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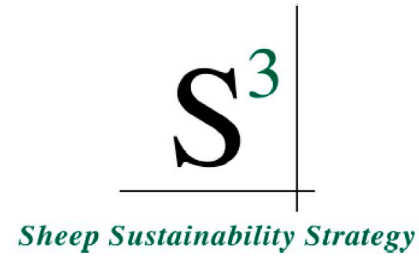
merino inc.research

Sheep Sustainability Strategy — Summary for Merino Growers



A Merino NZ Inc publication, summarising the S³ project, July 2008. For a detailed analysis of the method and results please contact Merino Inc or FECPAK International. Please file in your Merino Inc folder.

S³ project team

This was a unique project that brought together a consortium of participants, a variety of expertise and an inclusive approach working on solutions for industry.

Chairman	Alastair Campbell
Management committee	John Bates — Project Manager
	Greg Mirams — Technical Manager
	Dr Jon Hickford

Merino NZ Inc was one of a host of funding providers, including MAF Sustainable Farming Fund, Ravensdown, Merino ram breeders, Corriedale ram breeders, and equipment suppliers Prattley Systems Ltd, Tru-Test and ZeeTag. In addition to the funding of the project their were a number of service providers responsible for the administration and delivery of the project including; Lincoln University, FECPAK International and JBT Consulting.

Background

The S³ project, initiated by a small group of industry individuals and a group of merino and mid-micron breeders, analysed the parasite status and control methods of 37 farms over a three year period.

The aim of this farmer-driven research was; to benchmark parasite management strategies and costs, gain a better understanding of parasite challenge and status during a year, identify anthelmintic (drench) resistance issues, and to develop recommendations and protocols for parasite management for the industry.

The project encompassed the synergy between sustainable parasite management, breeding for resistance/ resilience and property bio-security.

Method

Data collection involved the testing of 8000 ram lambs (tested twice) on 37 properties in the South Island, for; FEC (faecal egg count), dag scores, weights, bloods (DNA), FECRT (faecal egg count reduction test)(6 drench options tested), drench usage history and, current quarantine protocols.

Each property received an individual analysis outlining; FECRT reports (drench resistance status), a recommended quarantine protocol, an indication of average growth rate per day, dag scores, FEC ranges, FEC/weight comparison, cost of production and a parasite species analysis.

The outcomes from the project will be the recording of parasite resistant sire lines on SIL and Lambplan, setting of robust quarantine protocols for breeders to safeguard their commercial clients against acquiring drench resistance, and the development of best practice tools for parasite management for all farmers.

FECRT — Faecal egg count reduction test

The FECRT is based upon the premise that under a fully effective drench treatment, the earliest eggs should be seen in faecal samples is 18-21 days later. If eggs are seen in samples 10 days post accurate drenching then this is normally accepted as evidence that some worms have survived treatment i.e. the drench is not working effectively.

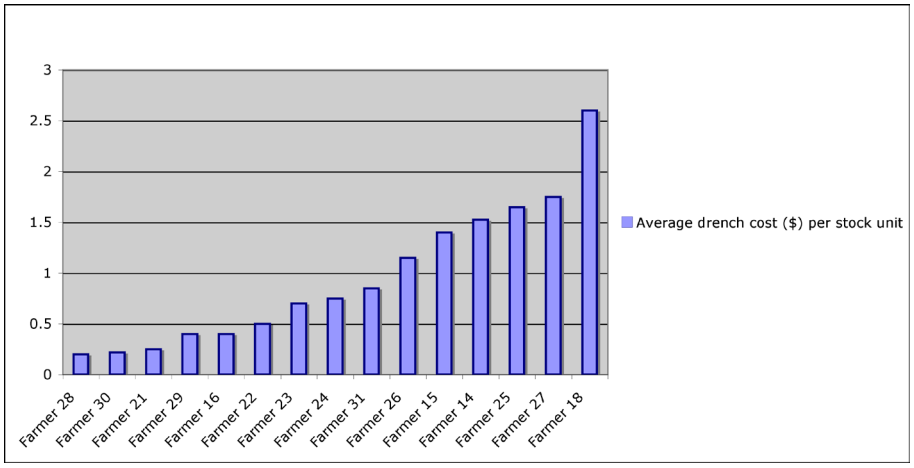
> *FECRT — Faecal egg count reduction test, a test based on comparing FEC before and after treatment to assess the effectiveness of an anthelmintic (drench). Used to detect and monitor anthelmintic resistance.*

FECRT tests are normally expressed as the percentage reduction in eggs counted between the pre and post-drench (10 days) periods.

