wormwise
national worm management strategy

MEAT & WOOL NEW ZEALAND | Sustainable Farming Fund | ANIMAL REMEDY AND PLANT PROTECTANT ASSOCIATION | AGCARM | NEW ZEALAND VETERINARY ASSOCIATION INC

Wormwise in Spring 2009

Farmers - think about how much you spend on drenches. Are you getting the best return for these dollars?

It makes sense to use only drenches that work in your farming system and a drench test, also known as a faecal egg count reduction test or FECRT, will indicate which drenches are best to use on your particular farm.

IN SHORT

What is a FECRT?

A faecal egg count reduction test or FECRT for short is also known as a Drench Test. It measures how effective drenches are at killing internal parasites or worms on your farm.

How does a FECRT measure drench effectiveness?

Clearly identified lambs or calves are drenched with a particular drench and the reduction in the faecal egg count is measured and compared to undrenched lambs or calves on farm, or to pre- drench levels. FECRT results combined with larval cultures of worm eggs in faeces provides information as to which types of worms are being killed by which drenches.

Are FECRT results from neighbouring farms relevant to your farm?

Not unless your farming system and animals are exactly the same. Recent drench test results show there are many instances of drench failure on individual farms.

How often should FECRTs be tested

Wormwise® recommends sheep and beef farms undertake FECRT tests every 3 years as a minimum.

Spring is a critical time when worms can seriously impact production. Successful farmers match their drench inputs to the production pressures and the risks animals are under.

Before buying any drench and reaching for the drench gun these are three smart things farmers need to know first:

1. Do you know the levels and types of worm burdens in the animals you are intending to drench?
2. Do you know whether or not the drench you intend to use is effective?
3. Have you carried out a FECRT (faecal egg count reduction test)?

Monitor Farm FECRT Results

Over the last season Wormwise® has investigated how drenches are working on typical sheep and beef farms throughout New Zealand. All Meat & Wool New Zealand Monitor Farms were tested using the exact same FECRT test protocol and range of drench actives and combinations. FECRTs were undertaken using the following range of actives: Benzimidazoles (BZ), Levamisoles (Lev), Combination (BZ & Lev), Ivermectin full and half dose, Abamectin and Moxidectin.

Meat & Wool New Zealand Monitor Farm drench test results in short:

At time of testing 2 out of 23 monitor farms had only ONE effective drench active working out of the range of seven drench actives and combinations tested.

8 out of 23 monitor farms tested had only TWO effective drench actives working out of the range tested at time of testing.

1 out of 23 monitor farms tested had only THREE effective drench actives working out of the range tested at time of testing.

5 out of 23 monitor farms tested had FOUR effective drench actives working out of the range tested at time of testing.

4 out of 23 monitor farms tested had SIX effective drench actives out of the range tested working at time of testing.

3 out of 23 monitor farms tested had SEVEN of the drench actives working out of the range tested at time of testing.

26 Meat & Wool New Zealand monitor farms commenced FECRT testing and 23 completed their tests.

Three monitor farms didn't complete testing, usually because faecal egg counts were too low i.e. sample counts with an average less than 500 eggs per gram (epg) for lambs or 250 epg for cattle.

FECRTs were undertaken using the following range of actives:

- Benzimidazoles (BZ)
- Levamisoles (Lev)
- Combination (BZ & Lev)
- Ivermectin full and half dose
- Abamectin and Moxidectin.

A full summary table of non identified Meat & Wool New Zealand monitor farm FECRT results, on a % efficacy basis plus key larval cultures isolated is available on **www.wormwise.co.nz** or request from the Farm Services Group, Meat & Wool New Zealand free phone 0800 696 328.

KEY

OK drench effective | NO drench resistance | ? drench resistance suspected. Retest | X not tested

Subscript FECRT shows drench/ active is not effective against

O = Ostertagia T = Trichostrongylus N = Nematodirus H = Haemonchus Co = Cooperia Ch = Chabertia

