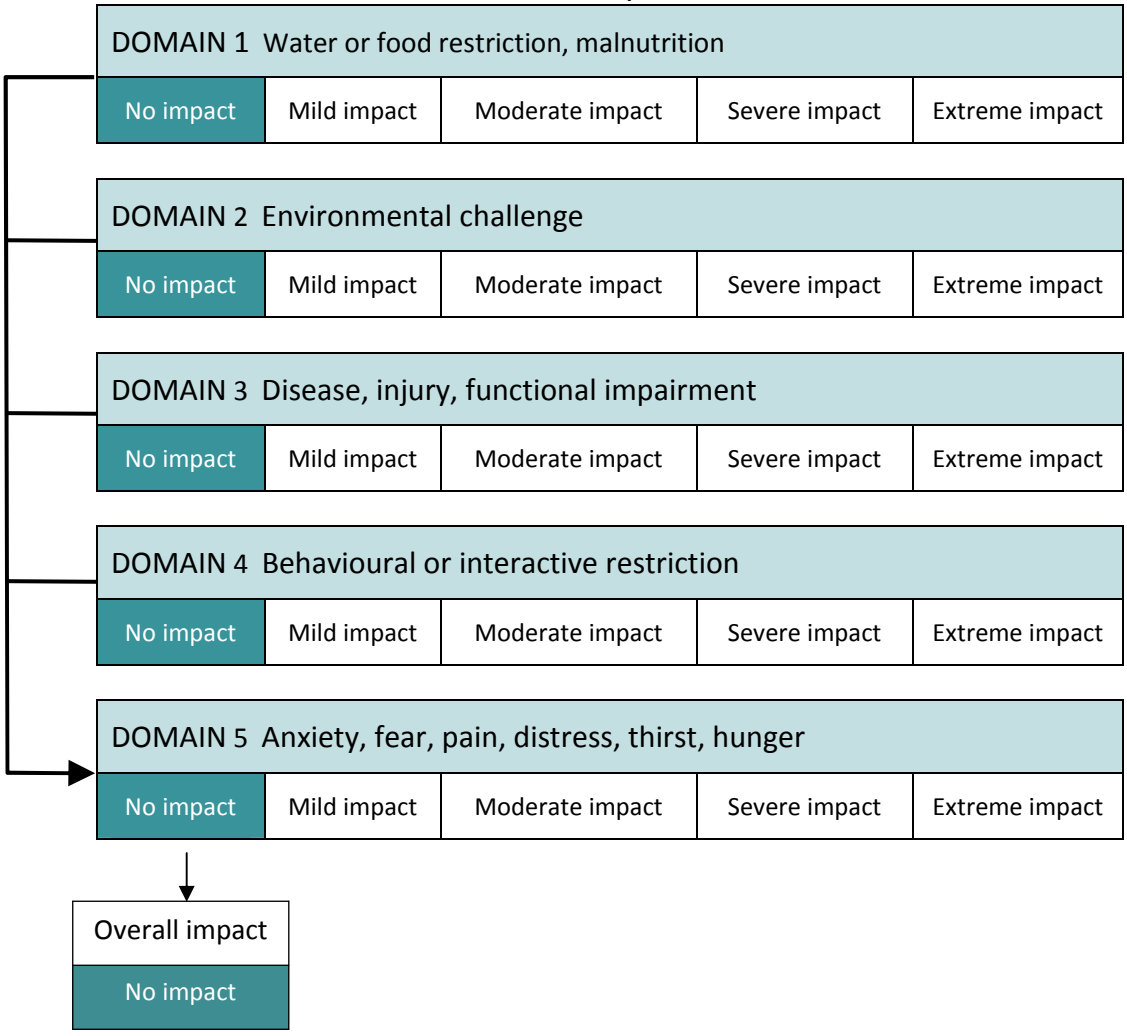
Control method: Baiting of rabbits with pindone

Assumptions:	▪ Best practice is followed in accordance with the standard operating procedure RAB004. ▪ Lethal poisoning with pindone can occur with a large single dose, but it is more effective when given as a series of smaller doses over a period of 4 to 12 days.

