

Background

Warren destruction by ripping is used to minimise the impact of the introduced European rabbit (*Oryctolagus cuniculus*) on agricultural production and the environment. Other rabbit control methods include poisoning, warren destruction using explosives, warren fumigation, surface harbour removal, shooting, trapping, exclusion fencing and biological control with rabbit haemorrhagic disease (RHD) and myxomatosis.

In many areas of Australia, rabbits depend on warrens for shelter from climatic extremes, predator avoidance and also for successful breeding. Warrens are destroyed using ripping or, in rocky or inaccessible areas, explosives. Since rabbits do not readily dig new warrens, rabbit populations do not persist in areas where warrens are effectively destroyed and re-colonisation is made less likely.

Warrens are destroyed using a tractor or bulldozer fitted with single or multiple-tined rippers. The technique used will vary depending on local conditions such as soil type, position of warrens and type of equipment available. Ripping will be more humane when the number of rabbits in the warren is low and when powerful machinery is used to achieve complete disintegration of the warren, so that the rabbits are killed quickly. Because ripping gives long term management of rabbit populations the need for repeated control operations is reduced.

This standard operating procedure (SOP) is a guide only; it does not replace or override the legislation that applies in the relevant State or Territory jurisdiction. The SOP should only be used subject to the applicable legal requirements (including OH&S) operating in the relevant jurisdiction.

Application

- Warren ripping should only be used in a strategic manner as part of a co-ordinated program designed to achieve sustained effective control. Reducing and maintaining low rabbit numbers by a combination of control methods over time is more effective than repeated (seasonal) use of a single method.
- Where warrens are the principal shelter for rabbits, ripping is the most cost effective and most long-lasting method of control. It is a critical component of rabbit control programs especially in broadscale areas such as the rangelands.
- Ripping is best suited to large scale operations. However, it may not be suitable in the following situations:
 - where locations are inaccessible to available equipment e.g. on steep slopes, very rocky land, along fences or riverbanks, around trees;

- where rabbits inhabit scrub with few warrens; or
- when there is a risk of soil erosion or damage to conservation areas.
- Ripping is most effective when rabbit numbers are already low, such as after a baiting program, drought or disease outbreak or at a time when rabbits are not usually breeding. The aim of ripping is to destroy the warren and prevent re-invasion, not to kill large numbers of rabbits.
- Sandy soils should be ripped when dry so that the collapse is more complete better and the soil will flow into the deeper tunnels. With heavier clay soils, it is best to rip when they are slightly damp. Ripping clay soils when they are too dry will result in large lumps of soil creating pockets where rabbits may survive and continue to live in the modified warren.
- Clearing surface harbour such as blackberry stands, hollow logs and rock piles may need to be performed prior to warren destruction to enhance the effectiveness of control programs and to slow re-colonisation.
- Trained dogs can be used to chase rabbits underground prior to warren ripping. However, it is unacceptable, and in some jurisdictions illegal, to set a dog onto a rabbit with the intention of catching or killing it.
- Clearing of native vegetation or disturbance of sites with aboriginal or archaeological significance is subject to compliance with various local, State and Commonwealth legislation. If in doubt, always check with the appropriate authority before undertaking warren and harbour destruction programs.

Animal Welfare Considerations

Impact on target animals

- Ripping of the warren causes it to collapse and the rabbits are usually crushed or suffocate. The weight of the soil prevents effective movement of the rabbit's diaphragm resulting in asphyxia.
- When complete destruction of the warren is achieved, time to death is thought to be quick. This is most likely in areas with fairly loose soil and where powerful machinery is used.
- Failure to cause complete collapse in deep warren systems may result in some rabbits becoming trapped in partly destroyed tunnels and then suffocating or starving over a long period of time. Some survivors may be able to dig out and re-open the warren. It is essential that the tunnel system is completely destroyed so that all rabbits die as quickly as possible and there is little chance of warrens being re-opened.
- Direct mechanical wounding can occur from the ripping tines. If rabbits are found that are injured but not killed, these must be destroyed by a shot to the brain or by cervical dislocation. Rabbits found injured above ground after ripping should not be left to die slowly.
- It is more humane to perform ripping when rabbit numbers are at their lowest e.g. after drought, disease or poison baiting or when they are not breeding. This means that lower numbers of rabbits will be killed by this relatively inhumane technique.
- Ripping also affects rabbits that are not inside the warren at the time by depriving them of shelter from extreme heat, cold and predators. Most rabbits

that are forced to live above ground after their warren has been destroyed will have little chance of survival.