Meat & Wool New Zealand Monitor Farm drench test results in more detail

Each row shows FECRT results across a range of actives for a single monitor farm

LAMB RESULTS

BZ	Lev	BZ/Lev	Iver full	Aba	Moxi*	Aba/ Lev
NO T,N,Co	OK	OK	?	OK	OK	X
? N	OK	OK	OK	OK	OK	X
NO O,T,N, Co	NO O,T	?	NO	OK	OK	X
? N	? N	OK	OK	OK	OK	X
NO O,T,N, Ch	OK	OK	OK	OK	OK	X
OK	OK	OK	OK	OK	OK	X
? N	OK	OK	OK	OK	OK	X
NO O,N	?	?	NO	OK	OK	X
OK	OK	OK	OK	OK	OK	X
NO N	NO O	?	NO O,N	OK	OK	X
NO O,N	NO O	?	NO	OK	OK	X
NO O,N,Co	OK	OK	?	OK	OK	X
NO O,T,N,Co,H	NO O,T	NO O,T	NO O,T,Co	? Co	OK	X
NO O,T,N,Co,H	OK	OK	?	OK	OK	X
NO O,N,Co	NO O,T	?	NO Co	OK	OK	X
OK	OK	OK	OK N	OK	OK	X
NO T,N,H,Co	?	OK	?	OK	OK	X
NO O,N	?	?	NO N	OK	OK	X
NO T,N	NO O,T	?	NO	OK	OK	X
NO N	? N	OK	? O,T,N,Co	OK	OK	X
NO H	OK	OK	NO N,Co	OK	OK	X

CATTLE RESULTS

NO O,Co	NO O	?	NO Co	X	X	OK
NO O,Co	NO O	OK	NO	X	X	OK

* If full dose Ivomec is no NO it is possible the persistent activity of Moxidectin may be reduced. Caution required.

A full summary of non identified Meat & Wool New Zealand Monitor Farm FECRT results on a % efficacy basis along with key larval cultures isolated is available on request from the Farm Services Group, M&WNZ free phone 0800 696 328.

Detailed Explanation of FECRT Testing

The Faecal Egg Count Reduction Test or FECRT for short is also known as a **Drench Test.** It is a useful procedure for investigating drench efficacy on a farm. It relies on the general relationship between numbers of eggs counted in the faeces being an indicator of the number of worms in an animal. For FECRTs undertaken in sheep and goats there is reasonable correlation between egg counts and worm burdens.

A FECRT compares pre- and post-treatment egg counts in animals which have been accurately dosed with the drench.
Ten to 15 animals should be sampled for faecal egg counts and then dosed exactly according to live weight at the manufacturers recommended dose rate.

Faeces samples from drenched animals are taken 7 to14 days later for post-treatment egg counts. The idea is to resample as close to the time when a new generation of worms could establish and produce eggs. This is called the minimum pre-patent period.

For most sheep worms the minimum time we work to for a pre-patent period is 14 days. Whilst 7 days for a post-treatment sample is adequate, an interval of 10-14 days after drenching is better. Any earlier than 7 days and some worms which are damaged but not killed by the drench may not be shedding eggs but can recover and be shedding eggs by 14 days.

Theoretically, at least 10 control animals (not dosed) should be sampled at the same time, in case some other factor is causing a significant fall in egg counts.

However, a control group is not essential or widely practiced in New Zealand because this means keeping a group of lambs undrenched for 10-14 days that are potentially heavily parasitised.

A standardised FECRT procedure has been recommended for adoption throughout New Zealand. It is advisable to test a range of drench actives and combinations at the same time to see which drench actives and combinations are effective.

Remember resistance occurs within species of worms and not generally across all types or species of worms on a farm.
The problem with diagnosing resistance on a farm is the majority of worm species produce very similar eggs and it's almost impossible to differentiate between different worm types by just looking for differences between their eggs under a microscope. However if we culture [i.e. hatch out and grow] those eggs through to the infective larval stage we can identify them as being of different worm types. Typically larval cultures take about 10-14 days to complete and need to be undertaken by specialist parasitology laboratories.

To find out which types of worms are involved Wormwise® recommends a FECRT should always be conducted in conjunction with larval cultures.
Ideally a FECRT calculates egg counts for each individual animal but larval cultures are made for each treatment group i.e. all sheep treated with ivermectin will get cultured together as a composite. We calculate the average faecal egg count and then take the various percentages from the larval cultures to estimate the number of eggs of each worm type. For example, if the average pre-treatment egg count from 10 lambs was 600 eggs per gram (epg) and the larval culture showed there were 50% Haemonchus, 30% Ostertagia and 20% Trichostrongylus larvae present in the larval culture then we would calculate there were 300 Haemonchus eggs, 180 Ostertagia eggs and 120 Trichostrongylus eggs present.

