

Bureau of Resource Sciences  
and  
CSIRO Division of Wildlife and Ecology

# **Managing Vertebrate Pests: Rabbits**

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The Bureau of Resource Sciences is a professionally independent Bureau established in October 1992 in the Department of Primary Industries and Energy. Its role is to enhance the sustainable development of Australia's agricultural, mineral, petroleum, forestry and fisheries resources and their industries by providing scientific and technical advice to government, industry and the community.

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# FOREWORD

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This publication, which is one in a series, provides land managers with 'best practice' national guidelines for managing the agricultural and environmental damage caused by rabbits. Others in the series include guidelines for managing feral horses, foxes, feral goats, feral pigs and rodents. The publication was developed and funded jointly by the Vertebrate Pest Program which is administered by the Bureau of Resource Sciences, and by the CSIRO Division of Wildlife and Ecology.

To ensure that the guidelines are widely accepted as the basis for rabbit management, comment has been sought from government including state, territory and Commonwealth agriculture, environmental and resource management agencies, and from other land managers, and community organisations, including the Australian Conservation Foundation, the National Farmers' Federation, the National Consultative Committee on Animal Welfare, and the Anangu Pitjantjatjara Aboriginal Land Council. The Standing Committee on Agriculture and Resource Management has endorsed the approach to managing rabbit damage set out in these guidelines.

There are strongly held conflicting views among people interested in the management of rabbits. Some scientists judge rabbits as Australia's most pernicious environmental problem, and wish to see

more resources allocated to their management. People involved in commercial or subsistence use of rabbits are alarmed at the prospect of rabbits being managed to levels too low to allow such uses to continue. Economists argue the spending on rabbit management should be fully justified in terms of the economic or environmental returns on such investments, and are concerned that the information necessary for this does not exist. People holding strong animal welfare concerns hope to see rabbit management and better control techniques reduce the level of suffering in rabbits subjected to control operations. Farmers would like to be sure that expenditure on rabbit control is not wasted by rapid reinvasion from adjacent areas. The authors have had a difficult task in considering these competing views in the preparation of these guidelines but believe they are a significant step forward in the management of rabbits.

The principles underlying the strategic management of vertebrate pests have been described in *Managing Vertebrate Pests: Principles and Strategies* (Braysher 1993). The emphasis is on the management of pest damage rather than on simply reducing pest density. A major difficulty faced by the authors was that despite numerous historical accounts and studies of rabbits in Australia, their impact on the environment

and on agricultural production is poorly documented. Nevertheless, the weight of scientific and other information collected over many decades reinforces the belief that rabbits are a serious vertebrate pest for agricultural production and the natural environment. Demonstration projects funded under the Vertebrate Pest Program administered by the Bureau of Resource Sciences are helping to document the impact of rabbits in Australia and to test the effectiveness of different approaches to management.

The guidelines recommend that, wherever practicable, management should concentrate on reducing rabbit density to low levels and holding it there by routine maintenance control. The evidence suggests

that, if undertaken as part of a local or regional group scheme, this is the most cost-effective way of managing rabbit damage. While there is hope that rabbit populations will in the future be controlled by new or modified micro-organisms acting as mortality or sterility agents, we cannot depend on such developments. Until they are proven it is essential that strong efforts to control rabbits by conventional means be maintained.

These guidelines will help land managers to reduce agricultural losses and environmental damage through the use of scientifically-based management that is humane, cost-effective and integrated with ecologically sustainable land management.



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- Land and Water Research and Development Corporation
- Meat Research Corporation
- Rural Industries Research and Development Corporation
- Australian Wool Research and Promotion Organisation
- Australian Conservation Foundation
- National Consultative Committee on Animal Welfare
- National Farmers' Federation
- Murray Darling Basin Commission
- Australian Veterinary Association
- Anangu Pitjantjatara Land Council

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## ACRONYMS AND ABBREVIATIONS

