

'Friendly' traps are designed to catch rabbits as they leave the warren and each trap can hold up to 4 or 5 rabbits without physical injury. The traps need to be checked each day to prevent prolonged distress to the trapped rabbits. They will catch rabbits of all ages and at all times of the year, and are ideal for rabbit control on 'Land for Wildlife', and other sensitive areas where fumigation may be deemed to be inappropriate. They are particularly appropriate if there is also a demand for skins and/or carcasses.

Most rabbits are reluctant to enter the traps. This is not surprising given that the traps are positioned in warren openings where rabbits are most wary. From within the burrow, the emerging rabbits have a very restricted view of the ground around the warren. They are very vulnerable to waiting predators such as foxes and cats as soon as they leave the opening. The rabbits will wait just inside the openings for quite long periods to reassure themselves that there are no waiting predators. Any scents of predators will obviously encourage the rabbits to stay in the warren.

The inner one-way flap of the trap must be pushed open by the emerging rabbit and if this flap is contaminated with human, dog or cat odours, the rabbit is most unlikely to venture into the trap.

If the trap can be pushed deeply into the burrow so that the inner flap is positioned well inside the opening, the emerging rabbit may push through the flap and become trapped before adopting the state of maximum alertness induced by the proximity of open ground. Covering the trap with opaque material may also shift the maximum alertness zone to the far end of the trap. When there is more than one rabbit waiting to get out of the warren, the second and later rabbits may actually push the hesitating first rabbit into the trap. Once one rabbit is in the trap the following rabbits do not appear to hesitate to push open the flap and become trapped with the first rabbit. The fear engendered by being trapped does not appear to be transmitted to the other emerging rabbits.

If wads of greasy wool are used to plug all the other openings except for the one opening with a trap, the time taken for rabbits to enter that trap is considerably shortened. The explanation for this observation is still speculative.

Most rabbits seem to be unable to dislodge the greasy wool plugs when digging from within the warren and they also seem to be reluctant to dig new exits. Therefore, all of the rabbits in the warren will tend to head for the opening with the trap, and the leading rabbit will be pushed into the trap by those further down the line.

With a trap positioned in every opening the ventilation of the warren is not reduced, but with only one trap, and all the other openings closed with greasy wool, the ventilation of the warren is significantly reduced, increasing the probability that the reluctant leader, waiting at the opening, will be pushed into the trap. The odour of the greasy wool may also be offensive to many rabbits and may encourage them to push and shove to seek fresh air.

If there is a trap in every opening, the ventilation is not compromised and the rabbits may resist entering the traps for many days. During this time, outside rabbits may dig around the traps or open up new entrances so that the rabbits still waiting in the warren can escape without entering the traps. It has been shown (Paoletti) that some rabbits will die in the warren rather than enter a trap.

If earth is used to close off any untrapped openings the earth fill is consistently dug through and the trapped exits are shunned. Openings blocked with solid objects such as rocks and logs are soon by-passed from either within or without. The greasy wool plugs are only rarely dislodged or bypassed, probably because the wool fibres become entangled in the claws of the forepaws rendering them ineffective as digging implements. The sheep odours and/or adsorbed human odours may inhibit attempts to clear the obstructing wool plugs.

Using a trap in every opening of a warren becomes rather expensive at \$12 per trap as most warrens have at least 4 openings. The wool plugs allow more warrens to be cleared with the same number of traps and each warren requires only 2 or 3 visits. If the wool plugs are left in place the warren will remain closed until the wool is either dislodged or by-passed and this may not occur for some months.

Another successful strategy to reduce trap phobia is to leave an inactivated trap in one of the main openings of the warren for several days. The rabbits become accustomed to the presence of the trap and will often go in and out of the warren through the inactivated trap (both flaps are held open with wire pegs).

Trapping with 'Friendly' traps, wool plugs and a trap-familiarisation period is practical as an intermittent weekend activity. After the familiarisation period, many rabbits will enter the traps overnight, and the trapped rabbits can be dispatched the next morning. The inactivated traps can be left in place for any convenient period because there is no possibility of any rabbit being caught in an inactivated trap. The trap activation and wool plugging can be delayed until there is an opportunity to check the traps on the following morning.

