

Research and Development Highlights in Pest Control Technology January - December 2009- our platform for 2010.

HIGHLIGHTS AND ACHIEVEMENTS:

1. **New product registration advances.** 2009 was a record year for new product registration achievements. Significant advances were made in the registration of microencapsulated zinc phosphide (MZP), Feratox[®], and para-aminopropiophenone (PAPP). Our research activities have forged ahead to the approval process required from both the Environmental Risk Management Authority (ERMA) and the New Zealand Food Safety Authority (NZFSA); consultation with Māori has occurred; and welfare considerations were researched and documented as key components of the registration assessment process. MZP and PAPP advanced to full formal assessment, while Feratox[®] dossiers were accepted to extend possum registration. Further details are below.

Table 1 Substance approvals (ERMA) and product registrations (ACVM Group, NZFSA) advanced in 2009

Product	Agency	Date filed	Outcome	Comments
Feratox [®] for dama wallabies	NZFSA	Feb 2009	Registration August 2009	Variation of registration (new target species)
ZaP [®] Possum paste with microencapsulated (MZP) Possum Paste	NZFSA	June 2008	Registration formalised once ERMA approved	Full application (new active); Evaluation completed June 2009
PredaStop [®] PAPP paste for Stoats	NZFSA	December 2008	Registration formalised once ERMA approved	Full application (new active); Evaluation completed December 2009
MZP and MZP Paste	ERMA	May 2009	Under Review & Evaluation	
PAPP Pastes & Ready-to-Use bait	ERMA	November 2009	In Public Notification period until 18 th February	

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- An exciting new initiative.** A substantial six year collaborative Foundation for Research, Science and Technology (FRST) research programme led by Lincoln University entitled "Pest control for the 21st Century PC21", was initiated on October 1st 2009. During the first 3 months of the programme, IP and collaboration agreements were secured between Lincoln, Otago and Auckland Universities, Connovation Ltd, Crop and Food Research Ltd, Lake Waikaremoana Hapu Restoration Trust, and Tuhoe Tuawhenua Trust. Research on new approaches to novel non-residual humane toxins for unwanted predators has been initiated. This includes screening of PAPP analogues for control of rodents and possums, and identifying other Red Blood Cell (RBC) toxicants. These and alternative active ingredients will cause a rapid and humane death through central nervous system anoxia or rapid heart failure. Developments will be advanced by emerging young researchers working within the programme, including PhD students Daniel Canole (University of Auckland) and Matt Kavermann (Lincoln University); and researchers Lee Shapiro (Massey University graduate), and Cheri Van Schravendijk (Lincoln University graduate).

Research in the first 3 months of the programme has included in-vitro and in-vivo testing of toxicants, and engineering advances for a tunnel delivery system for predator control. Assembly and fine tuning of prototype PAPP tunnels has progressed for further cage and field trials on stoats in 2010. Ngā Matapopore, a group of invited professional practitioners, community group leaders, researchers and managers with experience of Māori community pest control requirements, has been formed. An initial meeting of the group was held in December 2009 to review the aims and goals of the programme. In addition our Industry Advisory Board, which includes professional practitioners, community group leaders, researchers and managers with experience of industry pest control requirements, were briefed in December 2009. Looking to the future, we anticipate the development of more and better control tools combining "low residue" characteristics with humaneness facilitated by guidance from Ngā Matapopore and the Industry Advisory Board.

- Natural toxins.** A project led by Shaun Ogilvie entitled "Mātauranga rakau paitini – naturally occurring toxins in New Zealand plants with the potential for vertebrate pest control" was completed, and a report submitted to Ngā Pae o te Māramatanga. Plants and toxins have been identified which will be explored further in the new FRST programme PC21.
- PAPP progresses through registration hurdles.** The registration of PAPP has accelerated. Recent progress following field trials in 2008 (stoats) and 2009 (cats), has been rapid. One highlight mid-year was the successful completion of a major field trial with PAPP controlling over 80% of a population of carefully monitored feral cats on Ngamatea station in the central North Island. A report has been completed for conversion into a journal paper, conference presentations and inclusion in registration dossiers. PAPP dossiers for chemistry and manufacturing, toxicology, efficacy, ecotoxicology, non-target impacts and welfare, were filed with the NZFSA in 2008 and ERMA in 2009. In December 2009, a critically important milestone was reached in the registration process, namely the "publicly notifiable stage" on the ERMA-NZ website. The application is open for public comment and submissions until the 18th February 2010.