Reduction	Resistance status
Better than 95%	No resistance found — drug still fully effective
Between 90-95%	Resistance suspected — may or may not be start of resistance
Less than 90%	Drench resistance confirmed

Results and discussion

Cost of parasites — Drench costs



"No farmers had an effective quarantine protocol at the start of the project"

Figure 1. The average drench cost ($) per stock unit for each Merino grower in study.

The average drench spend $ per stock unit for the Merino Group (2003-2004) was $1.02. This ranged from $0.20 to $2.60 per stock unit (Fig 1). In comparison, the Mid Micron group averaged $1.19 drench spend per stock unit. The project average drench spend (Merino and Mid Micron) was $1.15 per stock unit.

The costs of drenching were calculated using each farm's drench usage data and set average prices, to enable between-farm comparison.

Drench spend analysis only accounts for the cost of the drench treatment and does not account for costs relating to time, labour, or loss of production caused by the use of an ineffective drench.

Cost of parasites — Drench resistance

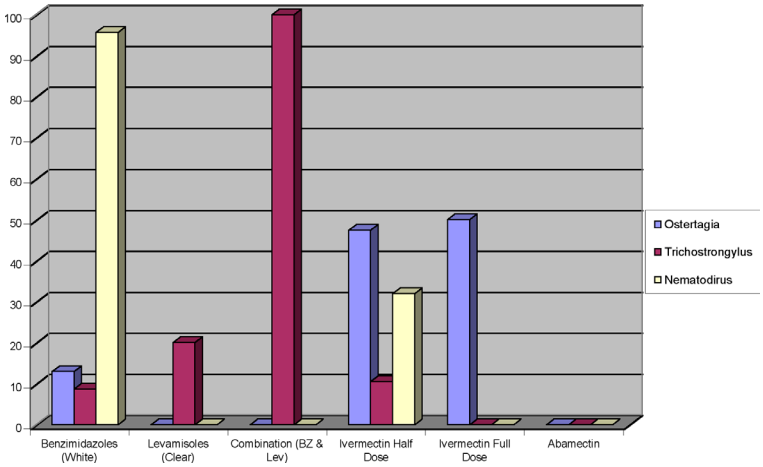
Table 1. Percentage (%) of the 37 properties with confirmed resistance to individual drench families.

White	Clear	Dual Comb (BZ & Lev)	Ivermectin Half	Ivermectin Full	Abamectin
79%	17%	3%	67%	32%	0%

45% of all farms were using an ineffective drench. Of the Merino farms involved (15 of the 37) 42% were using an ineffective drench. Table 1 shows the breakdown of resistance to individual drench families.

An expensive drench is a huge waste of money if you think it is working and it isn't!

Cost of parasites — Species resistance



"45% of the 37 farms involved were using an ineffective drench"

Figure 2. Summary of species resistance (%) to individual drench families.

A breakdown of parasite species resistance to the different drench families was also measured (Fig 2).

Cost of resistance to wool production

There was a predicted loss of $1.2 million annually to the Merino sector through the use of ineffective drenches. This equated to a wool value loss of $0.58c per head to the S^3 group.

This cost of drench resistance doesn't account for the cost of;

- Limited animal growth and performance
- Cost of time and labour

Parasite dynamics

FEC range within mobs

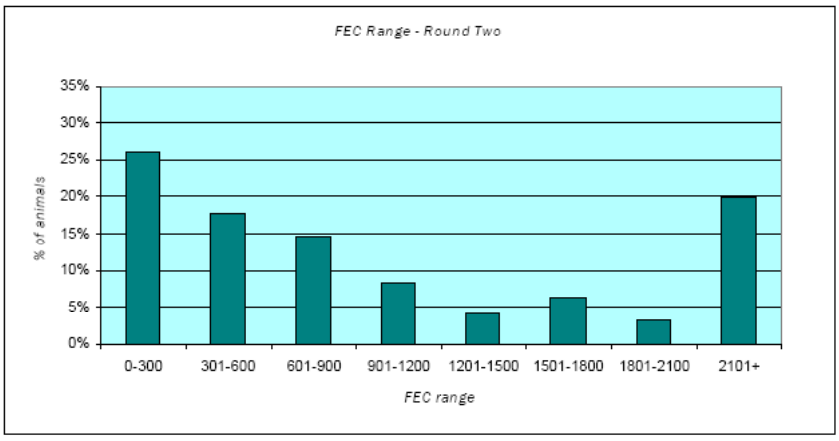


Figure 3. A typical example of the FEC range in a mob of ram lambs during autumn.

