Rabbit management; a foundation for healthy rangelands

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Abstract

Rabbits cost Australia's pastoral and dryland agricultural industries over $200 million annually and are a risk to over 300 threatened native species.

The massive devastation previously caused by rabbits has been very successfully curtailed by biological controls introduced over many decades. Native flora and fauna have flourished and rangeland managers have been able to manage their properties with less competition from rabbits. Yet rabbits remain as a latent threat and a barrier to full landscape recovery.

A sustainable future must include ongoing effort to continually develop new bio-controls for rabbits and promote a coordinated effort for integrated pest control programs.

Keywords: Biocontrol, environmental harm, economic loss, integrated management.

Introduction

Currently there is a complacency around the potential of the rabbit problem. There is a sense among many that myxomatosis and calicivirus (RHDV) have 'done the job' and rabbits are no longer a threat; but that ignores:

- The latent breeding capacity of a single pair of rabbits,
- The manner in which rabbits, even in very low numbers, are still controlling which plant species grow and which don't, and
- The high likelihood that bio-controls will wane in effectiveness over time.

There is also under-recognition of the harm done by rabbits because their impact is unseen:

- They don't destroy century old trees.They remove trees and shrubs at the seedling stage (before they are noticed).
- They are often just one more herbivore adding to total grazing pressure.Their 'take' is indistinguishable from other grazing animals.
- As 'ecosystem engineers' they influence entire ecosystems.There is low awareness of their contribution to the demise of plants, mammals, birds, reptiles and even amphibians.

Unless new bio-controls are constantly under development, and unless integrated pest control programs apply biological and physical controls across adjacent properties simultaneously, rabbits will continue to shape our natural environment and impose costs, both financial and personal, to primary producers and conservation managers.

Environmental harm

European wild rabbits are a risk to 322 threatened native species in Australia which is double the number at risk from cats and foxes combined. Wild rabbits compete for feed and shelter with native animals, but much of the environmental harm they cause comes from their selective grazing of seedlings and because they help maintain feral predators.

Even at very low densities of 1 rabbit per 2 hectares, or 1 warren per 10 hectares, rabbits can prevent the recruitment of entire species of plants, due to their selective grazing and

searching out of palatable seedlings. In this way they affect the structure and composition of vegetation communities and the native fauna reliant upon them. If rabbits are seen, they are already affecting native vegetation and the ecology of native animals (Bird *et. al*. 2012).

Rabbits may change the vegetation, so it no longer suits other species, out-compete them for food, or affect the availability of shelter and nesting sites through vegetation loss or competition.

Competition for burrows by more aggressive rabbits was a contributing factor to the extinction of the lesser bilby (*Macrotis leucura)* and the lesser stick-nest rat (*Leporillus apicalis*), and it is believed that rabbits may have been responsible for significant declines in the night parrot (*Geopsittacus occidentalis*) through habitat degradation (DEE, 2016). There is also evidence of rabbits acting aggressively towards native mammals, even much larger ones like yellow-footed rock wallabies (*Petrogale xanthopus*).

As a food source, rabbits help sustain populations of feral predators which also prey on and are a threat to native mammals, birds and reptiles. For some predators (feral cats and foxes), rabbits may be an important part of their diet and for others they may only be an opportunistic or incidental feed. Most evidence suggests that as rabbits decline, so too do feral predators and vegetation flourishes leading to a resurgence of native fauna. There may be some prey switching by predators because of rabbit decline (shifting their pressure to native fauna), but the resurgence of plants and other fauna minimises or overrides any losses for a positive net outcome.

To minimise the risk of temporary prey-switching affecting native fauna, programs to control pest predators should accompany rabbit-control initiatives. For optimum effectiveness, feral cat control programs should start with rabbit control.

Economic Loss

Competition from rabbits for feed reduces productivity, especially on grazing lands, but rabbits also have economic consequences for grain production, horticulture, viticulture, nursery, forestry and revegetation initiatives. Furthermore, rabbits can undermine or otherwise damage infrastructure and harm peri-urban properties and culturally important sites.

In areas where historic grazing pressure changed the landscape the continued presence of rabbits can hold it in a degraded (early successional) state, regardless of improved stock management and efforts to rehabilitate the landscape.