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5. **Advancing Zinc Phosphide (ZP) registration.** Following the filing of dossiers with ERMA-NZ earlier in 2009, ZP advanced through the pre-screening stage to the formal assessment phase. Meetings were held during October-December 2009 with ERMA officials. Detailed responses have been provided to ERMA to questions raised on the dossiers with regard to public submissions, and requests for additional technical information in response to the filing of our HS1 dossiers. Follow-up meetings in Wellington were held to clarify requirements relating to these submissions. A further set of queries were received in December and responses to these questions will be provided early in 2010.
6. **Initiating registration activities linked to a combination product containing Cholecalciferol and Coumatetralyl (C+C).** Toxicology, welfare, residue and efficacy dossiers have been prepared with PestTech, and edited for submission to NZFSA, prior to submission to ERMA. These dossiers will be finalised in the first quarter of 2010.
7. **Extending the registration of Feratox® in NZ.** Following a kill rate of approximately 90% of a population of radio collared dama wallabies, reports were completed and registration dossiers submitted in 2009. In August, we learnt that our application to extend the use of Feratox® to dama wallabies was approved by the NZFSA authority, extending the original 1997 Feratox® registration beyond the initial possum control. In addition, field trials on a possum specific bait called 215 have been collated for an AHB report. This bait enables Feratox® to be used more safely with less non-target interference. Field trials targeting Bennett's wallabies are scheduled for 2010.

Feratox® as an alternative to 1080 in Tasmania. Two presentations co - presented with Dr Mick Statham at a Department of Primary Industries, Parks, Water and Environment (DPIW) workshop in Launceston, Tasmania, in May, entitled "An update on Feratox® with latest research and registration activities" and "Plans for new repellent research", were well received by our client, DPIW, and stakeholders. In relation to our potential Feratox® registration in Tasmania, the Australian Pesticides and Veterinary Medicines Authority (APVMA) have requested additional details on chemistry and manufacturing, and hard copies of all cited publications. These were provided in November. Further field trials are planned in Tasmania in the first quarter of 2010 to provide additional efficacy data. There are considerable challenges in using any toxic bait in Tasmania with many non-target mammals present, hence smart use of delivery systems and baiting strategies coupled with local knowledge for optimum timing of control will be essential for the development of data for registration and ultimately best practise.

Three publications linked to the registration of Feratox® in Australia have been drafted based on collaborative research between Australian and New Zealand groups supported by DPIW and the Department of Conservation (DOC).

- a. Mick Statham has drafted a paper entitled "Feratox® as a humane control agent for wallabies in Tasmania". This will be a conference proceeding publication to accompany a presentation at the 24th Vertebrate Pest Conference being held in Sacramento, California in February 2010.

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- b. Charles Eason has drafted a paper for Wildlife Research on the "Humaneness and effectiveness of Feratox[®] for wallaby control".
- c. A third publication is in preparation for the New Zealand Journal of Ecology by Shapiro et al., entitled "The effectiveness of Feratox[®] as an alternative to 1080 for the field control of dama wallabies".

All three publications, coupled with new field efficacy data from Tasmania, will be important components if we are to proceed to full registration with the APVMA in 2010-12, and it is likely as series of trials will be needed.

8. **UK collaborative research.** Research agreements have been finalised which in 2010 will link our NZ researchers and Connovation Ltd. with research co-led by the Royal Veterinary College in the UK, focused on more humane rodenticides.
9. **Multi-species bait development.** A small two year FRST programme "Smart Pest Control", led by Lincoln University, ended on the 30th September with new multi-species bait products well advanced down the registration pathway. Novel camera-trapping methodologies have been developed and proven extremely useful for testing the effectiveness of new baits for possum, rat and mice control in the field. New baits have been manufactured to Good Manufacturing Practice (GMP) standards (NZFSA), and field life and stability tests have been completed. A quality assurance dataset for product registration has been generated. Connovation is committed to completing the registration of new multi-species baits containing 1080 alternatives, and registration activities will continue through 2010. Complimentary feedback was provided by FRST when Lincoln University submitted their final reports. There has been further testing of low dose (0.4%) multi-species cholecalciferol paste and solid bait in both cage and field trials to support the registration of two new products. Good results were obtained in the Coromandel on rats, and on Banks Peninsula on mice, by Lincoln University PhD student Shona Sam, with effective mouse control being seen on Onawe, Banks Peninsula.

