

Field trials and operational results of a deer repellent for 1080 possum baits

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The pesticide sodium monofluoroacetate (1080) is widely used in New Zealand to control vertebrate pests such as possums, rabbits and rodents. It is regularly applied by aerial broadcast methods to forest environments for ecological restoration, tree crop protection or to control the spread of the livestock disease bovine tuberculosis (Tb).

However, use of this pesticide can also have a significant non-target effect on introduced wild deer. Reductions of between five and 93 percent have been observed during formal monitoring of wild deer herds exposed to aerial 1080 baiting, with average density reductions of around 50 percent (Fraser 1989; Nugent *et al.* 2001; Nugent & Yockney 2002).

While reduction in wild deer density may, in some situations, have conservation benefits (DOC 2001) or contribute to Tb control (Fraser *et al.* 1995; Nugent & Proffitt 1994), the non-target by-kill of wild deer generates significant public opposition to 1080 poison from hunting interests, landowners, iwi and in rural communities where hunting is an important social and economic activity.

Epro Ltd, an integrated wildlife management and research company based in Taupo, has developed a bait additive which remains highly palatable to possums (Forsyth 2002; Morriss *et al.* 2003) but eliminates or significantly reduces the non-target deer by-kill for 1080 baits distributed by helicopter (Nugent *et al.* 2004; Speedy 2005).

The product is a contact repellent which must be surface coated to the bait to be effective. It is a non-toxic, natural product which has been improved to enhance its efficacy in repelling cervids and its operational application. Field trials to date have mainly involved carrot bait, but some small scale trials using cereal based pellets have also been conducted. The results in terms of possum control outcomes from nine field trials or control operations covering some 29,000 ha of land since 2001 are summarised in Table 1. The residual trap catch (RTC) results, as assessed by independent contractors using the standard national protocol developed by the National Possum Control Agencies, show that all operations passed performance monitoring for possum control outcomes.

Deer by-kill following application of deer repellent 1080 baits has also been assessed through a range of either scientifically-designed comparative trials or more subjective post-operational assessments by stakeholders, on a case-by-case basis as opportunities and funding have allowed. Table 2 outlines the results of the eight operations in terms of non-target deer by kill.

Initial trials in July 2002 at Hampton proved inconclusive due to low numbers of deer present in the

Dead sika hind - Clements Road, Kaimanawa Forest, July 2003



area treated with deer repellent bait, although no dead deer were found (Lorigan *et al.* 2002).

The second field trial, over sika deer at Clements Road in June 2003, was undertaken as an opportunistic chance to assess the product's performance for a particularly susceptible deer species. Sika are small in size and have a largely ground feeding habit. Five dead deer (two adult hinds and three sub-adult animals), confirmed as poisoned, were found during a large, coordinated search effort on day nine after this operation (Speedy 2004). However, most of the 60 personnel involved in carcass searches saw live deer in the search area and all saw significant fresh sign. Previous 1080 operations over sika using carrot bait at similar sowing rates and toxic loadings have caused far more significant mortality in this species than occurred at Clements Road (Nugent & Proffitt 1994). Nevertheless, the deaths were well publicised by hunting interests as a failure of the deer repellent.

The outcomes at Clements Road raised some important issues for further refining the deer repellent. The repellent mix for this trial did not appear to stick well to the carrot bait. When 69 mm of rain fell between day three and day eight after the operation, the repellent washed off some

Helicopter sowing poison baits



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baits, leaving smaller animals vulnerable. A change to both the mixing rate and the method of application to the baits after the Clements Road operation significantly improved bait coverage on subsequent operations and the outcomes in terms of eliminating or reducing deer by-kill improved markedly.

There was no evidence of red deer by-kill as a result of deer repellent 1080 bait application during a formal comparative trial run by Landcare Research Ltd at Tataarakina (Wakeman's Clearing) in July 2003, despite relatively high deer density (Nugent *et al.* 2004). This compared to a 75 percent reduction in the adjoining no-repellent treatment block, where pre-operational deer numbers were low due to Department of Conservation management regimes involving extensive commercial helicopter venison recovery operations.

The landowner of the Wakeman's Clearing area treated with repellent bait was sufficiently happy with the result to allow a further 4,900 hectares of his property to be treated with deer repellent bait in early October 2003. While there was no **formal deer** by-kill monitoring, the landowner's own subjective conclusion from this second operation, after searches by his staff failed to find a single dead deer, was that there were no impacts to his herd.

The Te Tapui operation over fallow deer in the

Large paper sack used as nominal dead deer in deer by-kill monitoring.



Waikato during July 2004 was another operation where formal monitoring was restricted by time and funding to subjective carcass searches only. **Despite many** man-days of search effort by hunters, landowners, **Epro** staff and Department of Conservation staff, no dead deer were found and many live deer have been seen and shot in the area since. This compares to other formal by-kill assessments

Table 1: Summary of possum control outcomes (Residual Trap Catch - RTC) for aerial 1080 bait applications using bait treated with Epro deer repellent (2001 to 2004).