The ‘cost’ of rabbits includes the losses in production they cause, funds to repair infrastructure, the costs of their control, and the social costs of confronting rabbits. Economic loss can be assessed from the costs to producers and the gains from rabbit control. It has been estimated that in the early 2000s the direct cost of rabbits in Australia, due to lost beef, lamb and wool production and expenditure on control measures, was $206 million which isfive times greater than losses from wild dogs and almost ten times the losses from foxes and mice (Gong et al, 2009).

Research has shown that as rabbit numbers increase pasture biomass decreases, species composition changes (e.g. there are fewer legumes and more grasses) and bare areas increase (Croft et al, 2002). Production (sheep liveweight and wool production) declines at higher rabbit densities (Fleming et al, 2002). It only takes around 12-16 rabbits to consume as much feed as a grown sheep (RABFS3, 2012). For cattle it is about 100 rabbits per beast.

A guide for southern Queensland concludes the losses to production due to rabbits are at least $1/rabbit/year for sheep and cattle, $50/rabbit/year for irrigated pasture, and $100/rabbit/year for vegetable production (DPI&F, 2008). A density of 100 rabbit/km^2 may take $100/km^2 from the profit margin equivalent to a reduction in stocking rate of 1 beast/km^2.

Indications of the lost production due to rabbits is provided by productivity increases following the introduction of biological controls. As examples, following the release of myxomatosis (1950), there was a 25% increase in wool and mutton production, ascribed to increased feed production and the subsequent increase in stock numbers (Waithman, 1979). After the spread of RHDV (1996), grazing productivity increased annually by $43/km^2, equating to $206 million over eight years, for cattle in inland Australia, and $7-38 million per year for sheep in higher rainfall areas (Mutze et. al, 2008).

The economic benefit of biological controls has been estimated to be $1.9 billion p.a. for myxomatosis and $0.35 million p.a. for RHDV. Collectively, bio-controls have generated a $70 billion nett benefit up to around 2010 (Cooke et.al, 2003).

RHDV reduced rabbit numbers by up to 98% in arid areas, but rabbits still persisted and began to recover over time, presumably due to changes in rabbits and the virus. In 2001 rabbit densities on grazing land in south-west Queensland were from 1 to 5 rabbits/hectare, sufficient to cause significant production loss from their grazing.

Rabbit management

Decades of research have driven a fundamental change in Australian landscapes through biological controls for rabbits. Myxomatosis, rabbit fleas and calicivirus have each resulted in substantial reductions in rabbit numbers, to the extent that rabbits are now probably under-recognised as a threat. However, biological controls tend to wane as rabbits build resistance and viruses become less virulent. Given the decades of work required to test and approve a new bio-control, constant effort is required.

Furthermore, bio-controls have never been able to reduce rabbit densities to a level where they no longer impair ecological recovery and plant composition – or retain the latent ability to quickly repopulate following favourable seasonal conditions. A mix of supplementary traditional physical measures, such as ripping supplemented with baiting or fumigating, is still needed to control rabbits for optimal environmental and production outcomes.

Rabbits' ability to breed and to repopulate from neighbouring countries underlies the advice to collaborate across boundaries on rabbit control. Their role in the food-web of feral predators means that rabbit control should go hand in hand with their control to avoid prey-switching and should be a prerequisite for cat and fox control to optimise those programs.

Conclusions

A sustainable future must not only include ongoing effort to ensure new bio-controls are available, but also promote coordinated effort for integrated on-ground control programs. Those programs should:

- Work across boundaries, to reduce risks of re-invasion.
- Tackle rabbits and predators together, because the survival of feral predators, rabbits and native prey animals is linked. Simultaneous control of the feral animals is more effective than targeting them individually and reduces any risk of short-term prey switching

- Use biological and physical controls together, because no single control is completely successful. Well timed, coordinated efforts are most effective.

An informal collegiate of like-minded individuals, organisations and interests is needed to make sure that rabbit control research continues and that there is adequate promotion and support for integrated pest control programs at the district scale. There is much to be gained from disparate groups sharing information and ideas. Foundation for Rabbit-Free Australia provides just such a forum and invites contributions to a national discussion and network.

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Conflicts of Interest:

The authors declare no conflicts of interest.

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