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**The behaviour, pathophysiology and pathology of brushtail
possums (*Trichosurus vulpecula*) poisoned with 1080 or
brodifacoum, and the implications for possum welfare.**

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Abstract

Millions of brushtail possums (*Trichosurus vulpecula*) are poisoned yearly in New Zealand owing to damage caused to agriculture and the environment. They are nonetheless sentient animals capable of suffering, and legislative and ethical obligations, and public concern demand that only the most humane poisons are used (Chapter 1). Accordingly, the aim of this work was to evaluate the effects of two poisons used for killing possums in New Zealand, 1080 and brodifacoum, and the implications for animal welfare. Animal Ethics Committee approval was obtained for all work. A lethal dose of 1080 in carrot baits caused retching, vomiting and seizures in possums caged indoors (Chapter 2). Possums did not fully lose consciousness until death but were likely to have been in a reduced state of awareness beforehand. The first signs of poisoning were observed after an average of nearly 2 h and they died on average 11.5 h after consuming baits, giving a period of potentially reduced welfare of approximately 9.5 h. Six possums of eight that consumed a sublethal dose showed signs of sickness, indicating that some sublethal doses can reduce welfare. Alpha-chloralose (a sedative) and paracetamol (an analgesic) had no effect on the behaviour of caged, 1080-poisoned possums (Chapter 3). The consumption of 0.88 mg/kg brodifacoum in cereal pellet baits by caged possums caused widespread haemorrhages which may have led to weakness, sickness or pain (Chapter 4). Possums did not lose consciousness until death after an average of 21 days but were likely to have been in a reduced state of awareness for up to six days beforehand. Signs of poisoning were first seen after 14 days on average, meaning welfare was potentially reduced for about seven days. Following the consumption of 0.86 mg/kg brodifacoum in cereal pellet baits, blood clotting ability was reduced and all possums had internal haemorrhages, both within eight days of bait being offered (Chapter 4). Possums penned outdoors with space for a high level of activity and exposure to spring and summer weather died after a lethal dose of 1080 or brodifacoum at about the same times as possums caged indoors, and following similar preceding signs of poisoning (Chapter 5). This implied that the results from caged possums are applicable to wild possums in New Zealand at most times of the year. This work, together with that of others, suggests that 1080 is the second-most humane poison for possums and that brodifacoum is among the least humane (Chapter 6).

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Table of contents

THE BEHAVIOUR, PATHOPHYSIOLOGY AND PATHOLOGY OF BRUSHTAIL POSSUMS (*Trichosurus vulpecula*) POISONED WITH 1080 OR BRODIFACOUM, AND THE IMPLICATIONS FOR POSSUM WELFARE.

Abstract	ii
Acknowledgements	iii
List of figures and tables	ix
Chapter 1 General introduction: the possum problem and the ethical and animal welfare implications of solving it.....	1
Abstract	3
Introduction	4
Possums and vertebrate pests in New Zealand	4
New Zealand's vertebrate pests and their control	6
The impacts of pests and pest control methods.....	8
Ethical issues with pest control	10
Public concern as an impetus for action.....	10
Legislation as an impetus for action	11
Is vertebrate pest control unavoidable? Is it necessary?	12
Is vertebrate pest control justified?	13
Principles for ethically sound vertebrate pest control.....	16
Animal welfare and its assessment for vertebrate pest control.....	18
Defining animal welfare.....	18
Guidelines for assessing animal welfare.....	19
Assessing the quantum of animal welfare compromise.....	20
Review of research toward humane pest control	22
Acknowledgements and author's note	26
References	26
Chapter 2 Behaviour and time to unconsciousness of brushtail possums (<i>Trichosurus vulpecula</i>) after consuming a lethal or sublethal dose of sodium monofluoroacetate (1080), and the implications for possum welfare.....	37
Abstract	39
Introduction	40
Toxicity	41
Advantages and disadvantages.....	42
Public concern about 1080 use.....	43
Humaneness concerns	46

Toxicokinetics.....	47
Toxicodynamics	48
Pathophysiological changes	50
Clinical signs.....	51
Pathological changes seen at necropsy	55
Aims of this study	55
Materials and methods	56
Animals and housing.....	56
Bait manufacture and 1080 exposure.....	57
Hands-off experiment	58
Hands-on experiment	59
Hands-off/ hands-on experiment.....	60
Statistics	61
Results	61
Hands-off experiment	62
Hands-on experiment	67
Hands-off/ hands-on experiment.....	69
Times to death.....	70
Body weight	71
Discussion	72
Times to death.....	72
Clinical signs and behavioural changes	73
Time to loss of consciousness.....	78
Body weight	81
Implications for animal welfare	81
Humaneness of 1080.....	86
Effects of experimental design and environmental conditions	87
Acknowledgements and author's contribution.....	88
References	89
 Chapter 3 Effects of alpha-chloralose and paracetamol on the behaviour of brushtail possums poisoned with 1080: a pilot study.....	 99
Abstract	101
Introduction	101
Alpha-chloralose	103
Paracetamol.....	104