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ACF	Australian Conservation Foundation	GIS	Geographic information system
ACT	Australian Capital Territory	GMAC	Genetic Manipulation Advisory Committee
AEDP	Aboriginal Employment and Development Program (now ARRI)	Landcare	Commonwealth Landcare Program
AHC	Australian Heritage Commission	LandCare	Victorian Landcare Program
ANCA	Australian Nature Conservation Agency (formerly ANPWS)	NCA	Nature Conservation Authority
ANZECC	Australian and New Zealand Environment Conservation Council	NCCAW	National Consultative Committee on Animal Welfare
APB	Agriculture Protection Board (Western Australia)	NFF	National Farmers' Federation
APCB	Animal and Plant Control Board (South Australia)	NLP	National Landcare Program
APCC	Animal and Plant Control Commission (South Australia)	NPWS	National Parks and Wildlife Services (various states)
ARRI	Aboriginal Rural Resources Initiative	NRIC	National Resource Information Centre
BRS	Bureau of Resource Sciences	NRMS	National Resource Management Strategy
CaLM	Department of Conservation and Land Management (New South Wales)	NSCP	National Soil Conservation Program
CALM	Department of Conservation and Land Management (Western Australia)	NSWAF	NSW Agriculture and Fisheries
CCNT	Conservation Commission of the Northern Territory	pers. comm.	Personal communication
CRC	Cooperative Research Centre (Vertebrate Biocontrol Centre)	PMIS	Pest management information system
CSIRO	Commonwealth Scientific and Industrial Research Organisation	PPB	Pastures Protection Board
DCNR	Department of Conservation and Natural Resources (Victoria)	ppm	Parts per million
DPIF	Department of Primary Industry and Fisheries (Tasmania)	RCD	Rabbit calicivirus disease (RCD) also called rabbit haemorrhagic disease (RHD)
DSE	Dry sheep equivalent	RLPB	Rural Lands Protection Board (New South Wales)
ERIN	Environmental Resources Information Network	SCARM	Standing Committee on Agriculture and Resource Management
ESD	Ecologically Sustainable Development	SCB	Soil Conservation Board of South Australia
ESP	Endangered Species Program	SCS	Soil Conservation Service of New South Wales
		SSC	Strategic, sustained control
		SSCAW	Senate Select Committee on Animal Welfare
		TAFE	Technical and Further Education
		VPC	Vertebrate Pests Committee of SCARM
		VPP	Vertebrate Pest Program

# GLOSSARY

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**active entrance:** a warren entrance that is being used as distinguished by obvious rabbit sign

**active warren:** an occupied warren

**acute poison:** a substance that kills an animal quickly, usually within hours, and after a single dose

**anticoagulant:** a substance that slows or prevents blood clotting. Anticoagulants may be used as poisons to kill pest animals

**antigen:** a substance, usually foreign to the body, that stimulates an animal's immune system to make antibodies. Antibodies react with antigens in the body and can prevent the development of disease

**biomass:** the weight of living material in a specified area; often the amount of plant material covering an area of ground

**cadastral data:** usually includes property boundaries, land tenure and roads

**calcareous:** containing or like calcium carbonate

**canids:** members of the dog family

**cementum:** a thin, bonelike tissue that covers the root of a tooth

**conservation values:** aspects of the natural environment that society wants to protect, such as endangered species, wilderness and biological diversity

**coumarins:** a class of chemical compounds; some of which are used as vertebrate poisons (anticoagulants)

**coupe:** a forest plantation management unit containing trees of the same age

**cumulative poison:** a poison that builds up in an animal's body with successive doses or continued exposure. Usually more than one dose is required to cause death

**discount rate:** difference in value between present and future benefits. Calculating discount rates involves using the reverse equation to that used for calculating interest rates on invested money

**dry sheep equivalent (DSE):** the number of animals that eat the same amount of pasture as a non-breeding, non-pregnant ewe. For example, 12–16 rabbits are usually considered to be one DSE

**ecotone:** boundary region between different ecosystems, such as between forest and grassland

**ectoparasite:** a parasite that lives on the outside of an animal's body. Examples are fleas, ticks and lice

**El Niño:** name of a warm ocean current that appears intermittently off the coast of Ecuador and Peru. This is now recognised as part of a global climatic event that happens about every 3–6 years and typically lasts 12–15 months. It is associated with abnormally dry weather in much of eastern Australia

**enclosure:** an area of land fenced round to keep in wanted animals

**endoparasites:** parasites that live inside an animal's body, such as tapeworms and the bacteria in the digestive tract

**enzyme:** a substance that promotes natural chemical reactions in the body without itself being used up or changed in the process

