stations rather than strips to target warren and high rabbit density areas and reduce off target take up.
- Rate of 0.5kg per bait station consisting of 1 x 2m long furrows, parallel to each other 1m apart.
- Target of 30 individual sites with maximum of 4 bait stations per warren complex with 2 at 30m from warren and 2 at 40-50m.
- Baits placed in afternoon period and checked following morning for take up with estimated weight remaining. Take up rates calculated for poison bait order one week before anticipated
- 2 free feeds at three day intervals followed by 2 bait feeds for four days each.
- 4 remote trail cameras in place along selected furrows to indicate off target utilisation and rabbit activity.
- Follow up carcass removal for no less than 12 days following final baiting period. Carcasses to be buried at depth of no less than 500mm below soil surface.
- All bait left uneaten after final baiting period to be collected and buried 500mm below soil surface.

A data sheet has been formulated to record the locations, take up rates and other observations. This is provided in Appendix 1.

3 RESULTS

3.1 Rabbit density

3.1.1 Quadrat counts

Quadrat counts were undertaken at a single site. Using methodology as discussed in section 2.1.1. Two hundred 0.1m quads were analysed which gave the following results. There was a mean pellet count of 1.03 per plot. Using the formula as prescribed in Mutze et. al,

$$\text{Den} = -0.0008 \times \text{DO}^3 + 0.0565 \times \text{DO}^2 + 0.86 \times \text{DO}$$

This resulted in a mean rabbit count of 0.094/ha⁻¹. It is expected from this count that there are potentially 127 rabbits within the Kanmantoo mine area proposed for baiting.

3.2 Free feeding

3.2.1 Trial feeding

Free carrot feeds were first implemented at four sites using the standard methodology as above. This resulted in significant uptake by Kangaroos. Remote trail cameras were placed at bait stations which gave an idea of what uptake rates were from different animals. Trail camera photos showed uptake was contributed to by Rabbits, Possums, White-winged Choughs, Kangaroos, and to a lower degree, foxes.



Figure 2. White-winged Chough eating carrot at bait station.



Figure 3. Kangaroos eating carrots at bait station.

Following the first bait uptake, the second free feed was undertaken using wire cages which restricted access to carrots by kangaroos but still allowed rabbits to have access (Figure 4). This resulted in uptake by rabbits with minimal disturbance from Kangaroos despite extensive time spent trying to gain access to carrot baits (Figure 5). Rabbits did not participate in bait consumption while Kangaroos frequented the area. When Kangaroos vacated the area, Rabbits re-entered the zone and were observed utilising caged bait stations within three minutes (Figure 6). All feeds following the wire cage installation were recorded.



Figure 4. Wire cage for prevention of off target utilisation.



Figure 5. Kangaroos trying to access carrots for rabbits.



Figure 6. Rabbits utilising bait station following cage setup.

3.2.2 Bait Feeding

Subsequent bait uptakes at the sites remaining are shown below in Table 1. Highest uptakes were observed at warren 1 which also had the highest level of trail camera observations pre baiting. Three furrows were re located following the first free feed due to off target utilisation. Warren two was also highly active with close to 100% take up of all baits. Warren 3 had low take up and furrow 1 was taken out of action as of 8th April due to possum observations. A total of just under 27kg of carrots was fed out over the period excluding the initial first feed (Table 2). 14.65 kg of Pindone baited carrots was added during the baiting period. No bait was added to the remaining furrows on the last bait feed due to minimal take up which might be a reflection of deaths occurring prior to this period.

Table 1. Take up total percentage.

Warren #	Free Feed (% take up)		Bait Feeds (% take up)			Total
	1	2	3	4	5	
1 (max 400)	400	400	260	340	360	1760
2 (max 400)	250	270	300	400	360	1580
3 (max 300)	180	100	60	60		400
4 & 5 (max 200)	100	70	20	120	200	510

Table 2. Kilograms of bait added per feed.

Warren #	Free Feeds (kg)		Bait Feeds (kg)			Total
	1	2	3	4	5	
1	2.4	2.4	3	2	1.8	11.6
2	2	1.6	1.6	1.6	2	8.8
3	1.6	1	0.75	0.6		3.95
4&5	0.8	0.5	0.5	0	0.8	2.6
Total	6.8	5.5	5.85	4.2	4.6	26.95

3.2.3 Off target utilisation

Brush-tail Possums were observed consistently utilising carrot free baits on numerous occasions (Figure 7). While lethal dose rates (LD50) are readily available for 1080 baits on a wide range of native fauna species, Pindone is very much an unknown. However, it is registered for use in possum control in New Zealand. Due to this, sites where possum uptake was observed were removed from the program. This was in all cases where there was a continuous tree canopy present.



Figure 7. Brush-tail Possum observed in bait cage.

4 DISCUSSION

Three baiting periods were conducted in a time span that allowed most of the bait to be available to rabbits prior to widespread rainfall which first occurred on 8th April followed by good falls on the 16th of April 2015. Following the first rains, greenness was clearly evident by the 14th of April across much of the Southern Lofty Ranges. Effectiveness of baiting after this point would drop considerably due to the availability of new green feed in the area.

There were three carcasses observed in the areas where baiting occurred and these were disposed of by burial on the TSF pit at a depth of 500mm.

Follow up camera trapping has identified rabbits on two occasions over a period of 6 days. Camera trapping post baiting suggests that control was successful at the warrens where bait stations received the full program. Steven McGovern from EBS Restoration reports that there are still regular sightings of rabbits within the woodland areas in the northern extent of the Mine lease. Unfortunately, due to off target utilisation, some active warren systems were left without baits. It would be recommended that future baiting activities are combined with warren ripping and fumigation where baiting is not appropriate.

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6 APPENDICES

Appendix 1. Rabbit baiting observations data sheet.

Kanmantoo Mine Rabbit Control Data Sheet														
Site #:							Observers:							
Habitat type:														
Rabbit activity type eg; Warren/Buckheap:														
Remote trail camera #:														
Furrow	Location		Free baiting #1			Free baiting #2			Poison baiting #1			Poison baiting #2		
	Easting	Northing	Date	Bait Weight (kg)	Take up (%)	Date	Bait Weight (kg)	Take up (%)	Date	Bait Weight (kg)	Take up (%)	Date	Bait Weight (kg)	Take up (%)
1														
2														
3														
4														
General Notes/Comments:														
Rabbit carcass removal and disposal:														



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