Figure 3 shows that in a typical mob of ram lambs 50% of the contamination is being generated by 13% of the animals. Identifying and culling these high polluters will reduce pasture contamination, and may have a profound improvement on the overall health and genetic make-up of the mob.

Parasites and weight

Up to weaning, higher growth rates correlate with lower FEC, but after weaning this correlation does not appear. Some animals with the highest FEC may also be the heaviest animals. These animals' growth may not be affected by the parasite challenge, but their high FEC output will have a detrimental affect on other animals as they pollute pasture.

Ideally, animals with high growth rates and low FEC should be selected for breeding. Such selection decisions should occur when animals are six months or older, at a time when their natural immunity will be expressed.

Parasites over time

There was a large variation between weaning and autumn FEC. There was also a large between-farm variation in FEC. This even included farms that were geographically close, and with the same genetics. There was no one pattern of changes in FEC and species dynamics over a year, and between years.

All farms have different parasite species challenges. Assume nothing.

Dags

Figure 4. The SIL dag score scale system.

Lambs were assessed for dag score on a 0-5 scale (Fig 4). There was no correlation between FEC and dag score. Dag score is not a reliable indicator of parasite challenge in animals. This is why FEC testing is the only way to be sure of a parasite challenge.

Dags form for a variety of complex reasons. These may include environmental effects, e.g. diet change, nutrition, water supply.

However, breeding for low dags will have other benefits; e.g. reduced crutching costs, less fly strike issues, improved visual impact at sale.

