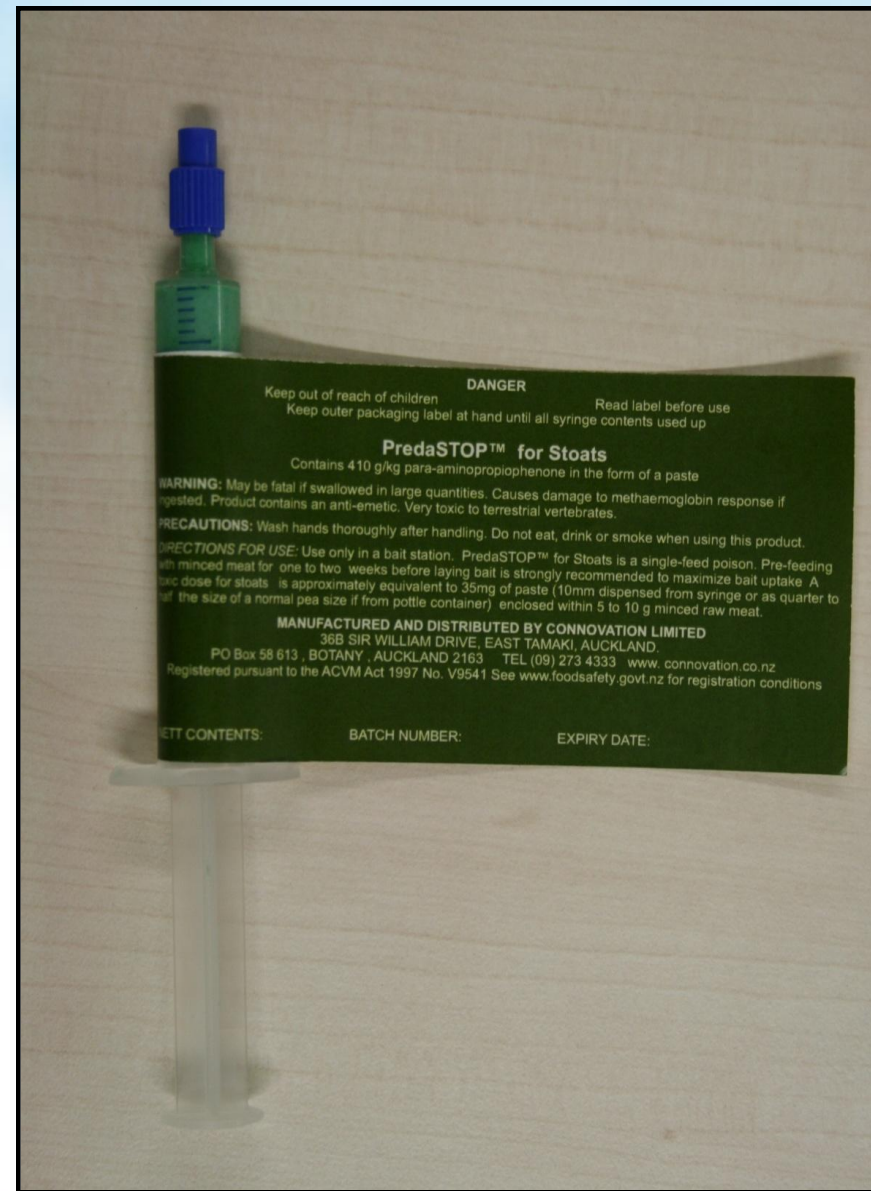


# Research on new toxins:- striving for improvements in animal pest control

**Charlie Eason, Shaun Ogilvie  
Cheri (Chuckie) van Schravendijk  
and James Ataria**

- Lincoln University  
August 2011



# Contents

- context & history
- research initiatives
- registration processes
- progress





# PAPP April 2011- stoat and feral cats

1<sup>st</sup> new toxin for 30 yrs

1<sup>st</sup> developed with welfare as a primary consideration

Keep out of reach of children

Read label before use

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Developed with NZ/Aus/US/UK collaboration

Eason CT, Murphy EC, Hix S, Macmorran DB 2010. The development of a new humane toxin for predator control. *Integrative Zoology* 1: 443-448.



