Sustainable Farming Fund
Ministry of Agriculture and Forestry
Te Manatū Ahuwhenua, Ngāherehere

Final Report Template

Project Title:	Parasite control in farmed deer – the way forward
Project Number:	L10/134
Date of Report:	October 2011

Note: The Final Report is due in the SFF Office within two months after the project completion date.

If any material supplied in, or attached to, this report contains confidential information, or is otherwise unsuitable for wider dissemination, please clearly mark accordingly and highlight directly with your Project Adviser (including the reason for wishing to treat the material in this manner).

This information from Sections 2 – 5 and Section 11 will be published on the SFF website unless you advise us otherwise.

1. Milestone Summary Table

Milestone Number	Milestone [As per SFF contract schedule]	Completion Date Original	Completion Date Actual	Percent Complete
1	Liase with technical personnel to define trial design and sample analysis	July 2010	December 2010	100%
2	Selection of farms and livestock for trials	July 2010	October 2010	100%
3	Complete efficacy trial	October 2010	November 2010	100%
4	Complete 1st phase drug residue study	November 2010	December 2010	100%
5	Complete 2nd phase drug residue study	February 2011	N/A	0%
6	Compilation final report	April 2011	Oct 2011	100%
7	Disseminate information to industry	November 2010 to October 2011	October 2010 to October 2011	100%
8	SFF Report – overview of project	October 2011	October 2011	100%

2. Project Objectives

(Why did you do this project? What were your key objectives at the start of the project? Outline if any of these objectives changed during the course of the project.)

Large scale commercial farming of deer started in New Zealand, and New Zealand remains the world's largest and most advanced deer farming industry.

Ineffectiveness against gastro intestinal parasites of currently used anthelmintics (that are registered for use in deer in New Zealand) poses a serious threat to the sustainability of deer farming.

Moxidectin is considered the most effective and certainly mostly widely used anthelmintic on New Zealand deer farms.

The first objective of this project was to clarify the issue of drench resistance versus drench efficacy of moxidectin.

The second objective is to establish a recommendation for a safe treatment to slaughter time for the injectable form of moxidectin based on drug residue trials.

The final objective was to convey our findings for the benefit of the entire NZ deer industry.

3. Approach

(What did you do – how did you go about it?)

FECs (Faecal egg counts) have a well proven role in the sheep and cattle industries as a reliable means of monitoring parasite burdens and determining drench resistance. **FECs have proven to be a most unreliable tool in the deer industry**. A whole worm count from the gut of deer is far more limiting and expensive but is the ultimate test and the system we have utilised.

Objective 1. Determine Moxidectin efficacy and identify/confirm the presence of drench resistance.

Deer (Rising 1yr) were selected for the trial that were at normal killable liveweight of around 100kg. They had not been treated with anthelmintic since before winter and faced natural field challenge against gastro intestinal worms. The trial was conducted on two farms each with a control group, Moxidectin Pour On group and Moxidectin Injection group(x6 R1 deer per group).

On Day 0 the Control group animals were slaughtered. Abomasa will be collected from the control group and sent to the laboratory for worm counts and abomasal digest(detects worm larva encysted in the abomasal lining). Adequate numbers of parasites were required and found. Hence we were able to continue with the trial and on Day 2 the Pour On and Injection groups were treated.

On Day 14 the two treated groups were slaughtered. Abomasa were collected from these groups and sent to the lab for worm counts and abomasal digest.

Comparisons of parasite numbers between treated and control group animals provide the answers.

The trial was completed on the first farm in early October and by mid November on the second farm. The alarming results from the first farm allowed us to add further treatment groups to the trial on the second farm – Moxidectin LA Injection, Moxidectin Injection plus Scanda oral and Startect.

Objective 2. To establish a recommended safe, treatment to slaughter time for the injectable form of moxidectin based on drug residue trials. Moxidectin Injection is not registered for use in deer and as such the withholding period automatically defaults to 91days. This becomes a major issue for treatment of venison finishing stock.

A field trial was conducted on 5 deer with guidance on trial design from NZFSA and Pfizer. The deer were slaughtered at 49days post treatment. Tissue samples were sent to an approved laboratory (AsureQuality) for drug residue analysis.

4. What were the main findings from this project?

Moxidectin is the most commonly used anthelmintic to treat parasites by the deer industry. Trials on both these commercial deer farms showed Moxidectin drench resistance present. The results pose serious questions over the use of Pour On drenches on deer. The combination drench regime trialled was the only treatment to provide satisfactory results.