Methods.....	105
Animals and housing.....	105
Groups.....	105
Group.....	106
Dosing.....	106
Behavioural observations.....	107
Time to loss of consciousness.....	107
Statistics.....	108
Results.....	108
Times to death.....	108
Behaviour changes.....	109
Clinical signs.....	109
Time to loss of consciousness.....	112
Discussion.....	113
Present observations.....	113
Comparison with 1080 findings in Chapter 2.....	116
Where to from here?.....	116
Summary.....	117
Author's note and acknowledgements.....	117
References.....	118
Chapter 4 Behaviour, coagulopathy and pathology of brushtail possums (<i>Trichosurus vulpecula</i>) poisoned with brodifacoum, and the implications for possum welfare.....	121
Abstract.....	123
Introduction.....	123
Toxicity.....	124
Toxicokinetics.....	125
Toxicodynamics.....	125
Pathophysiological changes.....	125
Clinical signs.....	126
Pathological changes seen at necropsy.....	126
Humaneness concerns and aims of this study.....	127
Materials and methods.....	127
Animals and housing.....	127
Brodifacoum exposure.....	128
Assessment of coagulopathy.....	128

Assessment of behaviour	129
Necropsies	130
Statistics	131
Results	131
Coagulopathy	132
Pathology and liver concentrations of brodifacoum	133
Clinical signs.....	136
Behaviour and responses to stimuli	137
Discussion	140
Times to death.....	140
Coagulopathy	141
Pathology	141
Clinical signs and behavioural changes	142
Time to loss of consciousness.....	143
Implications for animal welfare	144
Humaneness of brodifacoum	146
Improving the humaneness of anticoagulant poisons	146
Summary	148
Acknowledgments and author's note	148
References	149
Chapter 5 Behaviour, pathology and pathophysiology of penned possums poisoned with 1080 or brodifacoum	155
Abstract	157
Introduction.....	158
Differences between indoor cages and outdoor pens.....	158
Potential impacts of environmental factors on 1080 and brodifacoum toxicosis.....	159
Assessing environmental impacts on toxicosis.....	161
Methods.....	163
Animals and housing.....	163
1080 bait manufacture and exposure	165
Brodifacoum exposure	165
Weather and air temperature	166
Behavioural observations.....	166
Responses to stimuli.....	167
Necropsies.....	168

Feed pellet and fruit intake.....	168
Body weight.....	168
Statistics.....	168
Results.....	169
1080.....	169
Brodifacoum.....	174
Discussion.....	179
1080.....	179
Brodifacoum.....	181
Relevance of studies in this thesis to the wild.....	183
Summary.....	185
Author's note and acknowledgements.....	186
References.....	186
Chapter 6 General Discussion: applying assessments of the welfare impacts of poisons used for killing possums to the practical task of evaluating humaneness.....	190
Summary of this thesis.....	192
Methodological considerations.....	193
Behavioural sampling techniques.....	193
Interpretation of behaviour.....	194
Assessment of loss of consciousness.....	195
The use of wild-caught possums.....	195
A methodology for assessing the impacts of poisons on.....	198
possum welfare.....	198
Application of results.....	205
Assessing the acceptability of poisons.....	205
Assessing relative humaneness.....	207
References.....	209

List of figures and tables

Chapter 1

Table 1	Vertebrates officially listed as pests in New Zealand.....	7
---------	--	---