In complementary trials also conducted on Banks Peninsula, Steve Hix and collaborators, including Dave Hunter, obtained excellent kills of possums and rats. Earlier in the year the first major field trial with the new multi-species baits were conducted with 1080 incorporated, and promising results were obtained in terms of possum control. The field trials were complemented by cage trials completed earlier in the year with AHB co-funding for the possum components of the work. Low dose cholecalciferol paste bait containing 0.4% cholecalciferol, trialled with captive possums, showed a dosage of 15 gm was effective with an 89.5% kill rate in possums that ate bait. The overall time to death (7 days) is similar to that of the existing 0.8% formulation. "Shatter-testing" of our multi-species baits for targeting possums and rodents was completed, and a report written and circulated to key clients and collaborators.

As part of this FRST programme, we have also surveyed pest control contractor costs, and completed a cost/benefit analysis of conventional aerial control versus ground control methods. Ground control is becoming increasingly cost-effective, and will become more so when new tools from this programme, including multi-species baits, are more widely used. We collaborated with two Māori community groups, who have each produced a 10-year plan of pest management activities

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to protect tāonga species and ecosystems in their rohe (area). We have introduced each community to the toolbox of pest control techniques, including new tools such as PAPP, which will be available commercially for stoat control in 1-2 years. They have shown great interest in helping to advance these tools for better protection of threatened species. Each management plan described the preferred mix of pest control techniques for each community.

10. **Clarification of non-residual toxins.** Experimental work on monitoring the persistence of diphacinone versus coumatetralyl in cattle and deer, supported by DOC, was completed in November. Reports and publications will be compiled during the first quarter of 2010.
11. **Exploring the potential of Sodium Nitrite (SN) as a Vertebrate Toxic Agent (VTA).** Significant progress was made during 2009 in the completion of exploratory studies with SN-containing baits in penned possums and pigs using a new enteric coated formulation. The enteric coating performed as well, if not better than the more expensive lipid coated formulation tested earlier in the year, humanely killing captive possums in cage trials. Research on sodium nitrite, supported by the AHB and Regional Council, links to the Lincoln University FRST programme. We anticipate completing cage trials and preliminary field trials in the first half of 2010. SN in baits is not effective against rodents, but shows promise as an alternative to 1080 for possums. We have consolidated results from testing SN for possum control, establishing an approximate LD₅₀ of 120 mg/kg for SN administered in baits.
12. **Death by chocolate?** Following reports from the US on the potential of methylxanthines for coyote control we completed, under contract to AHB, an assessment of the toxicity of chocolate and the ingredients methylxanthines and caffeine in possums. Unfortunately possums showed no special sensitivity to these compounds. A report on this study has been completed and we have refocused on SN and other RBC toxicants.
13. **DNA Resistance Monitoring Capabilities.** Mutations at 6 different amino acid positions in the VKORC1 gene are known to confer resistance to anticoagulants in the Norway rat (*Rattus norvegicus*). So far, resistance has not been found in NZ rats, however DOC would like to be able to detect these mutations should resistance ever be suspected. Research was carried out to establish the capability to detect mutations conferring resistance to anticoagulants in rats by DNA sequencing of the vitamin K epoxide reductase subunit 1 (VKORC1) gene. Primers have been developed for Norway rats and mice (*Mus musculus*). As this gene has not previously been sequenced in ship rats (*Rattus rattus*), we tested the primers designed for Norway rats on four ship rats. We are now in a position to be able to detect mutations conferring resistance in Norway rats. Mutations are able to be detected in 2 of 3 exons of the VKORC1 gene in ship rats although this is not enough to determine resistance, as mutations cannot be ruled out in exon 1. None of the rats tested appeared to have mutations associated with resistance. A report was submitted to DOC. Using a range of different baits and rodenticides and integrating these in rodent control reduces the chances of resistance developing.