Impact on non-target animals

- Ripping can kill animals other than rabbits if they are inside the warren at the time. If a warren appears to be vacated by rabbits and possibly occupied by non-target species (e.g. wombats, snakes, dingoes), warren destruction must not be performed.
- Warren destruction may also have a negative impact on non-target species that use the warren or surrounding harbour, by removing their protection from extreme heat, cold and predators. Harbour such as native vegetation, logs and briars that are used by rabbits may also be an important habitat for native animals including amphibians, reptiles, small mammals and ground-dwelling or ground-feeding birds. The benefit of rabbit harbour removal should be assessed against the risk to native wildlife especially in conservation areas.
- Non-target native animals that are inadvertently injured or displaced during the ripping or harbour removal procedure should be taken to a registered wildlife carer or veterinarian for assessment.
- If using dogs to work an area prior to warren destruction, the following should be observed:
 - Dog handlers must be experienced and the dogs well trained i.e. they must be easily controlled by a whistle or call, obey the handlers' commands and will not chase or attack non-target animals including domestic livestock. Dogs that are deliberately bred or trained to attack without provocation must not be used. Suitable breeds would include terriers, labradors and others that are keen to chase but unlikely to catch a rabbit.
 - Handlers must not encourage dogs to attack and kill rabbits. Rabbits trapped in hollow logs etc. (where they are visible but the dogs can't access them) should be shot (refer to **RAB009 *Ground shooting of rabbits***).
 - Rabbits caught by dogs should be killed by a shot to the brain or by cervical dislocation. Rabbits should never be left to die slowly after being maimed.
 - Ensure that small dogs are not inside the warren before ripping takes place. They should be well restrained during ripping to prevent them from entering the warren.
 - For more details refer to **GEN002 *The care and management of dogs used for pest animal control***.

Health and Safety Considerations

- General safety precautions for using agricultural machinery must be followed. People can be killed or seriously injured falling from moving tractors, being run over by tractors, or being crushed when a tractor rolls sideways or backwards.
- Tractors must be fitted with an appropriate rollover protection structure.

- Operating heavy machinery on sloping ground can be dangerous. The maximum slope that can be ripped varies with the nature of the surface and each site must be accurately judged for safety. A measuring device should be used to assess the degree of slope if unsure of the limits. Rough ground will reduce the slope suitable for ripping. Tractors are unsuitable on steep slopes, whereas tracked machinery, such as bulldozers, are more stable.
- Further information on occupational health and safety aspects of operating heavy machinery can be obtained from the relevant State or Territory OH & S authority.

Equipment Required

Machinery

- The type of equipment used for ripping will depend on soil type, size and topography of area to be treated, cost and availability. From an animal welfare perspective, more powerful equipment is preferred as the warrens are more likely to be completely destroyed.
- Rubber tyred conventional tractors are best suited for treating areas with low numbers of warrens on relatively flat and non-clay soils. Smaller tractors are more cost-effective for follow-up ripping and where travel time between warrens is high relative to the time spent ripping.
- Steel or rubber-tracked equipment may be more efficient for areas with large numbers of warrens on steeper slopes. Large machinery is most cost-effective for initial ripping operations.
- A ripping tine on an excavator (ripper arm) can be effective in awkward locations.
- A blade plough may be the most appropriate type of equipment in areas with sandy soil that is at risk from wind erosion.
- Rippers with single, double or triple tines can be used depending on the tractor available and the soil type. If multiple tine rippers are used they should be no more than 50cm apart.

Procedures

Assessment of site and estimation of rabbit numbers

- To maximise effect on rabbit populations, a careful on-site risk assessment should be undertaken. Map the location of all warrens (include active/inactive and accessible/inaccessible warrens), note the presence of surface harbour and topographic features. For large areas, experienced spotters on motorbikes can log the location of warrens using GPS before warren destruction commences.
- The density of rabbits on the site should be estimated using spotlight counts and warren monitoring. The location and numbers of rabbits on neighbouring properties should also be approximated. If the density of rabbits is high it is best to poison or fumigate beforehand so that few rabbits are left.
- If it is suspected that native wildlife are using the warren, their presence can be determined by using sand pads - a 1m² area of raked earth or sand outside of the warren entrance- to detect and identify footprints.

- Contact your vertebrate pest control local authority for more information and advice on site assessment and monitoring of rabbit numbers.