Location	Size (ha)	Purpose	Timing	Operational Target (RTC %)	Post Operational Result (RTC %)
Kaingaroa Forest	1,500	Tree protection	Jul 2001	5.0	1.03
Hampton, Otago	700	Tb control	Jul 2002	2.0	0.00
Kaimanawa Forest, Clements Road	1,000	Tb control	Jun 2003	3.0	0.17
Te Wera Forest (pellets)	1,000	Tree protection	Jul 2003	5.0	0.67
Tataraakina / Wakeman's (Pine milling)	1,700	Tb control	Jul 2003	3.0	0.67
Pohokura (Pine milling)	4,900	Tb control	Oct 2003	3.0	1.10
Te Tapui Scenic Reserve	2,000	Community Possum Control Scheme	Jul 2004	5.0	4.67
Tataraakina / Ngatapa Stations	12,120	Tb control	Sep 2004	3.0	1.51
Confidential to client	3,800	Tree protection / Conservation	Sep 2004	5.0	4.01

for fallow deer of 75 percent kills in some aerial 1080 operations (Nugent & Yockney 2002).

A second formal deer by-kill monitoring assessment at Tataarakina, as part of a 12,000 ha Tb operation in Hawkes Bay over large parts of Tataarakina and Ngatapa Stations during August 2004, provided perhaps the best test for

the repellent to date. This area had high possum and deer density with both sika and red deer present in the 1,760 ha study area. Despite the detection of two dead stags, confirmed as poisoned, and herd densities approaching habitat carrying capacity, pre and post monitoring data from this trial suggested less than five percent of the resident deer

Table 2 - Summary of deer by-kill outcomes for aerial 1080 bait applications using bait treated with Epro deer repellent (2001 to 2004).

Location	Deer species present in treatment area	Monitoring method	Outcome
Kaingaroa Forest	Red deer (very low density)	Nil	Nil
Hampton, Otago	Red deer (low density)	Comparative trial of repellent versus no repellent using carcass searches referenced to known densities of large paper sacks.	Dead deer found in no-repellent area. No dead deer found in repellent area but inconclusive due to low numbers present.
Kaimanawa Forest, Clements Road	Sika deer (moderate density)	Carcass searches referenced to known densities of large paper sacks	72 percent of 90 sacks found. Five dead sika found (two hinds and three sub-adults).
Te Wera Forest (pellets)	Nil	Nil	Nil
Tataraakina / Wakeman's (Pine milling)	Red deer (high density)	Comparative Trial of repellent versus no repellent versus no-treatment using pre and post poison deer assessments and carcass searches referenced to known densities of large paper sacks.	Dead deer and a 75 percent deer density reduction in no repellent block. No dead deer found and no detectable change in deer density in repellent block.
Pohokura (Pine milling)	Red deer (high density)	Independent, subjective assessment made by landowner and his manager.	No dead deer found. Conclusion - no impact.
Te Tapui Scenic Reserve	Fallow deer (moderate density)	Independent, subjective assessment made by NZDA (Waikato Branch) and local landowners.	No dead deer found. Conclusion - no impact.
Tataraakina / Ngatapa Stations	Red deer (high density) some Sika deer	Pre and post poison deer assessments and carcass searches referenced to known densities of large paper sacks.	Pre and post poison deer assessments showed no change in density. Carcass searches found 27 percent of 400 sacks. Two dead stags found poisoned. Conclusion - <5 percent mortality.
Confidential to client	Red deer/Fallow deer (low density)	Nil	No reports of dead deer. Live deer seen in forest since operation.

had been affected by the poison application (Speedy 2005).

The final operation to date, during which deer repellent has been used over an extensive area, occurred at a North Island commercial forest. This operation was designed for the protection of both tree crop and conservation values, as part of an integrated land management approach to a range of values contained within that forest. While no formal deer by-kill monitoring was conducted, no dead deer have been identified and live deer continue to be seen within the forest.

Increasing numbers of land owners, many of whom would never have previously considered aerial 1080 bait application as a pest control tool, are now showing an interest in the more targeted approach offered by an effective deer repellent.

Deer repellent is not appropriate in all treatment areas where pest control using aerial 1080 bait application is proposed. Deer have both resource and pest qualities in different situations for different reasons relating to land use and landowner values. However, before now the option to protect wild deer from an undesired non-target by-kill during aerial 1080 baiting operations has not existed. What the Epro Deer Repellent does is offer a choice which will allow landowners and resource managers to make informed decisions about their game animals on a case-by-case basis in the future. That is a significant step forward in what is a complex resource management issue with ecological, social and economic dimensions.

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