Traps should always be handled with gloved hands to reduce the additional deterrent effect of human odours. Conversely the wool plugs should be handled with bare hands to allow human odours to be adsorbed onto the wool fibres which perhaps makes the wool even more offensive to the rabbits.

Trapping should always be followed by fumigation to make sure that any 'stay-put' rabbits are destroyed. It has been shown that some mature rabbits are capable of staying in a warren for as long as 2 weeks.

Rabbits have shown that they are extremely adaptable and may be capable of learning to cope with this 'new' insult of wool stuffed up their warren orifices. However any strategy which can reduce both the number of survivors and the number of available underground refuges, may have a significant effect in tipping the balance in favour of rabbit predators, and long term control of rabbit populations may be improved.

The best time to focus on warrens with fumigation, trapping or ripping, is when rabbit numbers are low, - for example, in the autumn, winter and spring after summer outbreaks of myxomatosis and after 1080 poisoning campaigns. The survivors of 1080 poisoning campaigns are usually immature. (Either they do not venture far from the warren and do not reach the bait trails, or their more active and voracious seniors eat all the baits). Myxomatosis is not age selective and both mature and immature rabbits may survive. (Haemorrhagic fever may not be lethal for immature rabbits.)

FUMIGATION

If all of the rabbits are underground at the time of fumigation, and if lethal levels of fumigant are reached rapidly in all sectors of each warren, there should be no survivors from within the fumigated warrens. Under such circumstances, the fumigated warrens can only be re-colonised by immigrant rabbits from surrounding areas. It should be remembered that social groups may extend over several adjacent warrens and that all members of these social groups will be familiar with each warren. At any one time it would be unusual for all the rabbits to be at home in their warren.

Warrens fumigated with phostoxin and plugged with wool will remain closed in the absence of rabbits capable of digging in through, or around, the wool plugs. The wool appears to clog the claws of the fore-paws making them ineffective as digging implements. The clogging fibres may be removed by the teeth and the presence of human odours on the wool may discourage the rabbits from getting more wool fibres entangled on their claws.

Some mature rabbits, (bucks and does), have been able to dislodge some wool plugs from the outside, and have done so with great vigour, displacing the wool quite long distances from the warren openings. The field trial data recorded to date did not include details of how the wool plugs were handled and it is possible that some of the removed plugs had been handled with gloves with minimal human odours adsorbed onto the fibres.

Immature rabbits appear to be much less able to dislodge wool plugs than mature rabbits, and rabbits of all ages appear to be unable to dislodge the wool plugs when working from the inside of the warren.

Because they are less familiar with the warren layout, 'immigrant' rabbits are probably less enthusiastic than previously resident survivors in their attempts to re-open a wool plugged warren from the outside. Rabbits are guided by scent and appear to be able to recognise soil previously dug by other rabbits. Perhaps greasy wool with strong sheep aroma may put the rabbits off the track, and wool which carries strong human odours may be shunned completely.

At some times of the year immigrant mature rabbits with strong territorial ambitions appear to have no great difficulty in dislodging the wool plugs. This has been seen during January and February in several warrens in prime sites. Some of these warrens had been closed for up to 5 months and it is possible that there were no longer any human scents on the wool plugs.

In large warrens, after a few of the obstructing plugs have been dislodged the other wool plugs are usually left in place, suggesting that once access has been regained, and adequate ventilation established, the urge to continue the unpleasant task of dislodging the wool is reduced. (This reduction in the number of openings makes follow-up fumigation much less labour intensive).

TRAPPING

'Friendly' traps are designed to catch rabbits as they leave the warren and each trap can hold up to 4 or 5 rabbits without physical injury. The traps need to be checked each day to prevent prolonged distress.

Trapping with 'Friendly' traps and wool plugs, will catch rabbits of all ages and at all times of the year, and is an ideal strategy for rabbit control on 'Land for Wildlife', and other sensitive areas where fumigation may be deemed to be inappropriate. It is particularly appropriate when volunteer labour is available or if there is a market for skins and/or carcasses.