Ripping procedure

- Clear warrens of logs, rocks, woody weeds and large shrubs etc. Take care not to endanger any native wildlife that may be using the harbour.
- It is important to drive any rabbits in the area underground before ripping takes place. This can be achieved by making loud noises or using dogs to work the area, chasing the rabbits into the warrens. Most rabbits will be underground during the middle of the day especially when the weather is hot.
- All warrens with open entrances should be ripped even if they are not currently active. Explosives may be needed if warrens are inaccessible (refer to **RAB007 *Rabbit warren destruction using explosives***).
- Rip the warrens to a depth of at least 700 to 900 mm and at least 2 to 3 metres beyond the edge of the warren to destroy burrows that have entrances on the edge of the warren and lead outwards. The deeper the ripping the greater is the destruction of the warren system.
- In some areas cross-ripping may be necessary. Rip one way; then cross rip at right angles to the first rip.
- Smooth/backblade the ripped warren to compact the soil surface and make it less attractive for rabbits to dig back in. Extensively ripped areas can be sown with pasture seed to hasten re-vegetation and prevent soil erosion on sloping ground.

Assessing effectiveness

- The effectiveness of warren ripping should be monitored by noting the presence of re-opened entrances 2-3 days after treatment. If many burrows have been re-opened you will need to rip again, but if there are only a few, then fumigation may be a more economical option.

Procedural Notes

More detailed information on warren destruction using ripping can be found in various State guidelines (eg. vertebrate pest control manuals, Landcare Notes, Farmnotes etc.).

Further Information

Contact the relevant Commonwealth, State or Territory government agency from the following list of websites:

Commonwealth	Department of Environment and Heritage http://www.deh.gov.au/
ACT	Environment ACT http://www.environment.act.gov.au/
NSW	NSW Agriculture www.agric.nsw.gov.au
NT	Parks & Wildlife Commission www.nt.gov.au/ipe/pwcnt/
QLD	Department of Natural Resources and Mines www.nrm.qld.gov.au
SA	Animal & Plant Control Commission http://sustainableresources.pir.sa.gov.au
TAS	Department of Primary Industries, Water & Environment www.dpiwe.tas.gov.au
VIC	Department of Primary Industries, Agriculture & Food www.dpi.vic.gov.au
WA	Agriculture WA www.agric.wa.gov.au

Disclaimer

The views and opinions expressed in this publication are those of the authors and do not necessarily reflect those of the Commonwealth and New South Wales Governments or the Commonwealth Minister for the Environment and Heritage and the New South Wales Minister for Primary Industries respectively. While reasonable efforts have been made to ensure that the contents of this publication are factually correct, the Commonwealth and New South Wales do not accept responsibility for the accuracy or completeness of the contents, and shall not be liable for any loss or damage that may be occasioned directly or indirectly through the use of, or reliance on, the contents of this publication.



Natural Heritage Trust

Helping Communities Helping Australia

An Australian Government Initiative

References

- Anon. (1999). Threat abatement plan for competition and land degradation by feral rabbits. Biodiversity Group, Environment Australia.
- Anon. (2004). Vertebrate Pest Control Manual. Agricultural Protection Program. NSW Agriculture.
- Bloomfield, T. and Cummings D. (2003). Rabbits: Warren destruction and harbour management. Landcare Notes LC0297. Department of Sustainability and Environment, Victoria.
- Coman (1994). District Rabbit control: A guide for co-ordinators and leaders. Landcare Australia and Bureau of Rural Sciences.
- Dobbie, W. (1997). Rabbit control in Central Australia: A guide for landholders. Centralian Land Management Association, Alice Springs.
- Edwards, G.P. Dobbie, W. and McK.Berman, D. (2002). Warren ripping: its impacts on European rabbits and other wildlife of central Australia amid the establishment of rabbit haemorrhagic disease. *Wildlife Research*, **29**: 567-575.
- Hart, Q. (ed.) (2003). Conventional rabbit control: Costs and tips. Bureau of Rural Sciences. Big Island Graphics.
- Linton, V. and Cook, B. (2001). Warren destruction. Fact Sheet, Rangelands Note. Primary Industries and Resources, South Australia.
- Robinson, M. (1996). Rabbit control: rabbit warren and harbourage destruction. Farmnote 101/1996 (reviewed 1999). Department of Agriculture, Western Australia.
- Williams, K., Parer, I., Coman, B., Burley, J and Braysher, M. (1995). *Managing vertebrate pests: rabbits*. Australian Government Publishing Service, Canberra.
- Williams, C. K. and Moore, R. J. (1995). Effectiveness and cost-efficiency of control of the wild rabbit, *Oryctolagus cuniculus* (L.), by combinations of poisoning, ripping, fumigation and maintenance fumigation. *Wildlife Research*, **22**: 253-269.