Conclusions and recommendations

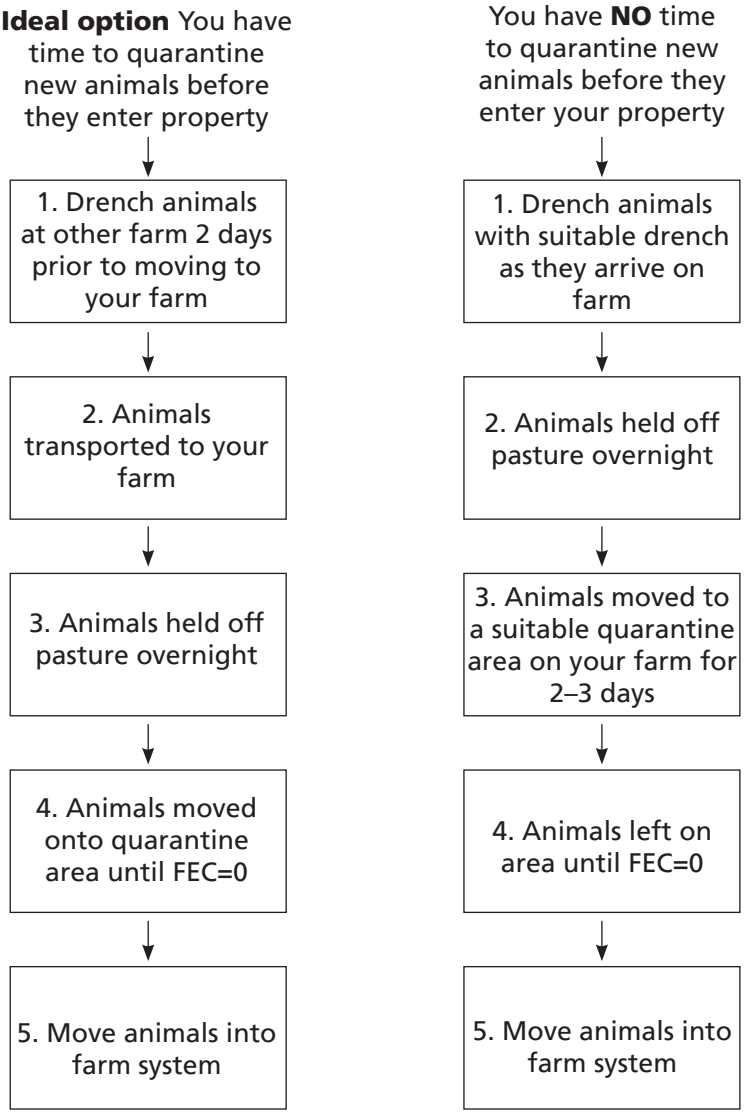
Quarantine protocols

Protect your property's present drench status by adopting adequate quarantine protocols.

An ideal protocol follows the following procedures;

1. Choosing an ideal quarantine drench — the drench must be the most effective available, work rapidly to reduce time animals need to be quarantined, and be practical to administer.
2. Drench application — the drench must have time to work before animals are moved, which is dependent upon drench type and delivery method. The time taken for FEC to reach 0 must also be considered, ideally no animals are moved until FEC=0.
3. Quarantine area identified — a suitable area may include; one that is grazed exclusively by another non-susceptible or highly resistant species, an area that is not due to be grazed again before cultivation, or an area that is highly contaminated.

The ideal quarantine "in" protocol



An ideal quarantine "out" protocol would follow the same procedures.

FECRT — drench assessment

Determine your drench resistance status of your property using the Faecal Egg Count Reduction Test. This will determine what drenches are going to be most effective for your use.

Larval cultures

Identify the species of parasites on your property. Again this will determine which drench to use. Often resistance may be isolated to one species of parasite, which means that a drench may still be an effective option if that parasite is not present.

Effective drenching

Use the right drench, at the right time, in the right way.

Select a drench you know will be effective, or is suited to the relevant situation, i.e. short withhold period, quarantine drench.

Store correctly, read label instructions, check expiry date.

Maintain and monitor your drench equipment. Undertake a dosage check, e.g. squeezing 5 doses into an accurate measuring cylinder which should equal the combined total of 5 individual doses.

Weigh animals to calculate dosage. Dose to the heaviest weight animal. If there is a wide weight variation, consider splitting into two lines and treat at a different dose rate. Administer drench gently. Use a drench ID marker to eliminate repeat or missed dosing.

Stock management

Consider the age and class of stock when preparing a grazing plan.

Faecal Egg Counts (FEC)

There are a number of options available to monitor FEC levels, offering different benefits, with some being better suited to your operation than others.

Vet services/Laboratories/ Rural retailers — FEC services normally involve the farmer collecting a faecal sample and delivering it to the service provider. Results will be returned, with recommendations, in approximately 1-4 days.

FECPAK system — An on-farm faecal egg counting system designed for farmers to process their own samples within 10 minutes. Guidelines are provided within the unit for management decisions.

Drench timing

Timing of worm challenge will vary within and between seasons, and with other factors e.g. age, nutrition, management event (shearing). Production impacts may often be sub-clinical with no visual signs of challenge. Regular FEC monitoring, along with condition scoring and weighing ensure effective timing, and reducing production losses, pasture contamination and ineffective drenching.

Knowledge and advice

Use all avenues of information available, e.g. research studies like S^3, vets, FECPAK team, stud breeders, chemical representatives.

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Pasture management

Use other forms of feed, e.g. hay/silage, fodder crops, to break parasite lifecycles, or minimise pasture contamination.

Stud Breeders

Use breeders who select for parasite resistance and performance (e.g. use WormSTAR, WormFEC, SIL).

The mobile data collection unit comprised of electronic ear tags, electronic weigh scales and indicator equipment, a label printer to assist with processing FEC results and blood analysis, draft alarm equipment to identify animals that required cross-checking, and refrigeration storage for samples.

"Through the project farmers have come to understand the importance of getting the base principles of parasite management sorted first — What drenches work on my farm? Is my farm protected from importing a problem? Do I know when worms affect my animals? It's about farmers becoming empowered with information to make smarter decisions" *Greg Mirams – Technical Manager S³*

"It is essential for stud breeders to take an industry lead by establishing effective quarantine protocols to protect the interests of their clients and their own property." *Alastair Campbell — S³ Project Chairman*