Trapping with 'Friendly' traps, wool plugs and a trap-familiarisation period is practical as a weekend activity because, after the familiarisation period, most of the rabbits will enter the traps overnight, and all trapped rabbits can be dispatched the next morning. (Without a familiarisation period trap phobia may keep the rabbits out of the trap for many days.) The inactivated traps can be left in place for any convenient period because there is no possibility of any rabbit being caught in an inactivated trap. The trap activation and wool plugging can be delayed until there is an opportunity to check the traps on the following morning. With only one or two traps per warren and all the other openings blocked with wool, ventilation of the warren is compromised and this may force the rabbits into the traps sooner than if all the openings contained traps and the warren ventilation was normal.

Traps should always be handled with gloved hands to reduce the additional deterrent effect of human odours. Conversely the wool plugs should be handled with bare hands to allow human odours to be adsorbed onto the wool fibres making the wool even more offensive to the rabbits.

Trapping should always be followed by fumigation to make sure that any 'stay-put' rabbits are destroyed. It has been shown that some mature rabbits are capable of staying in a warren for as long as 2 weeks.

Rabbits appear to have limited ability to dig new exits when working from within the warren. They can certainly escape via any old partly closed burrows and 'pop-holes' which may have been overlooked and not plugged with wool. They can also dig out through openings filled with tramped earth.

If only one or two traps are used per warren and the other openings are sealed with earth, the rabbits reopen the earth filled openings overnight and the traps are consistently shunned. Using a trap in every opening of a warren becomes rather expensive at \$12 per trap as most warrens have at least 4 openings. The wool plugs allow more warrens to be cleared with the same number of traps and each warren requires only 2 or 3 visits. If the wool plugs are left in place the warren will remain closed until the wool is either dislodged or by-passed and this may not occur for some months.

Rabbits have shown that they are extremely adaptable and may be capable of learning to cope with this 'new' insult of wool stuffed up their warren orifices.

However, any strategy which can reduce both the number of survivors and the number of accessible underground refuges, may have a significant effect in tipping the balance in favour of rabbit predators, and the control of rabbit populations may be improved.

Vol 2, No 2. Wool as a weapon in the war on rabbit warrens



Peter Thomson's family have been trying to revegetate their *Land for Wildlife* property, near Linton in western Victoria, for sixteen years but have consistently been frustrated by rabbits particularly as warrens are so difficult to eradicate in rocky granite country. Peter's concern with this problem has resulted in an innovative and unique method of control. In this article he explains the results of trials he is conducting using wool.



Set on a granitic hill near Linton, the Thomson's property, like many others, has a large population of rabbits. If the native vegetation aims for the property are to be achieved, and neighbours concerns allayed, rabbit control must be effective. Having been frustrated by what seemed an insurmountable problem, Peter Thomson believes he has found a useful tool to get on top of the rabbits - wool! Aerial photo: Peter Thomson.

Traditional warren fumigation, using either phostoxin or chloropicrin and earth sealing of all openings, is a commonly used method for killing the survivors of myxomatosis epidemics and 1080 poisoning campaigns. However, some rabbits are able to escape by digging out through the earth seals if gas concentrations do not rapidly reach lethal levels in all sectors of the warren. Also, any rabbits which were not in the warren at the time of fumigation can readily dig in through the earth seals. Whether reopened from within or without, the warren is again available as a refuge.

If wool plugs are used to seal all of the warren openings during fumigation, the number of both 'dig-outs' and 'dig-ins' are dramatically reduced. The forepaws of rabbits attempting to dig in or out through the wool become clogged with wool fibres and effective digging is prevented. A tight wad of suitable wool will remain in place for many months (and possibly indefinitely).

Some rabbits may construct new burrows to regain access to established warrens in prime sites. If these warrens are fumigated again, and the new openings sealed with more wool, even the most favoured warrens will soon be abandoned.

Predator pressure on the survivors becomes progressively greater as the number of rabbits and the number of underground refuges both diminish. Long term population control is possible and warren ripping is avoided.

In situations where fumigation may be prevented by the possible presence of indigenous fauna taking refuge in the warren, a similar strategy using wool plugs and *Friendly* traps can be very effective in mopping up rabbit survivors. The extra time and effort will be rewarded by achieving the eradication of rabbits without endangering any indigenous fauna. A tried and effective strategy for rabbit eradication is presented in the flowchart (page 5).