PART A: assessment of overall welfare impact



DURATION OF IMPACT				
Immediate to seconds	Minutes	Hours	Days	Weeks

SCORE FOR PART A:	**1**
Summary of evidence:	Note that Part A of the assessment examines the 'impact on the animal prior to the action that causes death'. Part B then looks at the 'actual mode of death' and the 'extent and duration of suffering caused'. With ingestion of lethal toxic baits there is usually little or no impact in Part A.

Domain 1	No impact in this domain.
Domain 2	No impact in this domain.
Domain 3	No impact in this domain.
Domain 4	No impact in this domain.
Domain 5	No impact in this domain.

PART B: assessment of mode of death

Time to insensibility (minus any lag time)				
Very rapid	Minutes	Hours	**Days**	Weeks
Level of suffering (after application of the method that causes death but before insensibility)				
No suffering	Mild suffering	Moderate suffering	**Severe suffering**	Extreme suffering

SCORE FOR PART B:	**G**

Summary of evidence:

Duration –

After ingestion of anticoagulants, there is usually a lag period of 3-5 days before the onset of clinical signs. This delayed onset reflects the time required to deplete existing stores of vitamin K and blood clotting factors. In rabbits that receive multiple small doses of pindone, the time to death is around 10 to 14 days after the initial dose[1]. Animals that are less active are likely to take longer to die because capillary breakdown is occurring at a slower rate compared with animals that are moving around[1].

Suffering –	Pindone interferes with the routine synthesis of vitamin K-dependent blood clotting factors in the liver. Without these factors, the normal daily damage to blood vessels can no longer be repaired. Rabbits are acutely susceptible to the effects of pindone with poisoned animals usually dying from multiple causes associated with anaemia or hypovolemic shock. A large single dose (18 mg/kg for rabbits) or repeated smaller doses (0.52 mg/kg/day over 7 days) are generally needed to induce death[2], however effectiveness is generally increased with repeated small doses. In a study that examined the effect of ingesting multiple low doses of pindone in rabbits, the most common post-mortem finding was widespread haemorrhage throughout the muscles on the posterior aspect of both hind legs[1]. Other common findings included massive leakage of blood into the abdominal cavity, haemorrhage in muscle around the rib cage and in the submandibular region and numerous smaller subcutaneous haemorrhages over the body. Small haemorrhages were found in most organs and the skin and mucous membranes were almost colourless. Bleeding from external orifices was also apparent. Less commonly there was leakage of blood into the pericardium and cerebral haemorrhage[1]. Although it is difficult to make a definitive assessment of the level of suffering, there is enough evidence from knowledge of the mode of action and the effects of anticoagulants in other species, including humans, to suggest that rabbits poisoned with pindone experience severe discomfort that can last for several days before death. They are likely to experience manifestations of anaemia including lethargy, laboured breathing, weakness and anorexia as well as pain and discomfort from local haemorrhages in multiple sites such as internal organs, muscles and joints. It is also important to note that a dramatic reduction of blood pressure – which is a potential consequence of severe blood loss -may result in the collapse of animals without loss of consciousness or loss of pain perception[3].

Summary

CONTROL METHOD:	**Baiting of rabbits with pindone**
OVERALL HUMANENESS SCORE:	**1G**

Comments

Pindone is one of the earliest first generation anticoagulant rodenticides developed in the 1940's[2].

Evidence from human case studies indicates that internal haemorrhage may, on occasions cause severe pain[3]. It is not the bleeding itself that causes the pain but rather the accumulation of blood in enclosed places which may exert pressure on various organs /nerves.

Further information on the effects of anticoagulants on other species including rodents and humans can be found in the review of the humaneness of rodent pest control by Mason and Littin[4].

Bibliography

1. Oliver, A.J. & Wheeler, S.H. (1978). Toxicity of the anticoagulant pindone to the european rabbit, Oryctolagus cuniculus and the sheep, Ovis aries. *Wildlife Research* **5**, 135-142
2. Eason, C.T. & Wickstrom, M. (2001). *Vertebrate pesticide toxicology manual (poisons)*. (Department of Conservation: Wellington, New Zealand).
3. Pesticide Safety Directorate (1997). *Assessment of humaneness of vertebrate control agents – evaluation of fully approved or provisionally approved products, No. 171 (December 1997)*.
4. Mason, G. & Littin, K.E. (2003). The humaneness of rodent pest control. *Animal Welfare* **12**, 1-37