**epizootic:** the occurrence or outbreak of a disease in a population or region at a much higher level than normally expected

**exclosure:** an area of land fenced round to keep out unwanted animals

**felids:** members of the cat family

**fibrin:** an insoluble fibrous protein produced during blood clotting

**forb:** a soft herb-like plant with a non-woody stem, especially a pasture plant that is not a grass

**geographic information system (GIS):** a computer-based system for displaying, overlaying and analysing geographic information such as vegetation, soils, climate, land use and animal distributions

**gross margin:** the difference between the returns from the sale of a product from a farming enterprise minus the running costs. It excludes capital components such as the purchase of machinery

**hypothermia:** unnaturally low body temperature in warm-blooded animals

**immunocontraceptive:** same as immunosterilant

**immunocontraceptive virus:** a virus that causes an immune response leading to temporary or permanent sterility in infected animals

**immunosterilant:** a substance that triggers an immune reaction that causes sterility in a treated animal; acts as a contraceptive

**knockdown:** a control action that markedly reduces population size over a short time

**LD<sub>50</sub>:** the quantity of a poison that will kill 50% of treated animals

**leporids:** animals of the rabbit and hare family

**macropores:** spaces in the soil that improve water penetration

**mediterranean regions:** regions with a climate similar to Mediterranean Europe, with hot, dry summers and cool, wet winters. In Australia these regions are around Adelaide and south of Perth

**metabolic poison:** a substance that is toxic to an animal's basic body functions through interfering with biochemical processes, such as oxygen transport

**micro-arthropods:** small insects, mites etc.

**mustelids:** weasels, ferrets etc.

**myxomatosis:** a disease caused by the myxoma virus that was introduced to Australia as a biological control agent for rabbits. The disease is effective in reducing rabbit populations in areas of moderate and high rainfall

**neophobia:** fear of new objects in the environment

**net present value:** discounted present value of all financial benefits produced by a project, minus the discounted value of the costs incurred

**one-off control:** a control measure that is implemented only once although it may have long-term or ongoing effect

**parenchyma:** essential or specialised supporting tissue of an organ

**phosphorylation:** attachment of a phosphate molecule to sugar groups. An essential biochemical reaction in plants and animals

**primary poisoning:** the death of animals that ingest the poison (see secondary poisoning)

**quadrats:** small plots of land used for sample measurements of such items as plants or dunes

**rabbit calicivirus disease:** an exotic viral disease that causes high death rates in rabbits. It is presently being investigated as a potential biological control agent for rabbits in Australia. Also called rabbit haemorrhagic disease

**run-on areas:** places where water tends to accumulate and which are moister and more productive than surrounding areas

**scat:** faeces

**second generation anticoagulant:** a new class of anticoagulant poison developed to control pests that have developed resistance to first generation anticoagulants. Warfarin and pindone are first generation. Bromodialone and brodifacoum are second generation. In contrast to first generation anticoagulants repeated ingestion may not be necessary to cause death

**secondary poisoning:** intoxication or death of animals caused by ingestion of other poisoned animals

**senescent:** post-reproductive age

**sign:** any evidence of the recent presence of an animal such as dung, scratch and dig marks etc.

**spotlight transect counts:** a count of the number of nocturnal animals seen in the beam of a spotlight along a set or random

transect. An estimate of population density can be extrapolated from this based on the length/width of the transect

**squat:** a shallow depression in long vegetation or under fallen timber where a rabbit takes shelter

**sterilising agent:** a substance that causes treated animals to become sterile; a contraceptive

**stop:** a shallow burrow dug by a pregnant female rabbit in which to have her litter. The entrance to a stop is covered with soil and is difficult to detect

**tarbaby:** a technique for killing rabbits where 1080 poison in grease is squirted into a rabbit warren. The rabbit dies from ingesting the poisoned grease while grooming the grease from fur and paws

**thermoregulation:** control of body temperature using a combination of external (e.g. the sun) and internal heat sources (metabolism)

**total grazing pressure:** the amount of pasture removed by all grazing animals present, including wildlife, domestic stock and insects. In practice, insects are usually not included in the calculation

**transect:** a rectangular plot in which data collection occurs

**type locality:** site at which the original specimen used to describe a species was collected

Note: All money values throughout the guidelines are in 1993-94 Australian dollars unless otherwise indicated.