The same process is taken with the post-treatment samples and egg counts are estimated for each type of worm. Then a reduction in egg count can be calculated for each type of worm.

With broad-spectrum drenches, a failure to reduce the faecal egg count by 95% or more is regarded as indicative of reduced efficacy of the drench and is considered to be sufficient to declare the existence of resistance to that drench.
Modern drenches should be reducing egg counts by at least 98-99%. In reality a drench efficacy of 95% is still good and indicates the drench is still useful. As the efficacy drops to lower levels farmers will start to recognise obvious signs of parasitism in drenched lambs or calves. We have adopted a policy that unless we can allocate at least 50 eggs to one type of worm pre-treatment then we can't make valid conclusions about resistance to that particular worm type. Remember we are using the egg counts to estimate how many worms are killed. Thus it is the relationship between the numbers of eggs produced by each type of worm and as this relationship is far from perfect,we need to be cautious when interpreting FECRT results.

The same technique can be applied, in principle, to other species e.g. goats, cattle, deer and horses. However for cattle the relationship between the number of eggs produced and the number of worms present is not as good as in sheep and goats. In young cattle the developing immune response from about 6 months of age is sufficient to reduce the egg production, especially for the genus Ostertagia. In addition, the actual size of the faecal egg count is invariably lower for cattle than for sheep. FECRTs can be undertaken in cattle but care must be taken with timing and result interpretation.

FECRT Best Practice Guidelines

1. FECRTs need to be undertaken at a time when as many of the major internal parasite species of interest are present in sufficient numbers and ratios to permit "valid" interpretations of test results.

   For sheep the key internal parasite species or worms of interest are – Haemonchus, Ostertagia, Trichostrongylus, Cooperia, Oesophagostomum, Chabertia, and Nematodirus.

   For cattle the key internal parasite species or worms of interest are – Ostertagia, Trichostrongylus, Cooperia.

   Microclimates, seasonal and geographical variations throughout New Zealand mean there are no definitive ideal best times to test for given provinces. Wormwise® recommends farmers seek advice from experienced, locally aware, credible parasite control advisors. In some cases key worm species may not all be present at any one time.

2. Test animals need to be weaned lambs or calves and sample group size for testing needs to be a minimum of 10-15 per group. Wormwise® suggests the test groups contain at least 12 in case there are losses during the testing. Test animals need to be consistent with respect to age, bodyweight, breed, parity and health status.

3. Ideally all faecal test samples should be taken directly from the animal's rectum to achieve sample consistency and identification accuracy.

4. The best choice of drenches to be tested needs to be fully discussed by the farmer and advisor considering the farm history, farming policies, local district knowledge and industry or national trends – in this order of importance.

For sheep

- 100% of animals with a positive Faecal Egg Count (FEC) pre-test i.e. all faecal samples contain parasite eggs
- Average group FECs preferably greater than 500 epg. The ability to interpret the results improves with increasing average pretest FEC.

For cattle

- 100% positive in pre-test FECs i.e. all faeces samples contain eggs
- Average group FECs greater than 250epg.

6. Post drench sampling is to take place 10-14 days post treatment for all sheep given oral drenches, and at an appropriate time for persistent, injectable or pour on products in both sheep and cattle. Typical times for these types of products are 14 to 21 days.

7. Larval Cultures: all pre-test samples should be sub-sampled for a group (or composite) larval culture with this sub-sample kept at ambient temperatures prior to dispatch to an appropriate laboratory (not refrigerated).

   All positive FEC post-test samples should be evaluated using information from composite larval cultures of each group to provide information about efficacy against individual worm species.

8. Test Validity: where a pre-test/drench worm species is present at less than 50 epg for that species – then no validity should be attributed to that result.

9. Test Interpretation: All FECRT test interpretations and conclusions need to undertaken by experienced parasite control advisors acutely aware of the specific area, farm history, farming-stock policy, farm management.
   The accumulated FECRT history achieved with sequential testing over time is helpful in detecting trends in drench efficacy change.

The internationally recognised cut-off for "efficacy" is acknowledged as a post drench FEC reduction of greater than 95%. However, this figure is only a guideline.