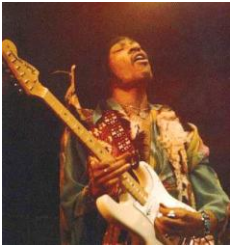
Department of Conservation  
Te Papa Atawhai



Lincoln  
University  
Te Whare Wānaka o Aoraki  
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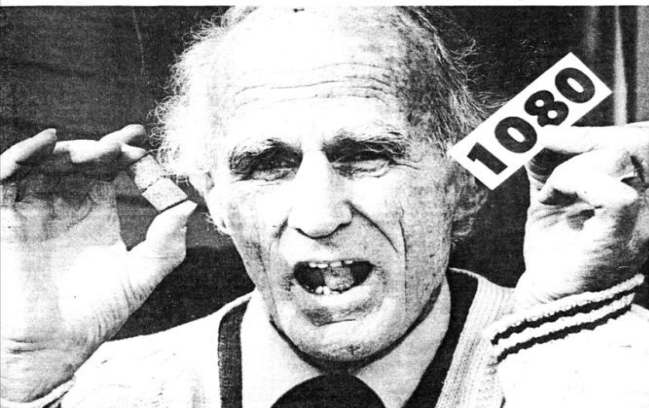
# VTA international-history & trends

Time	Toxin developments	Comments
Pre-1950s	strychnine (1800s), arsenic, cyanide,	Ancient or older toxins- date back hundreds if not thousands of years
<b>1950s-80s</b> 	<b>1080</b> , zinc phosphide (1950s) , cholecalciferol (1980s), warfarin (1950s), pindone, diphacinone, chlorphacinone (1961), coumatetralyl, defenacoum (1970s), bromodiolone, <b>brodifacoum</b> , flocoumafen, difethialone	Innovation and proliferation.
<b>1980s-2011</b>	Exploration limited –Many de-registered- Nothing new except NZ/Aus <b>Para-aminopropiophenone</b>	International reliance on anticoagulants

# 1080 + and -

- very effective
- inexpensive
- not bioaccumulative
- not persistent in the environment
- essential tool
- health concerns
- carcasses kill dogs
- polarised opinions
- use outside Aus/NZ minimal
- no antidote

Poison pellets 'relatively safe'



Mr Batcheler, with 1080 poison pellet in mouth, says only large doses of the poison are harmful to humans. More than 50 would be needed to kill a person, he claims. Photo: Don Scott

Opossum control expert Les Batcheler of Tasmania swallowed a 1080 practical demonstration was the only one to eat the pellets. The body and broke down quickly in the soil after 24 hrs.