To be effective the wool in the plugs must

become entangled in the claws of the forepaws to make them ineffective as burrowing instruments. Very greasy short wool or very daggy wool may not be effective. The wool plugs need to be positioned in a fairly deep segment of the burrow within firm earth so that any rabbit trying to dig in or out must claw through the wool rather than just push the wool aside to gain entry or exit.

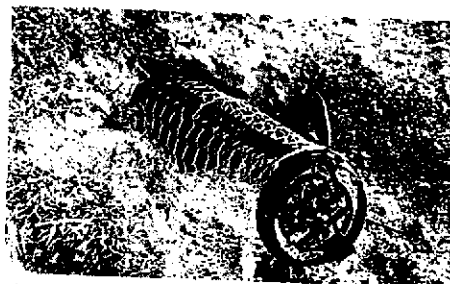
Relatively long staple greasy wool of low grades such as stained wool, fly-blown wool or wool plucked from dead sheep are suitable and can be used for rabbit control on the property. The savings achieved by having to fumigate less frequently will more than offset the income lost by not selling these low grades of greasy wool.

Carded wool seems to be much more tenacious than greasy wool and *Aussie wool* insulation batts cut into 30cm squares have proved to be ideal plugs for warren openings. Perhaps a similar product designed specifically for the task may prove to have a significant market and would create a very worthwhile new use for wool.

Whatever new methods of biological control are introduced in the future, there will always be a few rabbits which survive. It is imperative that simple and effective strategies for eliminating these survivors are available throughout the country before any new biological control methods are introduced.

Rabbit eradication flow chart - background and rationale.

Early in May this year when using *Friendly* rabbit traps to catch the survivors of a myxomatosis epidemic and a 1080 poisoning campaign, I observed that, with few exceptions, rabbits did not dig through plugs of wool placed within their burrows.



A Friendly rabbit trap. Photo: Peter Thomson.

Only one trap was used for each warren and all of the other openings were plugged with wads of wool covered with compacted earth.

I found that the rabbits either stayed in the warrens, went into the traps or dug new openings and only rarely were the wool plugs dislodged.

Immature bunnies tended to venture into the traps quite readily but mature rabbits showed a great reluctance to enter the traps. In some warrens the rabbits did not enter the traps for many days. The longest delay was between two and three weeks.

Sometimes the rabbits dug around the traps

and only rarely did entirely new openings appear. When other openings were discovered they were usually found to have been pre-existing 'pop-holes' or openings which had been overlooked at the outset.

Without the wool plugs, and using only one trap per warren, the earth-filled openings were reopened within 24 hours and the traps were consistently shunned.

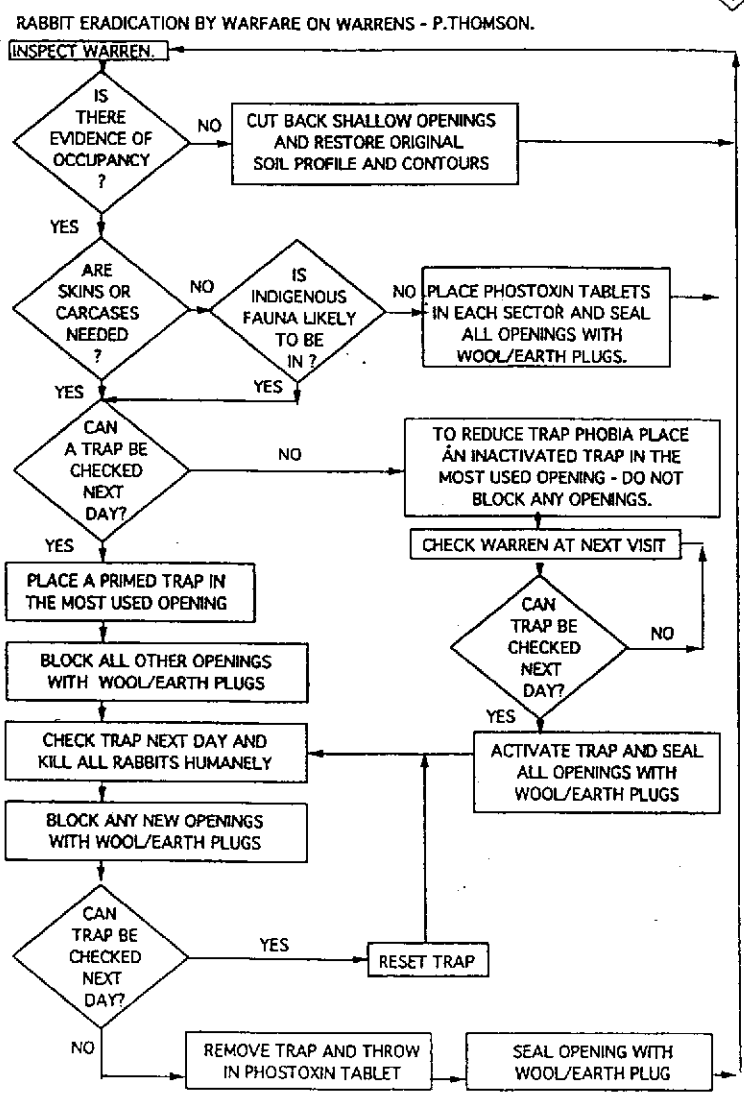
If there is a trap in every opening most rabbits will eventually enter a trap when hunger and thirst overcome their fear of the trap and, when one rabbit enters a trap, others seem to follow. It has been observed (Paoletti, pers comm.) that some rabbits die in the warren; they do not enter a trap and they do not dig out. They seem to be able to survive in a hibernation-like state for at least 14 days and, if the traps are removed without then fumigating the warren, these remarkable survivors are capable of continuing the species.

