

VERSION THREE

# FACING UP TO FACIAL ECZEMA

December 2019



Resources Book 18

# SUMMARY

Facial Eczema (FE) is caused by spores of a fungus growing on the litter in the base of the sward. They release a toxin which attacks the liver. It is a serious disease that affects sheep and cattle and can be fatal.

Your losses are much greater than they appear. FE, when no symptoms are visible, can reduce lifetime productivity by up to 25 percent.

There are practical ways in which you can reduce your losses. You should use two or three methods together.

Breeding for increased tolerance to FE should be your first line of defence. Buying FE-tolerant rams will make a great difference in only a few years, but you have to be consistent in only bringing tolerant rams into your flock.

You can give all or part of your flock a zinc bolus, which lasts six weeks, or dose with zinc oxide weekly or fortnightly to reduce liver damage. For large numbers, you can spray zinc on pasture.

Quit stock early, build up feed reserves, and aim for light rotational grazing.

Most vet clinics have a spore counting service. If one is not available, get together with other farmers and organise a spore counting service (persuade your vet clinic to offer the service, hire someone to do the counts). Spore counts will help you identify the safer parts of the farm (the shady, windy places).

Fungicide sprayed before the onset of FE season will reduce spore counts for five to six weeks. Use these pastures for your replacement ewe lambs and hoggets.

Aim to be lightly stocked through the danger period.

Neighbouring farmers should get together to share knowledge and hear advisers.

Don't relax precautions too soon—a few cool nights or heavy rain doesn't mean danger has passed. Once spore counts rise, pastures remain toxic until the spores disappear.

Faecal spore counting offers a method of determining how much challenge has occurred to the animals.



CHAPTER  
**01** | SHORT TERM  
MANAGEMENT OF  
**FACIAL ECZEMA**

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The nature of the problem	<b>5</b>
Zinc for protection	<b>8</b>
Management of pastures and grazing	<b>11</b>
Being prepared for FE—Summary	<b>16</b>

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CHAPTER  
**02** | LONG TERM  
MANAGEMENT OF  
**FACIAL ECZEMA**

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Breeding for FE tolerance	<b>17</b>
RAMGUARD™ FE tolerance testing service	<b>22</b>

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*The findings in this booklet are based on research done in the 1970s, 80s and 90s by the Mycotoxic Diseases Group at the Ruakura Agricultural Research Centre. Since the closure of this group in the 2000s very little research on Facial Eczema (FE) has been done.*

*The editing of this booklet, “Facing up to Facial Eczema”, was necessary to make some additions, alterations and extensions. These changes are mainly based on the 2013 paper in the New Zealand Journal of Agriculture Research “The Review of genetic studies of susceptibility to facial eczema in sheep and cattle” by C.A. Morris, N.R Towers, S.H Phua and N.G Cullen.*

*There is already enough knowledge to greatly reduce the damage caused by FE. Beef + Lamb New Zealand hope this booklet will provide more of that knowledge and encourage greater dialogue about the problem.*

*Neighbouring properties may have a lot in common when FE is rife and there is much to be gained by working together. You might set up a local discussion group and bring in speakers or consultants. Work together to get a spore counting service for your district—persuade your vet clinic to provide a service or club together to buy a microscope and set up a local spore counting service. Details of the spore counting technique can be obtained from AgResearch.*

*If you have further questions, talk to your vet or one of the Beef + Lamb New Zealand Extension Managers. And check out the information at [www.beeflambnz.com/facial-eczema](http://www.beeflambnz.com/facial-eczema)*

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# GOOD PRACTICE CHECKLIST

## Know the danger periods and at risk pastures

- » Be vigilant during danger periods—January to May in most years.
- » Identify danger to animals from spore counts—on farm or local.
- » Use historical records to identify most at risk paddocks.