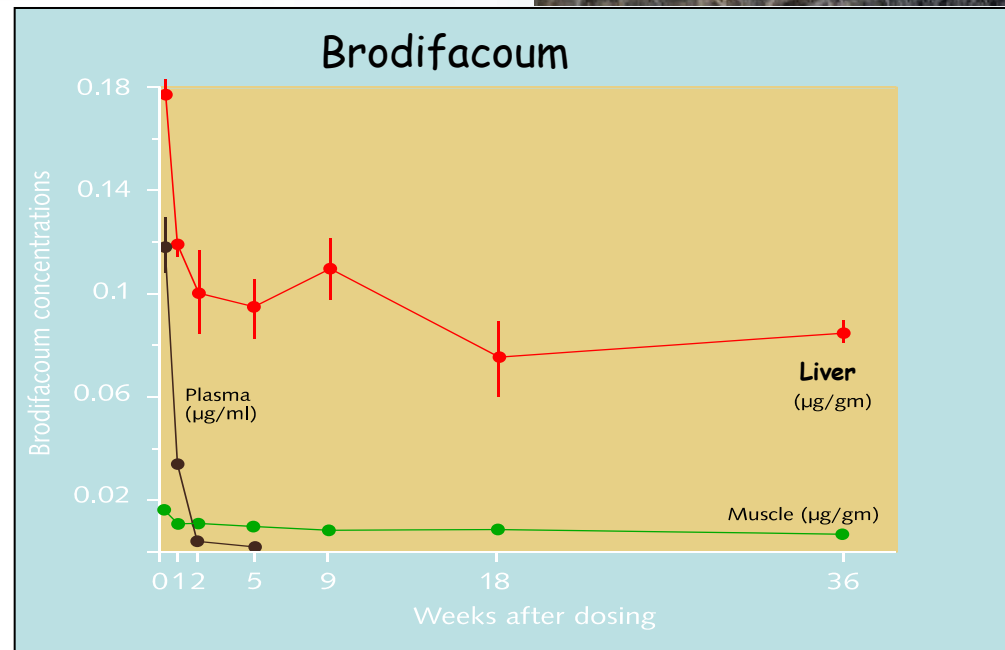




# Brodifacoum + and -

- kills rats/possums
- potent and effective
- successfully used to eradicate rats > 100 NZ Islands
- antidote

- welfare



Eason et al 1996.  
Persistence of brodifacoum  
*New Zealand Journal of Agricultural Research* 39: 397–400.

# Animal Pests in NZ

- **Introduced pest animals**
  - possum, rat species, mouse, mustelids
- **Concern:**
  - Impacts on taonga plants, birds, bats, invertebrates

Possum



Rat



Stoat



# A snapshot of the problem

## Mammalian pests are destroying New Zealand's biodiversity



**Stoats kill an average of 40 North Island brown kiwi chicks per day** – this adds up to 15,000 /year ; this is 60% of the total number of North Island brown kiwi born each year. Stoats are ‘surplus killers’ – they kill everything they find, such as the penguin (above centre)

**Possoms destroy forests and drastically reduce native birdlife in doing so** .They eat the eggs and chicks of native birds, including kiwi, kukupa and kokako, and are vectors of TB.



# Current solutions



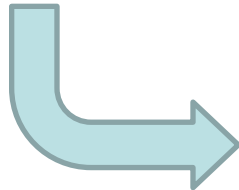
**Works, but very low capacity**



**Works, but has unwanted consequences**

Kea eating 1080 bait

Bald eagle killed by brodifacoum in Alaska



# Why seek new tools, toxins & deployment strategies?

- really big challenges
- persistent compounds
- some poisons inhumane or unpopular
- O/s no new VTA's since 1980's
- boom/bust cycle of pest control



*“If not striving to go forwards we are going backwards”*

# Delivering - our “two-part” approach

## Part 1. New toxins with the following specs

- Low secondary poisoning risk
- Low persistence
- Antidote
- Humane
- More acceptable

## Part 2. Effective/responsible toxin delivery

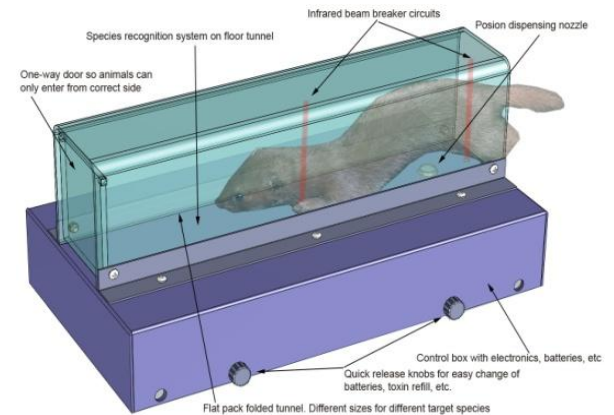


## Part 2. Effective/responsible toxin delivery

Thinking beyond baits > devices that:

- identify and distinguish between species
- provide >100+ kills with a single unit
- have a 12 month minimum maintenance period
- have discrete toxin application

Target for 2011 proven in 1st field trials







# Toxins and baits

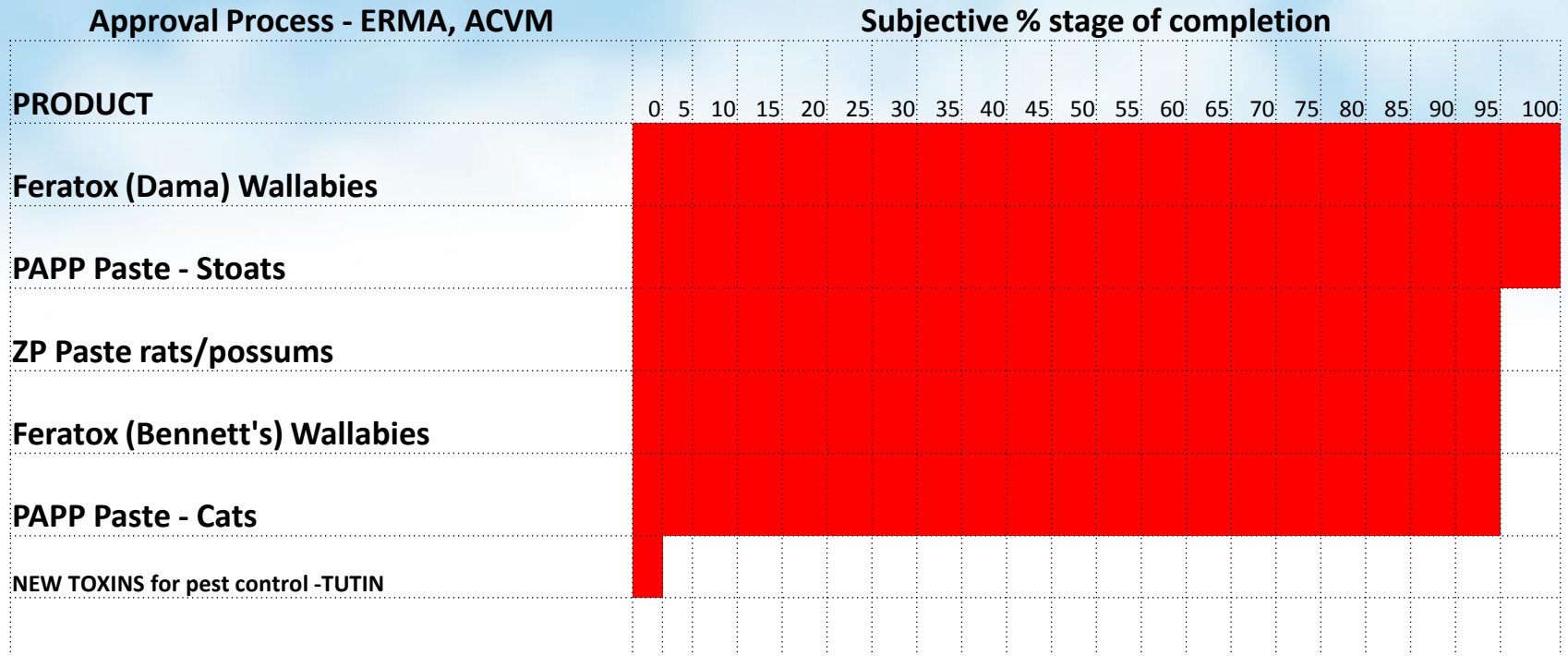
Our highest short-term priority first 6-8 months of 2011

- **Feratox®** for wallabies, **para-aminopropiophenone (PAPP)** for stoats and cats for kiwi protection
- ZP for rodents/possums