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14. **Repellent research.** This project's aim is to improve the effectiveness of seedling stockings for commercial forestry, by impregnating biodegradable plastic stockings with repellents that are released over time. It involves collaboration with Plant and Food Research, pest control company EPRO, and is supported by DPIW in Tasmania. A variety of carriers for surface coating the repellent have been systematically assessed in the laboratory. Pilot studies have been conducted in Tasmania with the commercially available EPRO deer repellent, which also looked promising in 6 week field trials. Testing in December 2009 with penned wallabies in NZ has focused on the use of the preferred stocking material with repellent. The control trees were stripped of all leaves and some bark. Some of the trees protected with stocking were pushed over but not significantly eaten. The next stage is field trials in Tasmania in January/February 2010.
15. **NZ baits for UK badger vaccination?** Ray Henderson (PestTech) and Duncan MacMorran (Connovation Ltd.), met with Tb researchers in the UK to discuss research on baits for Tb vaccination of badgers. A bait preference study in wild badgers at Woodchester Park, UK, showed our NZ baits were more palatable to badgers and had less non-target uptake than alternatives.
16. **NZ Biosecurity Institute Conference - National Education and Training Seminar (NETS), Queenstown 2009.** Charles Eason presented a 30 minute keynote lecture entitled "Pros and cons of 1080 and other existing and new tools for animal pest control" at the NETS 2009 Biosecurity Conference, Queenstown 14th-16th October. Both Lyn Nicholls and Steve Hix attended, and 3 posters were exhibited. A further presentation was given to the Forestry Stewardship Council participants and overseas assessors in Rotorua on "Trends in vertebrate pesticide usage and new developments".
17. **High profile at National Possum Control Agencies (NPCA), Wellington 2009.** Lincoln University, Connovation Ltd. and associated researchers had a high profile at the recent NPCA conference held in Wellington in November. A total of 8 presentations were given at the conference, covering advances in new product development; recently completed field trials; progress in the registration of new products; new monitoring techniques; and comparative cost-benefit analyses of different control techniques.
18. **Community Groups and Professionals.** Numerous consultations occurred between community groups and professionals throughout the year, e.g. a field demonstration workshop and briefing by Steve Hix and Charles Eason, held at the request of Environment Southland in mid-December in and near Invercargill. This covered optimum use of existing control techniques for ground control and new product developments, and involved interactions with community groups and pest control professionals.
19. **Keeping Councils posted on new developments.** Two versions of an Envirolink report for Regional Councils on Trends for Alternatives to 1080 were completed. The reports highlight progress in new product research and development, namely:

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- a. Feratox[®] cyanide pellets are now being registered for wallaby control as well as possums;
- b. registration documents are currently being assessed by ERMA for ZP as an alternative to 1080 for the control of possums;
- c. registration documents are being prepared for a combination of C+C to provide an anticoagulant alternative for effective possum control.

Anticipated timelines for product availability are 2010 (ZP) and 2011-2013 (C+C) subject to ERMA and NZFSA approval, and continued focused research and development effort. In parallel, we are pursuing the registration of PAPP, a RBC toxicant, for 2010, a novel poison for humane control of stoats and cats.

On the platform of PAPP, alternative RBC toxicants are being advanced for larger pests, possums and rodents. These RBC toxins are safer, being designed to minimise the impact of invasive animals. They exhibit humane performance and have a simple antidote.

Over the last three decades, considerable effort has been put into improving and refining the use of 1080. In contrast, the last 12 months has seen a record period for new product registration advancement; however there are no "silver bullet" replacements for 1080. A suite of more effective and acceptable tools is being developed to reduce over-reliance on 1080 and to provide greater flexibility. There is now an intense focus on delivery of alternatives within 1 - 6 years. Our new consortium, linked with Lincoln University, is working to a timeline to deliver a suite of improved eco-friendly toxin products available by 2012, and additional products with novel RBC toxins targeting rodents, possums and other major pests delivered by 2015.