## Use two or more of the following protection measures

Breeding animals for FE tolerance is a medium to long term strategy that:

- » Underpins other protective measures.
- » Can achieve significant tolerance in 5-10 years if managed well.
- » Requires consistent use of rams bred from tested and certified sires, from breeders using RAMGUARD™.

Protecting animals with zinc:

- » Has a prophylactic effect in animals for FE protection.
- » Can be administered to sheep and cattle as a zinc oxide bolus or drench.
- » Is also effective if sprayed on pasture animals that are grazing.
- » Can be administered to cattle via the water supply.

Management during danger periods:

- » Use alternative crops such as chicory.
- » Practice lax grazing to avoid the toxic spores concentrated in the base of the sward.
- » Identify “safe” pasture from historical records and pasture spore counting.



## The nature of the problem

### Facial eczema is very costly— and very difficult to pin down

As farmers know, it comes and goes. You make all the mental resolutions and preparations to cope with it and nothing happens. Then some years later it almost wipes you out. The biggest impediment in the general acceptance that FE is a problem, is its haphazard occurrence, so that by the next year, the misery of the previous year seems to have been forgotten.

It is also a hidden killer. You see only a few sheep with the symptoms, but then you have a barren ewe problem, deaths at lambing, ewes that run dry before weaning. You don't connect these with FE, but for every clinical (or obvious) case, there can be five, 10 or more with the disease. That is the nature of the FE problem—it is hard to know if you have one.

If you farm in the North Island you probably do. And it is costing you, on average, hundreds or thousands of dollars a year. In the 1981 outbreak, the cost of lost production to New Zealand was estimated to be \$266 million dollars (inflation adjusted to 2019, after Smith and Towers).

Many farmers know this but are turning a blind eye. This booklet has been published by Beef + Lamb New Zealand to get across a message:

- » That there are economical means to cut your FE losses.
- » That you have a range of options so you can choose those which are best for your farm.
- » That they don't have to cost you a fortune or involve extravagant labour.

## The cause and the cost

FE is caused by the spores of a fungus, *Pithomyces chartarum*, which grows on the litter in the base of the pasture. Swallowed by sheep, the spores release a toxin which can cause severe injury to the liver and bile ducts. In some animals the bile ducts may become partly or completely blocked. When this happens bile and other waste products will build up in the bloodstream causing sensitivity to light.

The fungus is very common. It is found all around the world, but nowhere does it cause such severe problems as in New Zealand due to the toxic nature of the New Zealand variety.

It is always in the pasture, and the sheep are always ingesting it in small quantities. Then, when temperatures and moisture levels are high, and grass minimum night temperatures remain over 12 to 13°C, the conditions are right. The fungus suddenly goes on the rampage, growing rapidly and producing vast numbers of toxic spores.

Each rise in spore numbers provides the starting point for the next period of rapid growth and after two or three 'danger' periods spore numbers are high enough to threaten animal health.

While spore counts of 80-100,000 are often spoken of as the 'danger level', stock grazing pasture with 40,000 spores per gram of grass for long periods even with breaks are just as likely to develop facial eczema. The cause of this sensitising or potentiation is not clearly understood but its accumulating toxic effect has been well documented.

The symptoms of FE are distressing: frequent urination, restlessness followed by shaking and rubbing heads against posts and gates, avoiding direct sunlight, then drooping and reddened ears and swollen eyes. These and other exposed areas develop a weeping dermatitis and scabby skin, affected areas may become infected or fly blown.

Not all animals with FE damaged livers will show these clinical symptoms—in fact, except in very severe outbreaks, most animals with FE liver damage will show no outward signs at all. A blood test—the GGT test—can be used to detect liver damage in these animals. Even low exposure to FE in young animals (sheep or cattle) seems to affect growth rate and longevity.

Some animals seem to handle exposure to FE in different ways. Possible sources of genetic variations for FE susceptibility include:

1. Variation of grazing patterns of pasture of the different breeds.
2. Variation in the effectiveness on how the toxin is destroyed by rumen microbes in the gut.
3. Variation in how the animal absorbs toxin from the gut and how it gets metabolised and excreted.