Chapter 2

Figure 1	Mechanism of the interference by 1080 in the tricarboxylic acid (TCA) cycle.....	49
Figure 2	Mean (\pm SEM) percentage of observations each hour in which caged brushtail possums were observed sitting or lying in a curled posture ('curled'), moving about the cage, crouching with hunched back, grooming, standing still on all four legs, or lying on the side, back or front ('lying'). Possums were fed a lethal (\square) or sublethal dose (\blacksquare) of 1080 in carrot baits at 0 h. Note different scales on y-axis.....	66
Figure 3	Mean (\pm SEM) body weight of caged brushtail possums fed 1080 in carrot baits in four experiments.....	71
Table 1	Description of the treatment for possums in each experiment.....	57
Table 2	Time after dosing at which clinical signs of poisoning appeared in caged possums fed a sublethal or lethal dose of 1080 in the hands-off experiment.....	63
Table 3	Time before death at which ten caged brushtail possums lost reflexes or responses to stimuli after consuming a lethal dose of 1080 in carrot baits in hands-on experiment.....	68
Table 4	Time before death at which ten caged brushtail possums lost reflexes or responses to stimuli after consuming a lethal dose of 1080 in carrot baits in hands-off/ hands-on experiment.....	69

Chapter 3

Figure 1	Behaviour changes seen in possums given 1080 + water, 1080 + alpha-chloralose, or 1080 + paracetamol.....	110
Table 1	Groups, body weights and doses given.....	106
Table 2	Time to onset (mean \pm SEM) of clinical signs of poisoning in brushtail possums orally dosed with 1080 + water, 1080 + alpha-chloralose or 1080 + paracetamol, and number of possums showing each sign.....	111
Table 3	Number of possums showing a positive response to stimuli at two stimulus response tests before death.....	112

Chapter 4

Figure 1	Mean (\pm SEM) activated partial thromboplastin time (APTT) and one-	
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	stage prothrombin time (OSPT) of brushtail possums exposed to brodifacoum in cereal baits ('brodifacoum treated') or untreated cereal baits ('untreated') over three days (day 0–2).....	132
Figure 2	Mean (\pm SEM) daily feed pellet intake of brushtail possums after exposure to brodifacoum in cereal baits ('brodifacoum treated', n = 18) or untreated cereal baits ('untreated', n = 18) over three days (day 0–2).....	137
Figure 3	Mean (\pm SEM) percentage of observations in which brushtail possums were observed sitting or lying in a curled posture ('curled'), crouching with hunched back ('crouched') or lying on the side, back or front ('lying'). Possums were fed brodifacoum in cereal baits ('brodifacoum treated', n = 18) or untreated cereal baits ('untreated', n = 18) over three days (day 0–2). Note different scales on y-axis.....	138
Table 1	Total number of caged possums with haemorrhages of different severity and distribution at 4, 8, 12, 16 or 20 days after initial exposure to brodifacoum, or at death.....	134
Table 2	Number of haemorrhages of different severity (mild, moderate or severe) and extents (focal or multifocal, patchy, diffuse or extensive) in the organs or remaining tissues other than bone in different areas of the body occurring in penned brushtail possums poisoned with brodifacoum, and number of possums with haemorrhages in different regions of the body and of different severity and extents.....	135
Table 3	Time after dosing at which clinical signs of poisoning appeared in caged brushtail possums fed a lethal dose of brodifacoum, compared to the time to death.....	136
Table 4	Time before death (mean \pm SEM) at which brushtail possums lost overt responses to stimuli compared to the time at which possums became prostrate, and number of values contributing to each mean.....	139

Chapter 5

Figure 1	Layout of pens for study on effects of 1080 or brodifacoum on penned possums.....	164
Figure 2	Mean (\pm SEM) percentage of observations in which penned 1080-poisoned brushtail possums were observed running ('running') or walking ('walking') about the pen, standing still ('standing'), sitting or lying in a curled posture ('curled'), crouching with hunched back ('crouched'), or lying on the side, back or front ('lying').....	173
Figure 3	Mean (\pm SEM) daily intake of cereal feed pellets and apples by brushtail possums after exposure to brodifacoum in cereal baits over three days (day 0–2).....	177
Table 1	Time after dosing at which clinical signs of poisoning were observed in penned brushtail possums fed a lethal dose of 1080, compared to the time to death.....	171
Table 2	Time after dosing at which clinical signs of poisoning appeared in penned brushtail possums fed a lethal dose of brodifacoum, compared to the time	

	to death.....	176
Table 3	Number of haemorrhages of different severity (mild, moderate or severe) and extents (focal or multifocal, patchy, diffuse or extensive) in the organs or remaining tissues other than bone in different areas of the body occurring in penned brushtail possums poisoned with brodifacoum, and number of possums with haemorrhages in different regions of the body and of different severity and extents.....	178
Table 4	Time to death of penned brushtail possums poisoned with brodifacoum compared to haemorrhage characteristics determined at necropsy.....	179
 Chapter 6		
Table 1	Degree of welfare compromise caused by or indicated by several clinical signs of poisoning observed in possums.....	203