Table 1. Summary of new products and predicted registration timelines¹

Type	2010	2011	2012	2013	2014	2015
Products containing vertebrate pesticides already in use in NZ	Feratox [®] for Bennett's wallaby control. Low dose (0.4%) cholecalciferol paste & solid bait	Cyanide for pigs/ferrets	C+C solid bait for multi-species control	C+C paste bait for multi-species control of possum, rats, mice & rabbits		
Products containing vertebrate pesticides NOT already in use in NZ.	ZP 1.5% paste for possum	ZP 1.5% paste for possums & rodents		ZP solid baits for possums, rodents		

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NZ registrations of a new generation of vertebrate pesticides	PAPP paste for stoat & feral cat control	PAPP for cats & mustelids	SN for nuisance feral pigs	SN for possums	More potent PAPP-like rodenticide &/or combined rodenticide & mustelid toxin	PAPP-like possum selective toxin & other RBC toxins.
		PAPP delivered in repeat dose tunnels for stoats	PAPP delivered in repeat dose tunnels for cats	Multi-species tunnels	Possum tunnels	Natural toxins.
						Tunnels with sensors

¹ Timelines are subject to regulatory approval
PAPP – para-aminopropiophenone
C+C – cholecalciferol and coumatetralyl
ZP – zinc phosphide
SN – sodium nitrite

20. **Other conference presentations on new products.** Poster presentations were given at the 5th International *Mycobacterium bovis* Conference, organised by the AHB at Te Papa, 26-28th August.

A presentation at the International Society of Applied Ethology Conference in Cairns was given alongside complementary presentations by Kate Littin (Ministry of Agriculture and Forestry, MAF), Glen Saunders (Invasive Animals Cooperative Research Centre, IA-CRC) and Bidida Jone (Royal Society for the Prevention of Cruelty to Animals, RSPCA). Our focus was an update on the development of humane poisons for pest control.

On behalf of the research team, Charles Eason presented a 30 minute keynote lecture entitled "Trends in vertebrate pesticide use and new developments: New Zealand perspective and international implications" at the European Vertebrate Pest Conference (EVPC) in Lyon 7-11th September, and was co-author on a paper presented by Simon Humphrys of IA-CRC. James Ross presented a paper, entitled "Cost effectiveness and efficacy of multi-species pest control in New Zealand". A number of invitations resulted from attendance at the EVPC. Firstly, Hans-Joachim Pelz from the Julius Kühn Institute invited Eason to be on the organising committee of the next EVPC in Berlin in 2011 or 2012. Secondly, Alan Buckle, a visiting research fellow at the University of Reading, invited Eason to co-author a chapter in a new rodenticide book, and thirdly, a German Environmental Protection Agency invitation was received to facilitate a workshop on new alternatives to anticoagulant rodenticides.

Collaboration with David Heath, a consulting veterinarian, resulted in submission of a co-authored abstract on PAPP, presented at the XXIII World Congress of Hydatidosis Conference, Colonia de Sacramento, Uruguay, December 10th-12th.

21. **Researcher Development.** Judy Chan, working with Lincoln University partners Connovation Ltd., completed her PhD thesis at the University of Auckland entitled "Delayed release of diphacinone ". Penny Fisher completed a PhD at Lincoln University on anticoagulant pharmacokinetics and risk assessment.

REPORTS, PUBLICATIONS & PRESENTATIONS

Published:

Beasley M, Fisher P, O'Connor C, Eason C 2009. Sodium fluoroacetate (1080): assessment of occupational exposures and selection of a provisional biological exposure index. The New Zealand Medical Journal 122: 79-91.

Eason CT, Ogilvie S 2009. A re-evaluation of potential rodenticides for aerial control of rodents. Department of Conservation Research and Development Series 312: 33 pp.

Eason C, Ogilvie S 2009. New toxin research accelerating. Biosecure (MAF Biosecurity Journal) 25: 24.

Eason CT, Murphy E, Hix S, MacMorran D 2010. The development of a new humane toxin for predator control in New Zealand. Integrative Zoology 1: 443-448.

Littin KE, Gregory NG, Airey AT, Eason CT, Mellor DJ 2009. Behaviour and time to unconsciousness of brushtail possums (*Trichosurus vulpecula*) after a lethal or sublethal dose of 1080. Wildlife Research 36: 709-320.

Accepted or "in press":

Eason CT, Baigent D, Wilson L, Hix S, MacMorran D, Ross J, Miller A, Ogilvie S 2010. Toxicity of cholecalciferol to rats in a multi-species bait. New Zealand Journal of Ecology.