Death rates and animal stress during a FE season can be high. In some areas, farmers have lost up to 70 percent of their hoggets. A loss of 20 percent of lambs is common.



*The symptoms of FE can be distressing.*

*“A facial eczema outbreak causing moderate liver damage in a flock may result in very few ewes showing clinical signs of the disease, yet numerous trials have shown that the following effects can be expected:*

- » *Reduced fertility and fecundity*
- » *The lifetime production of hoggets will be reduced*
- » *Reduced growth rate in affected lambs and hoggets*
- » *Increased culling. The proportion of ewes culled or barren can be 12 percent higher in affected ewes than in unaffected ewes.*

*All these losses can be suffered in a flock which only shows a handful of clinical cases.”*

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*Facial eczema in hill country—potential toxicity and effects on ewe performance. Sheath, Webby & Boom. Proceedings of the New Zealand Society of Animal Production 1987, Vol. 47: 45-48.*

*“Farmers judge a bad FE year by the number of ‘clinical’ or animal with visible symptoms. But the greater concern is the number of sub-clinicals, since this is liver damage that is not visible.*

*“If you get, say, 5 percent clinicals, then at least 50 percent of the flock has sub-clinical FE. With 20 percent clinicals, the whole flock will be affected.”*

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*Former Whatawhata scientist Dr Clive Dalton*



## Planning your campaign

### 1. Start by considering the options and which of them, or a combination of them, may be suitable for your property. The options are:

- » Breeding an FE-tolerant flock by buying rams from a ram breeder selecting for FE tolerance as major breeding goal (a list of ram breeders is available from the SIL website [www.sil.co.nz/tools/flocks-focussed-on-health-traits#drop4](http://www.sil.co.nz/tools/flocks-focussed-on-health-traits#drop4)).
- » Dosing your most important stock with zinc, either by using the Time Capsule® zinc bolus, drenching with zinc oxide, or spraying pasture with zinc oxide.
- » Growing a forage crop.
- » Using fungicides to provide safer grazing.
- » Lowering your stocking rate at vulnerable times.
- » Use of alternative pasture species.



## 2. Get the expertise

- » Check up on breeders offering FE-tolerant rams that are suited to your main breeding requirements. Watch out for false claims of FE tolerance, check the RAMGUARD™ list.
- » Learn how to collect and count spores. Otherwise send grass samples to your nearest spore counting service. Most vet-clinics offer spore counting services.
- » Use spore counts to identify the safe paddocks on your farm.
- » Alternatively, use a faecal counting service to monitor spore intakes early in the FE season and decide when to take precautions.
- » Familiarise yourself with the use of a fungicide spraying and use of zinc preventatives.



## 3. Don't get caught short

- » Buy your stocks of zinc boluses, zinc oxide or fungicide early—in bad FE seasons shortages are common and you may not be able to get supplies when you need them.
- » Don't relax precautions too soon—a few cool nights, or heavy rain, does not mean the risk of FE is over. Once spore counts rise pastures remain toxic until the spores disappear. Check spore counts before you relax.
- » Consider having blood samples taken from your replacement hoggets at 21 day intervals at the end of the FE period and culling those with the highest GGT values as these are the most FE sensitive animals.

## 4. Treatment of affected sheep

There is no treatment for the liver damage caused by FE, but you can relieve stress by:

- » Providing shade, plenty of water, and a low protein diet with no chlorophyll in it (hay or silage) to help the natural healing process.
- » Continuing zinc dosing as long as there are spores present, to prevent further liver damage.
- » Avoiding copper supplements (including mineralised drenches) if you expect FE to be a problem. Copper may exacerbate the toxic effects of sporidesmin metabolism in the liver.

Some animals will appear to recover but lose condition under the strain of pregnancy and lactation, and may die. Culling should be left as late as possible since animals sent away early are condemned because of jaundice.