Results from the first farm were very conclusive and alarming. The 6 animals in the control group had surprisingly high levels of both adult Ostertagia (average of 18000) and immature/larva in the lining of abomasa (average of 21000). One treatment group was given Moxidectin Pour On and the other group Moxidectin Injection – both at standard recommended dose rates

Drench Trial

- Results from 1st farm

	Oster adults	T.Axei adults	Oster larva	pH
Control	18133	1200	21200	5.2
Moxi Pour On	5217	67	17133	4.5
%Efficacy	71.2%	94.4%	19.2%	
Moxi Inj	2983	0	4000	5.8
%Efficacy	83.5%	100%	81.1%	

The benchmark for drench resistance is a 95% kill. Moxidectin injection group achieved just over 80% for both adult and immature Ostertagia parasites. The result with Moxidectin Pour On is significantly worse – not even killing 20% of immature larva that reside in the lining. They emerge from here and develop into adult Ostertagia.

Moxidectin Injection produces a higher level of active drug in the bloodstream than Pour On but irrespective of this the trial reveals clear Moxidectin resistance on this farm.

The normal and required acid pH of the abomasum in deer is less than 3. The elevated pH present in all these deer indicates damage to the abomasal lining and hence ability to function.

The treatment groups were replicated on the second farm. Fortunately the results from the first trial farm were available prior to starting the trial on the second farm and additional treatment groups were added.

Results 2nd trial farm - EWSNZ/SFF

	Oster adults	T.Axei adults	Oster larva	pH
Control	3367	50	1683	4.1
Moxi Pour On	2717	17	1783	4.9
%Efficacy	19.3%		0%	
Moxi Inj	433	0	300	4.7
%Efficacy	87.1%		82.2%	
Moxi LA Inj	650	0	67	4.7
%Efficacy	80.7%		96.0%	
Moxi Inj/Scanda	83	0	33	5.0
%Efficacy	97.5%		98.0%	
Startect	617	0	17	5.1
%Efficacy	81.7%		98.9%	

The natural parasite challenge on this farm was lower but still significant. The results with Moxidectin PourOn were even worse with only 20% of adult Ostertagia and zero % of larva being killed. In fact there is no statistically significant difference between using Moxidectin Pour On and using no drench on this farm!! As on the first farm Moxidectin Injection had kill rates in the 80% range and well below desired/acceptable levels. Moxidectin resistance is also confirmed on this farm.

Two other groups were treated with the sheep products - Moxidectin Long Acting and Startect (the completely new drench family aimed at sheep parasites with multiple resistance) Results with both of these were disappointing particularly their efficacy against adult Ostertagia. The standard sheep dose rate of Startect used may not have been appropriate for deer.

The only treatment yielding a satisfactory result on this farm was the simultaneous use of Moxidectin Injection and Scanda given orally. Scanda is a combination sheep drench containing Oxfendazole (BZ/white) and Levamisole (clear).

Based on the significant and alarming level of resistance on these trial farms it would be naïve to think the issue is not widespread in the industry.

The second objective was to provide a guide for farmers on the safe use of Moxidectin injection in relation to drug residue and slaughter time.

Five R1 hybrid deer were injected with Moxidectin Injection (standard rate of 1ml/50kg) and slaughtered 49days post treatment. They were slaughtered at an export certified DSP and held under NZFSA detain pending the results. Samples of fat and liver from each animal came back with clear results and the product cleared for export.

Farmers can now confidently treat with Moxidectin Injection and send them to slaughter after 49days. Processors and NZFSA will accept stock 49 days post

treatment. Based on veterinary advice/script farmers do not need to declare treatment on their ASD form that accompanies deer to DSP when treated 49 to 91days prior.

5. What difference has this project made to your group / community of interest / industry?

(Include intangible benefits where significant — e.g. “enabled us to develop a strong on-going working relationship with the scientists”).

Due to the alarming nature of the results there has been widespread industry interest in this project.

The extent of resistance present was not anticipated and the inferior result using the Pour On formulation provides a stern warning.

The evolution of the project to be extended in an attempt to find satisfactory treatment options was opportune and brought to industry attention the place of combination drenches for farmed deer.

Dissemination of the project was made easy due to the nature of the results. Widespread dissemination was achieved to all New Zealand deerfarmers and the veterinary fraternity.

