Why 0.02%? A review of the basis for current broadscale control of rabbits in New Zealand

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Abstract

Rabbit (*Oryctolagus cuniculus*) populations in many parts of New Zealand have begun to increase dramatically as the impact of rabbit haemorrhagic disease wanes, and aerial poisoning control operations have resumed. Aerial 1080 poisoning of rabbits has historically used high prefeed and toxic bait sowing rates and low toxic loading. We review the extent to which this practice is based on a good mechanistic understanding of the process, or has evolved by trial and error to find a workable and affordable system. Current operational practices appear to have resulted from attempts to provide solutions to poor bait quality and concerns about the welfare of livestock. Current research on 1080 use on rabbits in Australia and possums (*Trichosurus vulpecula*) in New Zealand suggests that higher toxic loading and decreased sowing rates may be as effective as current practice, but with substantive reductions in the costs associated with control methods and the amount of toxin applied to the environment.

Keywords: aerial poisoning, operational practice, *Oryctolagus cuniculus*, rabbits, sodium fluoroacetate, sowing rates, toxic loading, 1080

Introduction

Aerial poisoning of rabbits (*Oryctolagus cuniculus*) emerged in the latter half of the 20th century as a crucial tool for reducing the economic cost to pastoral agriculture in New Zealand. However, the need for aerial poisoning declined dramatically in 1997 with the illegal release of rabbit haemorrhagic disease (RHD), a viral disease lethal to rabbits. The impact of RHD now appears to be waning and land managers have resumed aerial application of 1080 (sodium fluoroacetate) baits (primarily carrot), using practices established in the mid-1990s. Those practices include use of prefeeding, a low toxic loading, and high sowing rates. In contrast, aerial 1080 poisoning of possums (*Trichosurus vulpecula*) in New Zealand now uses a relatively high toxic loading, and considerably less prefeed and toxic bait, and is as least partly a result of research and operational refinement over the decade in which aerial poisoning of rabbits was in abeyance. This disparity prompted a review of the basis for the practices used for rabbits (Twigg, 2010). Here we assess whether current best practice for aerial poisoning of rabbits with 1080-laden carrot bait is based on a good mechanistic understanding of the process, or has evolved by trial and error to find a workable and affordable system.

Methods

We combine a literature review with new primary data to ask two interlinked questions; why do managers use the historically favoured 1080 toxic loadings of 0.02% for carrots and 0.04% for oats (now formalised in current registrations), and why do they apply bait at the rates and manner that they do? We then explore (focusing on carrot bait) what the optimal loading and sowing rates might be, based on the data available on rabbit densities, movement and foraging behaviours, and susceptibilities to 1080. This assessment is important because poison programmes remain the only realistic backstop for regaining control of burgeoning rabbit populations beyond the reach of other follow-up or secondary control measures. The greatest concern is the potential resurgence of bait and poison shyness problems that arose from historically poor practice during the final years of the pest boards in the 1980s (Lough, 2009).

Results

Our review suggests that low toxic loading of 1080 appears not to be based on experimental optimisation using New Zealand rabbits, but on early (1960s) Australian toxicity assessments. A low toxic loading is also favoured to minimise risk to livestock, particularly sheep (*Ovis aries*), and destocking periods (McIntosh, 1958). Further, despite long-standing concerns about carrot bait quality, current practices still

appear to produce a large number of sub-lethal bait fragments (Batcheler, 1982). Rabbits that ingest few sub-lethal fragments may become ill and stop feeding (within 30 min – 3 hours) prior to obtaining a lethal dose. This phenomenon has major implications for increasing bait shyness in rabbit populations. Thus high sowing rates appear to be an attempt to overcome poor bait quality by providing rabbits with many opportunities to encounter and ingest sufficient toxic bait to ensure a lethal dose. We suggest an alternative approach is to increase toxic loading of 1080 (up to a max. of 0.15%), such that the number of baits that need to be encountered and ingested to obtain a lethal dose is reduced. Using this approach, we deduce that the amount of toxic bait that would need to be sown to ensure the ingestion of a lethal dose could be substantively reduced, perhaps by as much 80%. We argue that previous research indicates that undesirable non-target and environmental impacts of higher 1080 concentrations are minimal.

Discussion

The 'traditional' use of multiple prefeeds and high toxic sowing rates may be an unintended counter to poor bait quality and the subsequent need for rabbits to find multiple baits. Whereas low toxic loading of 1080 appears to be a tradition spawned by concern about the risk to sheep rather than a consideration relating to efficacy of use against rabbits. Thus formalised current registrations pertaining to 1080 use have arisen from operational trial and error, and historical research that has attempted to find effective solutions to operational problems. We deduce from both parallel experience in possum poisoning (where there has been a shift to individually lethal baits and reduced sowing rates) and to the success of the one-shot-oat technique in Australia, that an approach based on use of individually lethal baits has the potential to be as effective as current practice and yet open the door to a substantive reduction in the amount of toxic and nontoxic bait used, and in the amount of 1080 applied to the environment.

References

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