Sheep with signs of FE should be separated from the flock early. They are very susceptible to flystrike and should be carefully treated for this.

# ZINC FOR PROTECTION

## Dosing sheep with zinc

You can protect sheep by dosing with zinc oxide. Zinc works because the zinc reacts with sporidesmin, the toxin causing FE, making the sporidesmin “unavailable” to cause the liver cell damage and bile duct blockage that leads to FE.

You have to start early so that the zinc is in the system before the spores are eaten. In most districts that means early to mid-January—but don’t start too early as that increases the risk of zinc toxicity.

Zinc can be given either as the controlled release zinc bolus the Time Capsule, which provides protection for up to six weeks in sheep, or as a zinc oxide drench. Time Capsules for calves and cattle are also available.

While daily or twice weekly drenching is required for the best protection, dosing with zinc oxide at weekly or fortnightly intervals will give substantial protection, reducing liver damage by about 60 percent for weekly doses and 50 percent for fortnightly doses. If drenching fortnightly and spore counts start to increase rapidly during the second week after drenching, bring the next drench forward to increase the level of protection.

It may be impractical to drench large flocks, but consider treating your replacement ewe lambs and hoggets as FE can reduce their lifetime lamb production. You may be able to put them in paddocks that are easily mustered and handy to yards.

This is usually at a time when viral pneumonia is a threat, so if you can work quietly with small mobs and dust-free yards, so much the better.

Zinc oxide dosing has a reputation for being difficult and messy, but the Time Capsule, although more expensive, is a convenient way to provide long term protection.

Make sure that you use zinc oxide suitable for animal dosing—most of the zinc oxide available has been registered with the Agricultural Chemicals and Veterinary Medicines Authority and the packaging carries full mixing instructions and the dose rates. Read and follow the instructions carefully; overdosing can lead to zinc toxicity.

Don’t get caught out by relaxing precautions too early. A few cool nights or heavy rain does not mean the FE season has finished. Once spore counts rise, the pastures will remain toxic until the spores disappear, so check the spore count before stopping dosing.

Like all FE control methods, zinc is not 100 percent effective, however often you dose. Also keep in mind that zinc is a heavy metal and retained in the soil. Close to toxic levels have been reported in holding paddocks on some dairy farms. You still need breeding and grazing management as part of your defences.



## Dosage volumes

### Without stabilisers

Mix 1 kg zinc oxide to 2.5 L of water. Dose at the rate of 1 ml/10 kg liveweight x days between drenchings.

Dose interval	Lambs 30 kg	Ewes 60 kg
3-4 days	11 ml	21 ml
1 week	21 ml	42 ml
2 weeks	42 ml	84 ml

### With stabilisers

A number of zinc oxide products containing a stabiliser which helps maintain the zinc oxide in suspension while making a more concentrated drench, which make dosing easier, are available. These should be dosed at the rates stated on the package. Alternatively, a stabilised suspension can be prepared using farm-strength seaweed-based liquid fertilisers. Mix 1 Kg Zinc Oxide (ZnO) with 0.2 L stabiliser and 1 L of water and dose at the rate of 0.5 mL/10 Kg liveweight x days between dosing.

Dose interval	Lambs 30 kg	Ewes 60 kg
3-4 days	5 ml	10.5 ml
1 week	11 ml	21 ml
2 weeks	21 ml	42 ml



## Zinc in the water supply

This method of dosing is suitable for cattle only; sheep do not drink enough water to take in enough zinc to provide good protection. There are four main methods of adding zinc sulphate to the drinking water for cattle:

1. An in-line dispenser adds a concentrated solution of zinc sulphate to the water reticulation system.
2. Adding zinc sulphate to a large tank supplying the system.
3. Floating trough dispensers (these may need twice daily checks to refill dispensers and to stir the trough to ensure the right concentration).
4. Direct addition to the trough (which will only cope with very small numbers of cattle).