Drench resistance in the deer industry has been proven and deerfarmers should exercise more care with parasite control programmes on farm. The avoidance of using Pour On drenches and the inclusion of combination drenches will at least delay the onset of resistance. The awareness created has highlighted the limited knowledge that exists regarding parasitism in farmed deer in New Zealand and will hopefully stimulate more research.

6. If you did the project again what would you do differently?

(i.e. what worked and what didn’t?).

Initial protocol proved to be sound. We achieved more than was expected at the outset. This was due to the opportunity to extend the trial beyond the original protocol

This was only possible due to the financial support of both Cash and In-kind contributions of non-SFF sources.

Future trials will use a 2% aliquot rather than 1% aliquot for counting parasites. This will further enhance the statistical significance of the results

7. Is there anything the SFF could have done differently?

It would be great to see SFF have more flexibility.

As the gravity of the results became apparent there was no option to take advantage of this huge opportunity within the SFF framework.

Fortunately the opportunity was not lost due to community sources recognising the significance and providing additional In-Kind and Cash contributions.

The original total project budget went from $38,000 to $63,600.

8. Is there anything that you have learnt that would be useful for new project teams?

The level of In-Kind contribution is likely to be much more than you estimate.

Make sure you build into your application SFF compliance costs.

For this project 13% of the total grant was needed for costs associated to meet reporting requirements of SFF

9. Where to from here – what are the next steps?

Questions raised from trials in this project are to be addressed with further trials in Spring 2012.

Practical issues to be addressed:-

- determine the need for levamisole in a combination drench of deer
- to determine if oral moxidectin is as effective as injectable.

Further work on speciation of gastrointestinal species of deer will be done by Paul Mason (parasitologist – Christchurch)

Parasite research in deer is ongoing at AgResearch Invermay and through contacts with Colin Mackintosh additional samples from the 2012 drench trial animals will be collected (blood, faeces and saliva). This will be helpful in the quest to find a useful and practical test for parasites in live deer. Early research considering deer saliva as an indicator of parasitism is being looked at. Also antigens from ovine Ostertagia are being tested on sera submitted and tentative results look encouraging.

Contact with Landcorp and Dave Leathwick (parasitologist) at AgResearch Palmerston North offer further extensions to our project. AgResearch PN has developed an assay to measure blood levels of moxidectin following treatment. Their present work is confined to cattle but this year will evaluate blood levels following different application methods of moxidectin in deer.

Budgeted costs for this years project is in the order of $60,000

10. Financial summary

Provide a brief comment as to whether the project was completed on budget; whether there is any grant money left unspent. Please provide a financial statement to summarise the incomings/ outgoings over the life of the project – you can either attach a copy of your own financial statement or use the “final financial template” available at our website http://www.maf.govt.nz/sff/forms/index.htm

Had the original protocol been followed the project would have come in on budget except for the In Kind costs which were underestimated.

The acknowledgement of the gravity of the findings part way through the project meant the project was extended and the original budget was exceeded by 67%.

This was achieved from additional contributions:-

SFF = $20000 = zero more than budget

Community Cash contribution = $17347 = 73% more than budget

Community In Kind contribution = $25789 = 222% more than budget

Please note the Final Financial Summary is GST exclusive

NB. The Year 2 listed SFF income of $2689.82 excl has not yet been paid

11. List and attach any major outputs from the project.

Examples could include:

1. Scientific reports

Cervetec 2011 – Proceedings of Deer Branch of the New Zealand Veterinary Association - conference held in June 2011 and proceedings due for publication November 2011

"CERVINE ANTHELMINTICS – THE BUBBLE HAS BURST"

"MOXIDECTIN DRUG RESIDUE TRIAL"

2. Code of Practice/ Best Practice Guide

Moxidectin drug residue trial in deer – published in Vetscript p41,42 October 2011

3. Publications (booklets, posters, links to websites)

http://www.elkwapitisociety.co.nz/5.htm

http://youtu.be/Il1daco7oLY

If appropriate, we would like to publish a copy of the above on our website: please provide an electronic copy for this purpose preferably in Word format.

Report Confirmation

Name [Project Manager]	Confirmation		Date
Dave Lawrence	I hereby confirm the above information is true and correct:	X	5/11/2011

Submission Note - By the due dates Final Reports should be sent:

1. Electronically to the SFF Process Coordinator **and** copy/cc. your Project Adviser (usually in the same e-mail as the final Request for Payment (R4P) form).

Please ensure you put your project number in the e-mail's subject line:
e.g., 06/999 Final report 2007.

2. In hardcopy, together with any associated attachments, to **both** the Process Coordinator **and** your Project Adviser.