# R & D and Registration Progress



# What's/who involved



# What is needed?

## NZFSA require

- ACVM Act – NZFSA registration of a trade name product
- Includes dossiers on:
  - Chemistry and manufacturing
  - Toxicology
  - Efficacy (target species, dose rate, directions for use)
  - Welfare
  - Residues





# ERMA= EPA requirements

- **Explosiveness**
- **Flammability**
- **Oxidising properties**
- **Toxic properties**
- Toxicity Acute oral
- Acute dermal
- Acute inhalation
- Skin Irritation
- Eye irritation
- Sensitisation
- Mutagenicity
- Carcinogenic effects
- Reproductive/developmental effects
- Target organ systemic effects
- **Corrosiveness**
- Corrosive to metal
- Corrosive to dermal tissue
- Corrosive to ocular tissue
- **Ecotoxicity**
- Aquatic ecotoxicity
- Soil ecotoxicity
- Terrestrial vertebrate toxicology
- ID risk, cost and benefit
- Primary and secondary non-target
- Efficacy data as part of risk vs. benefit analyses
- Evidence Maori consultation
- Life Cycle Analysis
- Public notification

# Steps we follow.....

Agency	Focus
<b>Māori</b>	<b>Ngai Tahu HASNO sub-committee advice from Nga Kaihautu Tikanga Taiao (EPA)</b>
<b>NZFSA Pre-screen</b>	<b>Independent review of dossiers</b>
<b>NZFSA Full assessment</b>	<b>Five dossiers</b>
<b>EPA Pre-Screen</b>	<b>HS1</b>
<b>EPA Full-assessment</b>	<b>Public notification and feedback on Q &amp; A.</b>
<b>EPA- Evaluation and Review report</b>	<b>Final decision made by the ERMA “authority”.</b>
<b>NZFSA</b>	<b>Registration- Product license granted or rejected</b>

# Systematic approach for advancing “low residue” and new toxins in NZ

*Focus .... i) extending the registration of acceptable “low residue” tools*

*ii) registration of agents not previously used in NZ*

*iii) new toxins*

*iv) toxins from native plants*

*then linking new toxins to new baits and re-settable delivery systems*



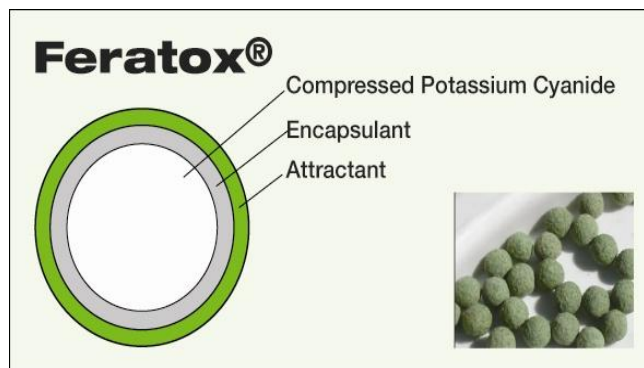


# 1st extending the registration of acceptable tools- Cyanide in a pellet



- Feratox® registered 1997 for possums-used routinely
- proven humaneness in possums
- kills “on the spot” (50 cents/kill)
- no secondary poisoning
- registration extended to wallabies Dammar 2010- Bennett’s 2011

*Feratox pellets -  
Not used before  
For Dama or  
Bennett’s wallabies-*



# Quick clean kill-alternative to 1080 for wallabies

Species	Onset of symptoms	<b>Duration of symptoms prior to unconsciousness</b>	Duration of symptoms prior to death	<b>Time to death</b>
Possum	3 mins	<b>3.5 mins</b>	15 mins	<b>18 mins</b>
Damar Wallaby	2.1 mins	<b>5.6 mins</b>	11.4 mins	<b>13.5 mins</b>
Bennett's Wallaby	2.2 mins	<b>12.8 mins</b>	19.3 mins	<b>21.5 mins</b>