Except for the first day or two, cattle will accept the water at the recommended dose rates, so long as they don't have access to untreated water. It is essential that treated water does not get into the household or dairy supply.

Start dosing as soon as warm, humid weather begins. If you are monitoring spore counts, start immediately spore rises begin. Unless spore counts are rising rapidly, start with a quarter dose on day 1 and increase over 3-5 days. The troughs on paddocks that have not been grazed should be primed with zinc sulphate at the rate of 1 gram per litre.

If possible, avoid dosing for more than 100 days as the risk of zinc toxicity increase with the duration of dosing, however, zinc toxicity is reversible so don't stop dosing if spore counts are still high. Over dosing damages the pancreas but it can partially self-repair, allowing the animal to recover from the effects of zinc toxicity. Calculate the dose carefully and mix thoroughly. High or irregular doses can occur with direct addition to troughs or with poorly designed dispensers.

In areas where copper and selenium are deficient, supplement with these after the zinc programme—but not during it unless there are clinical deficiencies. For more information contact your veterinarian.

## Dosing cattle with zinc

Beef cattle can get FE, but it is not as common. Since FE toxins work on a weight per kg basis, the heavier the animal the more toxin is needed to have an effect. Management is virtually the same as for sheep: watch the spore counts; use safer pastures; don't graze hard; provide supplementary feed; have a concentrated calving and wean early to put replacement stock and any sale calves on safe pasture; get rid of surplus stock, and use zinc.

Prevention with the "Time Capsule™" zinc bolus for cattle, or dosing with zinc oxide, follows the same lines as for sheep.

## Weekly spraying—dry cattle

The amount of zinc oxide to use for various classes of cattle on a weekly routine.

% Pasture utilisation	Dose rate (Grams of Zinc per 100 kg liveweight)	COWS			HEIFERS		
		350 kg	400 kg	450 kg	215 kg	245 kg	265 kg
20	60	210	240	270	130	150	165
30	50	175	200	225	110	120	135
40	40	140	160	180	85	100	110
50	35	120	140	160	75	85	95
60	31	110	125	140	65	75	85

NB: Not recommended for calves.

## Zinc on pasture

This is a low-labour method for dosing large numbers of animals. It requires an area of sprayable land with sufficient pasture to provide grazing for 12 to 24 hours. It works best when the area is small, the pasture moderately long and most of it is eaten. The animals should be confined to the area until the sprayed pasture is eaten.

A spraying system with a high return flow through the bypass valve is required to keep the zinc oxide in suspension for spraying. If you have a high-pressure hose, you can use it to disperse the powder while filling the tank (be sure to put a piece of timber over the pump inlet first to prevent blocking).

Dose rates should be adjusted to compensate for changes in the pasture utilisation. On shorter autumn pastures, the rate would be 30 to 35 percent. If the rate is not measured, assume 30 percent.



## Check zinc dosing efficacy

It is important to check that, whatever zinc dosing method is chosen, that it is elevating the zinc concentration in the blood. To be effective serum zinc concentrations should be doubled or tripled (to lie in the range 18–35  $\mu\text{mole/L}$ ). Have your vet sample 10 animals a few days after zinc treatment was started, for serum zinc analysis. If the serum zinc levels have not increased check that the zinc doses have been calculated correctly, that animal weights are known (weigh, don't guess), drench mixtures are made up correctly and dosing guns are calibrated. If using slow release zinc boluses check serum zinc levels again after a few days—boluses sometimes take up to a week to “get going”.

If serum zinc levels are not increased you are not getting protection!

Make sure animal liveweights are known and adjust dose volumes accordingly.

Check that zinc oxide (ZnO) drenches are mixed correctly and the ZnO stays in suspension.

Check that the drenching gun delivers the correct volume.

A survey of serum zinc levels on dairy farms using various methods to administered zinc showed that most animals had serum zinc concentrations below the recommended range and were being dosed at too low a rate, most probably because animal liveweights were estimated incorrectly, doses were not matched to liveweight and dosing guns weren't accurate or zinc water treatments were delivering inadequate amounts of zinc.