Eason CT, Fagerstone KA, Eisemann JD, Humphrys S, O'Hare JR, Lapidge SJ 2010. A review of existing and potential New World and Australasian vertebrate pesticides with a rationale for linking use patterns to registration requirements. International Journal of Pest Management.

Eason CT, Henderson R, Hix S, MacMorran D, Miller A, Murphy E, Ross J, Ogilvie S 2010. Alternatives to brodifacoum and 1080 for possum and rodent control - how and why? New Zealand Journal of Zoology.

Eason CT, Murphy EC, Hix S, Henderson RJ, MacMorran D 2010. Susceptibility of four bird species to para-aminopropiophenone. Department of Conservation Research & Development Series.

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Lapidge SJ, Eason CT, Humphrys ST 2010. A review of chemical, biological and fertility control options for the camel in Australia. Rangeland Research

Submitted:

Eason CT, Fairweather AAC, Arthur D, Eason CMF, Elder PA. Reference concentrations of cholecalciferol in animals: - a basis for establishing non-target exposure. Journal of Applied Toxicology.

Eason CT, Miller A, Ogilvie S, Fairweather A. An Updated Review Of The Toxicology And Ecotoxicology Of Sodium Fluoroacetate (1080) In Relation To Its Use As A Pest Control Tool In New Zealand. New Zealand Journal of Ecology.

Eason CT, Ogilvie S. New toxin research. Indigena.

Internal and Contract Reports within Lincoln University, Connovation Ltd. and collaborators:

Cruickshank R, Ogilvie S, Eason CT 2010. Anticoagulant resistance in rats. Unpublished Report for the Department of Conservation. 3 pp.

Eason CT, Hix S, Frampton C, Arthur D, Murphy E, Fairweather A 2009. Diphacinone persistence in livestock. Connovation Report for the Department of Conservation. 8 pp.

Eason CT, Hix S, MacMorran D, Murphy EC 2009. The first stage of preliminary screening of candidate Mthb inducers as potential rodenticides including PAPP and sodium nitrite by oral gavage and in bait. Connovation Report for DoC, New Zealand. 8 pp.

Eason CT, Lapidge SJ, Hix S, MacMorran D 2009. The effectiveness of an encapsulated formulation of a new pig toxin in pen trials. Connovation Report for Regional Council. 10 pp.

Eason CT, Ogilvie S 2009. Trends in vertebrate pesticide use and development: alternatives to 1080 - what and when? Envirolink Report. 26 pp (short version 6 pp.)

Eason CT, Ogilvie S, Murphy E, Broome K, Fairweather A 2009. Comparative pharmacokinetics and Residue Guidelines for Vertebrate Pesticides. Report for the Department of Conservation. 18 pp.

Hix S, Lee L, MacMorran D, Eason CT 2009. Stage 1. The effectiveness of low dose cholecalciferol bait for killing captive possums. Connovation Report for the Animal Health Board. 6 pp.

Hix S, Durrett T, Shapiro L, MacMorran D, Ross J, Eason CT 2009. Rodent deterrent for selectivity and safety of 215 possum bait. Connovation Report for the Animal Health Board. 12 pp.

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Hix S, MacMorran D, Aylett P, Eason CT 2009. Multi-species bait shatter test. Connovation Internal Report. 6 pp.

Hix S, Shapiro L, MacMorran D, Eason CT 2009. Death by Chocolate: Chocolate and theobromine and caffeine toxicity to possums. Connovation Report for Animal Health Board. 6 pp.

Lee S, Hix S, MacMorran D, Eason CT 2009. Feratox field trials on dama wallabies. Connovation Report for Department of Conservation. 10 pp.

MacMorran D, Lorigan R (EPRO), Pillowe A (EPRO), Shapiro L, Tucker N (Plant and Food Ltd NZ), Aylett P, Hix S, Eason CT 2009. Smelly stockings - Preliminary report on product development logic. Contract Report for Department of Primary Industries, Parks, Water and Environment, Tasmania. 6 pp.

Miller A, Ogilvie S, Ataria J, Waiwai J, Doherty J. (2009). Sodium fluoroacetate (Compound 1080) uptake by puha, a culturally-important food plant. Report prepared for the Animal Health Board. Lincoln University Wildlife Management Report No. 48 32 pp.