# 2<sup>nd</sup> registration of agents not previously used in NZ – micro-zinc phosphide

- encapsulation essential for palatability
- no bioaccumulation-low 2<sup>nd</sup>ary poisoning
- effectively kills rodents and possums
- widely used o/s
  
- > \$1.0 M spent in last 10-15 years-NZ safety & efficacy-

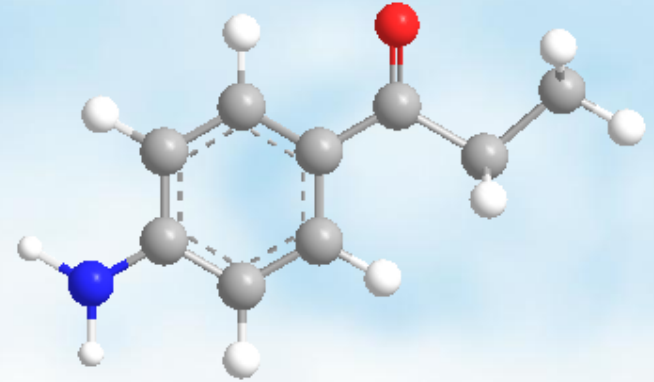


# Zinc phosphide-paste

- Oct 2008: – NZFSA approved –subject to ERMA review
- Dec 2008: – submitted to ERMA
- Early 2009:- ERMA pre-screening complete
- July 2009:- Publicly notified (12 submissions)
- Nov 2010:- ERMA draft Evaluation and Review Report
- April/May 2011:- Final Evaluation and Review Report
- May 2011:- ERMA Authority Review
- July/August 2011:- EPA Authority Approval
- August 2011:- NZFSA final steps towards registration



## 3rd. New toxins and baits- PAPP



- Oct 08:- Pre-screen NZFSA
- Nov 08:- Full assessment NZFSA
- May 08:- Pre-screen ERMA
- 2009:- Full assessment ERMA
- Feb 2010:- Public notification (18 submissions)
- Oct 2010:- Draft Evaluation and Review Report
- Jan 2011:- Final Evaluation and Review Report
  
- **March 2011:-ERMA approval for stoats and feral cats**
- **April 2011:- NZFSA registration**

# PAPP registered April 2011- 1<sup>st</sup> new toxin for 30 yrs

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Keep out of reach of children

**DANGER**

Read label before use

Keep outer packaging label at hand until all syringe contents used up

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PO Box 58 613, BOTANY, AUCKLAND 2163 TEL (08) 273 4333 www.connovation.co.nz

Registered pursuant to the ACVM Act 1997 No. V9541. See www.foodsafety.govt.nz for registration conditions

NET CONTENTS:

BATCH NUMBER:

EXPIRY DATE:

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**SYMPTOMS OF POISONING:** Rapid respiration, lethargy and lack of co-ordination.

**FIRST AID:** In the event of poisoning or suspected poisoning act immediately. Have product label or Safety Data Sheet available. Get medical attention. For advice contact National Poisons Centre 0800 POISON (0800 764 766). For animals, consult a veterinarian immediately. Product contains an anti-emetic. Administration of methylene blue antidote may be an option for non-target animals.

**DOMESTIC ANIMALS/LIVESTOCK:** It is important to prevent access to bait by domestic animals, pets, birds and livestock. Signs are required at each point of entry to the site to alert dog owners/the public and potential risk from scavenging of carcasses. The bait station needs to be of an approved design to prevent access and for removal of the toxic bait on completion of the control operation. Neighbours within 3 km of any bait station must be notified prior to the intended pest control operation and of the risk to pets and companion animals.

**STORAGE:** Store locked up in original packaging tightly closed in a cool dark place until used up.

**SHELF LIFE:** Any product held after the expiry date shown on the container should be disposed of according to the label directions.