# MANAGEMENT OF PASTURES AND GRAZING

This section has two parts. The first deals with the lessons about pasture species and grazing management learnt from the FE outbreaks in the North Island in 1938 and the research undertaken by Reg Keogh, Grasslands Scientist, AgResearch.

The second part examines grazing strategies to reduce FE risk for hill country areas. This is largely based on trials at a Gisborne farm and Whatawhata Research Station, reported by Dr Gavin Sheath, AgResearch, Ruakura.

## FE outbreaks—lessons from 1938 disaster

The main findings of extensive investigations following the widespread FE outbreaks in North Island regions in 1938 can be summarised in these quotes:

*“In localities where the disease occurs the outbreaks are most severe on pastures where perennial ryegrass is dominant, where the pastures have been closely eaten and have dried out during a hot, dry period and have flushed rapidly after rain.”*

*“The occurrence of the disease is generally less severe as the dominance of perennial ryegrass in the pasture declines, as the pastures are less closely eaten during dry weather and as the soil conditions do not favour very rapid growth.”* (Levy & Smallfield 1942).

These findings were made long before it was known that the fungal saprophyte, *Pithomyces chartarum*, was the organism that produced the liver toxins responsible for FE. Subsequent research has confirmed the validity of the conclusions reached by Levy and Smallfield and extended our understanding of the roles of pasture species and grazing management in the development and control of FE.

## Predicting FE challenges

While rapid increases in spore counts generally follow periods of high humidity, light rain or heavy dew, and grass minimum temperatures of 12-13°C for several nights, it is impossible to accurately predict danger periods based solely on the weather due to differences in pasture type, farm topography and grazing pressures. It pays to prepare for the worst and start taking precautions with the advised measures (such as lower stocking rates, spreading out stock and avoiding dangerous pastures) or administering zinc once the spore counts start rising.

Weekly spore count information is collated byASUREQuality ([www.asurequality.com](http://www.asurequality.com)) and can be requested from your Beef + Lamb New Zealand Extension Manager. Many local vet clinics also monitor this information for their location.

## PASTURE SPECIES AND GRAZING MANAGEMENT

FE can be controlled through choice of pasture species and/or grazing management. More detail is available in our Factsheet 124, Preventing Facial Eczema by Pasture Species Selection and Grazing Management and Factsheet 117 Facing up to facial eczema.

### Pasture species and FE

Chicory, plantain, legumes and tall fescue can be used as FE-safe pastures/crops. The legumes include white and red clovers, lotus species, and other legumes such as lucerne, sulla and sainfoin.

The best control is obtained with crops of chicory, chicory with red and white clovers, or with tall fescue, red and white clover pastures. Livestock performance is also superior on these crops and/or pastures compared with that on ryegrass-browntop based pastures.

FE risk is highest on pastures containing ryegrass, browntop, cocksfoot, Yorkshire fog, and dogstail grass species. Where your existing pastures contain these grasses and you are not able to replace any with FE-safe species, an option is to over-sow in spring with late-flowering red clovers, and encourage development of red clover-dominance for the summer-autumn period.

Red clover-dominant pastures are a much lower FE risk than grass-dominant pastures. Such pastures can be held in reserve for periods of high FE risk.



*Chicory-based crop illustrating lack of litter and the ability to harvest all forage without adversely affecting persistence of the crop.*

## Grass-dominant pastures

Most of our pastures will become grass-dominant as dry periods develop during summer. This is a result of stock grazing out clovers and lack of clover regrowth without adequate soil moisture. These pastures are then a mosaic of dark green urine-patch sites interspersed among straw coloured inter-excreta sites, and ungrazed dung-patch sites.

Livestock prefer to graze pasture at urine-patch sites in grass-dominant pastures and as *Pithomyces* spore loads (spores per unit of pasture) are also often very high at these sites, it follows that stock obtain much of the toxin from here.