Infective Larvae on Pasture

Regardless of the preceding season we know some worms will have survived over the winter and will infect this year's lambs. The number of infective worm larvae available in spring is largely determined by how many eggs were laid over the preceding autumn and whether temperature and rainfall were adequate to allow these eggs to develop into larvae. In order to develop into infective larvae (L3), eggs require warm moist conditions. As a crude indicator, if your grass is growing then so are your worm eggs and vice versa. If the grass is growing fast then so are the larvae.

Once grown the focus is on the survival of these larvae. Optimum survival is achieved at temperatures around 10 degrees and the larvae must not dry out. Given the cold winter from May 09 onwards it is reasonable to expect there was good survival of larvae over winter in many areas. There will still be a gradual die off as the occasional warm period will allow larvae to move around and thus consume precious energy reserves. Heavy rainfall can displace these larvae but some will be washed into the top layers of the soil which will assist survival. They are not generally killed by frost although they don't survive repeat freeze/thaw conditions.

In the laboratory larval cultures survive best at about 5-10 degrees stored in water and some will survive like this for more than a year.

Once the weather warms up these overwintered larvae generally die off at a reasonably fast rate to be replaced by contamination from ewes and lambs in the new season.

Source of Larvae for Young Lambs

Most farmers know that around lambing, ewes develop a "peri parturient rise" or PPR in egg counts. Whether this translates into larvae on the ground depends on the weather at that time. This rise in egg counts generally peaks about 4-6 weeks after lambing and subsides back to low levels by weaning. Thus eggs from early lambing ewes are often passed in faeces when conditions are not very favourable for their development. At this time the infection in the ewe tends to be dominated by Ostertagia but many other species will be there in smaller numbers.

Ewes under nutritional stress e.g. the East Coast North Island during the droughts of 2007-8-9 have been found to be significant pasture contaminators throughout the winter.

Worm Control in Lambs

Unfortunately there is no way to actually measure how many larvae are on the pasture in a particular paddock, so advisors are generally conservative in their opinions and recommend pre-cautionary drenching.

Most farmers follow a preventative approach where lambs are drenched at about 4 weekly intervals from weaning. Remember the aim of this preventative approach is to limit the size of the autumn peak of larvae on pasture towards the end of the season and to keep it as small as possible. Stopping the early proliferation of worm eggs stops the multiplier effect over the following months leading up to autumn.

Considerations for worm control in cattle

Over summer there are some key messages to be considered for cattle. We know drench resistance is widespread in cattle to ivermectin-type "ectins" and benzimidazole-type "White" drenches for Cooperia. Consequently Wormwise® recommends any drench for young cattle i.e. less than 9 months old should include levamisole but preferably in combination rather than on its own.

There are a few early indications that New Zealand cattle farmers maybe just starting to see some evidence of resistance to ivermectin-type drenches in Ostertagia as well. It is not serious yet but this does have implications around quarantine drenching of incoming cattle.

Remember the concept behind a quarantine drench is to avoid importing a load of resistant parasites along with any purchased stock. For incoming cattle, as for sheep, the idea is to use a drench to remove any possible susceptible AND resistant parasites which may present. Thus a combination drench including all three existing broad spectrum drenches (Benzimidazole, Levamisole and Macrocyclic Lactone) is highly recommended.

Drench Resistance and its impacts

The results from the FECRTs sponsored by Wormwise® over this last season are consistent with the earlier survey 4-5 years ago and show widespread resistance issues to a range of drench actives. This reinforces the need for each farm to know precisely which drenches work against which worms on farm at different times throughout the season. This may take more than one series of drench tests to work out, as different worm types dominate at different times of the year. In hot dry seasons, or dry areas it's often difficult to get sufficient worm numbers available to make an assessment.

Remember the hidden cost of drench resistance when it goes undiagnosed in the early stages, and young animals grow at less than optimal rates. Would you notice a drop off in growth weight of 30-80 grams/head/day unless the animals also became daggy? Similarly for cattle, would you notice a drop of 80 –100g/day?

What should interested farmers do now?

Visit the Wormwise® website **www.wormwise.co.nz**

See the relevant sections in the "Handbook of Sustainable Worm Management for Livestock Farmers", which is freely available to all farmers via Meat & Wool New Zealand free phone on 0800 696 328 and on the website

Remember previous Wormwise® information around Refugia (R&D Brief 136) and Quarantine drenching.

In most farming systems well fed older stock do not need to be drenched.

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