**SPILLAGE:** In the event of a spill, contain and isolate the spill and take all practical steps to minimise any harmful effects. Scoop up spilled bait into secure containers. If lost or spill in other than the intended application area, notification within 24 hours is required to the person who granted permission for use, the officer in charge of the nearest police station, the nearest Medical Officer of Health, the owner/occupier of the land, the person on behalf the substance is being applied, the Local/Regional Council and FRMA.

**DISPOSAL:** Dispose of unwanted or expired product by burying under at least 50 cm of damp biologically active soil or with other organic material in an active appropriately managed landfill. Ensure bait is covered immediately to prevent scavenging. Unwanted or expired product can be burnt in a suitably constructed and located incinerator and any residues buried as above. DO NOT use the empty container for any other purpose. Dispose of container by burying or burning as described.

**Legal obligations:** This product must only be used by a person holding a Controlled Substances Licence issued by a test certifier who has been approved. Signs must be erected at every normal point of entry to the place where the substance is to be applied. Signs must remain in place until baits are retrieved or are no longer toxic, or until any other legal requirement affecting signage has been complied with. This product must be used only in bait stations.

**CONDITIONS OF SALE:** Connovation Ltd will not accept any responsibility for any consequential loss, injury or damage arising in connection with the supply or use of these goods other than the goods be of merchantable quality at the time of sale. To the extent allowed by such statutes the liability of Connovation Ltd is limited to the replacement or refund of the goods at the prior paid.



ECO TOXIC



TOXIC



TOXIC

**NET CONTENTS: 22g**  
as 10 syringes each containing 2.2 g

FRMA Register: HSR100194  
HSND Classification: 9.19 (total): 6.94, 9.34, 9.1D  
Registered pursuant to the ACVM Act 1997 No. V9541  
See <http://www.foodsafety.govt.nz>  
or <http://www.connovation.co.nz>



# 4th natural toxins

“There are poisonous plants in the forest that could be used to control pests”-PhD of Cheri (Chuckie) van Schravendijk

Research team:-

1. has discussed use of toxins and explored philosophies around pest control
2. has identified native NZ plants with potentially toxic properties –explored knowledge/Matauranga around these plants



# 6 native plants

(Pauling et al. 2009)





# Tutu



**PhD of Cheri (Chuckie) van Schravendijk**



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# Research Plan

- Tutin QA, stability ex situ
- Seasonality, best plant parts
- Toxicity in rats and possums
- Humaneness
- Palatability
  - Advance to use in bait





# Latest Results

- Four lots of monthly sampling done
- Highest concentration in new shoots
  - 3.7 mg/g dry weight
- Promising: estimated 100 g of new shoot would kill 2000 mice



# Nga Matapopore



Dave King

Lisa Waiwai

Jamie Ataria

James Waiwai

Te Whanau Pani Turipa

Jim Doherty

Maria Waiwai QSM

Raewyn Solomon

Craig Pauling

Donna Gardiner

# Summary of toxins covered in this presentation in the registration pipeline

Type	2010	2011	2012-2013
Already in use Altn. to 1080	Feratox® Dama wallabies	Feratox® Bennets	
New to NZ		MZP paste	MZP paste pellets for and rodents, possums
New toxins		PAPP for stoats	PAPP in tunnels and and tutin

# Summary

- New toxins are emerging- pipeline established
- **Welfare** focused Feratox, PAPP.
- Low residue ZP(back up to 1080/brodifacoum)
- Other PAPP-like **welfare** focused toxins for rodents
- Tutin being explored
- Combining new toxins with resetting delivery systems
- Future –*safer/more acceptable toxins and delivery alongside trapping*

*PCE June 2011:- “ Research to develop better toxins should absolutely continue”*



# NZ-Research partners



**Pest-Tech**



**Regional  
Councils-Pest  
Control  
Professionals**

**Design and  
Engineering**  
Lincoln Ventures  
Auckland University of Techno