The intake of spores (and toxin) increases markedly during the second and subsequent days of grazing.

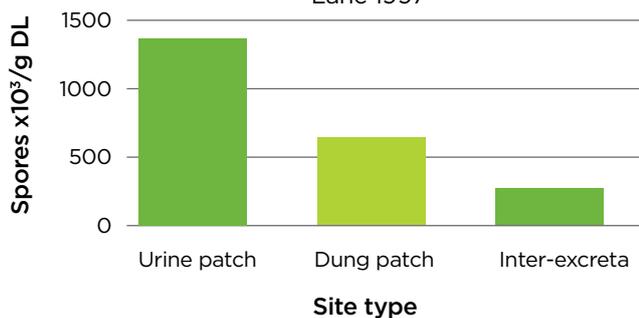
Spore intakes can be kept at a minimum if stock do not get an opportunity to regraze urine-patch sites and this can only be achieved by use of a grazing rotation with daily shifts.



Grass-dominant pasture showing prominent urine-patch sites.

### MEAN PITHOMYCES SPORE LOADS

Lane 1997

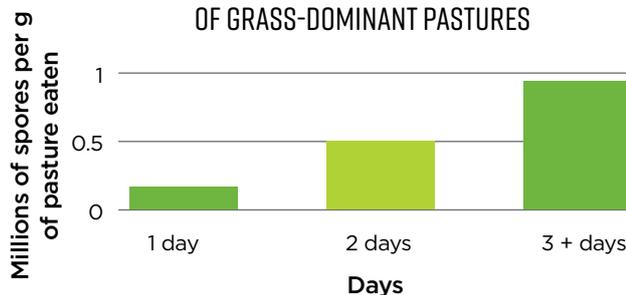


## Grass-clover pastures

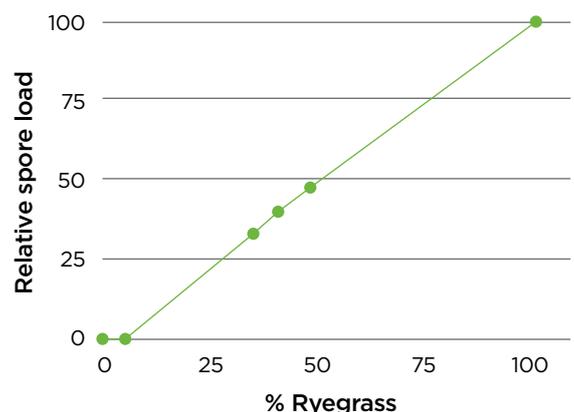
The presence of clovers influences grazing patterns by making less preferred herbage, such as that at inter-excreta sites, more acceptable. This in turn results in less intense grazing of urine-patch herbage. There are effects on pasture structure and composition, with less litter produced and consequently lower spore loads.

As the proportion of clover increases in a pasture there is a consequent decrease in spore loads. Conversely, spore loads increase as the ryegrass content increases.

### PATTERN OF SPORE INTAKES DURING GRAZING OF GRASS-DOMINANT PASTURES



### INCREASE IN SPORE LOAD AS % RYEGRASS IN PASTURE INCREASES



## PLANNED GRAZING STRATEGIES IN HILL COUNTRY

Planned grazing can substantially reduce the risks of FE in hill country, but the planning should start early. The successful farmer will be the one who dictates what their stock is consuming, and is not simply reacting to situations that develop.

### Safer areas within your farm

Generally the safest areas are:

- » The shady south-facing slopes
- » Those facing prevailing, drying winds.

Checks by AgResearch at Whatawhata Hill Country Research Station have shown spore counts on easy rolling paddocks and those that face north, can be twice those on the south-facing paddocks.

But remember the lower risk on the cooler, drier slopes is only relative. If the spore count on the sunny face is eight times the danger threshold, it will be four times on the shady slopes (and thus still dangerous).