It also seems that rabbits may have problems constructing new outlets when working entirely from within the warren.

Trap-phobia is a most significant factor and severely limits the usefulness of traps. However, a period of familiarisation using an inactivated trap can result in rapid, predictable and high trapping rates when the trap is subsequently activated and the other openings plugged with wool.

Warrens which have been trapped and then fumigated with the use of wool plugs have shown no signs of being reoccupied after several months, whereas warrens trapped and fumigated at about the same time, without the use of wool plugs, have been reoccupied within less than three weeks.

A formal field trial to compare fumigation with and without wool plugs was commenced at Banongil East, near the western Victorian town of Skipton, on 11 September 1993 when, with the help of Royal Melbourne Institute of Technology students from the Landscape Architecture course, 70 warrens were fumigated in an area with a particularly high rabbit population. Twenty seven of the warrens were fumigated in the traditional way with earth sealing of all openings. Forty three warrens were fumigated with all of the openings sealed with either greasy wool or off-cuts from *Aussie-wool*[®] insulation batts. Early results confirm a significant difference in the time taken for the fumigated warrens to be reopened - most of the warrens fumigated without the use of wool have been reopened within two weeks and only a few of the wool-plugged warrens had been reopened at three weeks.



A flow chart for eradication of rabbits from warrens (see text for details). Prepared by Peter Thomson.

The wool plugs were dislodged in only two warrens and these dislodged plugs consisted of rather short staple dags. None of the carded wool plugs have been dislodged so far.

The area of the trial still has many rabbits as not all of the warrens in the area were fumigated and no attempt was made to exclude rabbits from adjacent paddocks. Predator pressure is minimal and above-ground cover is provided by abundant basalt boulders.

The results of this trial will be submitted for publication in due course. In the meantime I hope that others will also have success in using wool as an effective weapon in the war on rabbits.

Peter Thomson

As with all pest plant and animal control programs, there is clearly value in working as a group, across a large area, to achieve control.

Stephen Platt.

Did you know?

- that the first attempts to control Australian rabbits using bacteria were initiated by Louis Pasteur, the famous French scientist, in 1888 but were halted by quarantine authorities. The agent, chicken cholera baccillus, was later found to be useless.

- that a Brazilian bacteriologist was the first person to suggest using myxoma virus on Australian rabbits in 1918 but that trouble with sending the virus to Australia, a lapse of interest and the Second World War delayed its release until 1950-52. Source: Fenner, F. (1958) Myxomatosis in rabbit control symposium (Melbourne, Dep't Agriculture) Papers. CSIRO.

Feedback: We are interested to hear of your results using the technique proposed by Peter Thomson or any other rabbit control technique. Please write to The Editor, *Land for Wildlife News*, PO Box 137, Heidelberg, 3084.