Pauling C, Ogilvie SC, Miller A, Ataria JM, Waiwai J, Doherty J, Eason CT 2009. Mātauranga rakau paitini – naturally occurring toxins in New Zealand plants with potential for vertebrate pest control. Report prepared for Ngā Pae o te Māramatanga, University of Auckland. Lincoln University Wildlife Management Report No. 50 30pp.

Shapiro L, Hix S, MacMorran D, Eason CT, Murphy E 2009. PAPP field trials on feral cats. Connovation Report for the Department of Conservation. 10 pp.

Conference Presentations:

NETS 2009, NZ Biosecurity Institute Conference, 14-16th October Queenstown

Presentation:

Eason CT, Ogilvie S, Murphy E. Pros and cons of 1080 and other existing and new tools for animal pest control.

Posters:

Eason CT, Ogilvie S, Henderson R, Hix S, Shapiro L, MacMorran D, Murphy E. Improvements in control tools for Tb vectors and other animal pests.

Shapiro L, Dilks P, Eason CT, Hix S, MacMorran D, Murphy E. Advancing para-aminopropiophenone (PAPP) products for humane predator control.

Shapiro L, Hix S, Eason CT, Adams P, MacMorran D. Feratox[®] for wallabies.

NPCA, 25th – 26th November 2009 Wellington.

Presentations:

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Eason CT, Fairweather A, Drysdale J. New product registrations - Maximising effectiveness to meet challenges.

Eason CT, Lapidge S, Hix S, Shapiro L, Aylett P, MacMorran D. Sodium nitrite as a potential VTA.

Eason CT, Ogilvie S, Shapiro L, Hix S, MacMorran D, Murphy E. Improvements in control tools for possums - trends in vertebrate pesticide use and their development.

Hix S, Hunter D, Shapiro L, Durel T, Eason CT, MacMorran D. Reducing rat interference with Feratox[®].

Hix S, Hunter D, Shapiro L, Eason CT, MacMorran D. Increasing the cost effectiveness of cholecalciferol baiting.

Ross J. Re-evaluating the cost effectiveness of ground control.

Sam S, Ogilvie S, Paterson A, Eason CT. The not-so-secret life of mammalian pests: the use of camera traps for wildlife management.

Shapiro L, Dilks P, Eason CT, Hix S, Ogilvie S, MacMorran D, Murphy E. Advancing para-aminopropiophenone (PAPP) products for humane predator control.

Shapiro L, Dilks P, Eason CT, Hix S, Ogilvie S, MacMorran D, Murphy E. Feratox[®] for dama wallabies.

European Vertebrate Pest Conference in Lyon 7th - 11th September

Presentations:

Eason CT, Ogilvie S, Ross J, Murphy E, Henderson R, MacMorran D. Trends in vertebrate pesticide use and new developments: New Zealand perspectives and international implications.

Humphrys S, Eason CT, Lapidge S. Humane pest management - tools the next generation.

Ross J. Cost effectiveness and efficacy of multi-species pest control in New Zealand.

International Society of Applied Ethology Conference, Cairns 6th - 10th July 2009

Presentation:

Eason CT, Murphy E, Hix S, Shapiro L, MacMorran D. New Approaches to Developing Humane Toxins.

Animal Health Board organised Tb conference, Wellington August 2009

Presentations:

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Eason CT, Ogilvie S, Murphy E, Shapiro L, Hix S, MacMorran D. Improvements in Control of Tb Vectors and other animal pests.

Shapiro L, Dilks P, Eason CT, Hix S, MacMorran D, Murphy E. Advancing PAPP Products for Predator Control.

XXIII World Congress of Hydatidosis, Colonia de Sacramento, Uruguay, December 10th - 12th

Presentation:

Humphrys S, Murphy E, Lapidge S, Staples L, Eason CT, MacMorran D, Heath DD. PAPP for humane removal of unwanted dogs.

DPIW workshop in Launceston, Tasmania 4th - 5th May

Presentations:

Eason CT, MacMorran D. Smelly Stockings.

Eason CT, Statham M, MacMorran D, Dawson J. Feratox[®] as a humane alternative for browsing control.

Forestry workshop, Rotorua, April 30th

Presentation:

Eason CT. 1080 replacements - what's new in the product development pipeline?