Fence the safer areas separately, and if possible have sufficient fencing so that you can move sheep, either daily or every second day, on a 10-to 20-day cycle. Use spore counting, watch your newspaper or the notice board of your vet clinic, and listen to the radio for local FE warnings. Beef + Lamb New Zealand publish weekly spore counts in e-diary for affected areas, from January to May.

### Safer pastures

Spore counts are generally lowest on hillsides of low fertility grasses like tall fescue. Summer growing grasses like kikuyu or paspalum also have lower spore counts. Pastures with a high clover, lotus or chicory content are safer than ryegrass dominant pastures.

You will reduce the danger if you encourage clover or avoid ryegrass dominance in summer. Under clover there is less litter, lower temperatures and more moisture.

### Risk monitoring

FE is the result of the accumulated total intake of the toxin sporidesmin. Experimentally, small daily doses over an extended period cause as severe liver damage as does a single very large dose, or several moderately high doses, and this has to be kept in mind when monitoring the risk of FE.

Monitoring spore counts is an integral part of assessing the risk of FE but keep in mind that spore counts provide only part of the equation for total toxin intake.

**Toxin (Sporidesmin) intake =  
Spore count x amount pasture eaten x number of days**

Thus spore counts should be used to warn of the danger of FE and not taken as an absolute guide to the safety of any given pasture. Rising spore counts should trigger preventative action, while pastures with very high counts should be avoided.

### Pasture spore counts

Pasture spore counts are made by collecting multiple small samples of pasture from across a paddock, mixing the samples, and then washing the spores from a sub-sample of the pasture and counting the spores using a special counting chamber and a microscope. The spores have a very distinctive shape, often described as looking like a hand grenade, and are easily recognised. Most large animal veterinary offer a spore counting service but the technique is relatively simple and many farmers have their own spore counting equipment. Most large animal veterinary practices will offer a pasture spore counting service.

Regular pasture counts have the advantage of warning of danger before the animals graze the pasture, but do not take into account grazing pressure and pasture height which determine how many of the spores are actually ingested, and the length of time the animals are exposed to toxic pasture. As most of the spores are in the base of the sward lax grazing can minimise spore intakes and in this circumstance pasture counts may over estimate danger.

In a set-stocked grazing system, grazing pressure can affect the apparent pasture spore count. In a trial in which a single paddock was divided into three sections and grazed by lambs at “low”, “moderate” and “high” grazing pressure so that the lambs gained weight, maintained weight or lost weight, the spore counts increased with grazing pressure. The most likely explanation was that, because the spores are concentrated in the lower part of the sward (where dead matter percentage is highest) increasing grazing pressure preferentially removed the lower spore count upper regions of the sward.

The often quoted “danger level” of 100,000 spores per gram of grass refers to the spore count that caused clinical FE in lambs grazing pastures with spore counts reaching this level, on occasion, during a trial lasting several weeks. Many of the trial animals suffered sub-clinical liver damage. A better measure of FE risk is the cumulative spore count (spore count X numbers of days of exposure). Trial work with grazing lambs suggested that a cumulative count of 600,000 leads to liver damage in the more sensitive animals and thus, liver damage could be expected in such animals after six days grazing at 100,000, after 12 days at 50,000 spores per gram of grass, or 20 days at 30,000.

There is a huge variation in spore counts both between farms and within and between paddocks; and therefore district warnings should only be used as a guide as to whether spores are around as individual farms and paddocks may vary dramatically from the district “average” with many having much higher counts and some much lower counts. Individual farm testing of several monitor paddocks should be used to decide when to start and stop a FE prevention programme.

Multiple samples (at least 10 but more is better) should be collected on a transect diagonally across a paddock and mixed thoroughly before several small sub-samples are selected and bulked together to send for spore counting.

When pasture spore counts are trending up and reach 30,000/g (20,000 if the weather is warm and humid and forecast to stay that way) FE control measures should begin and be kept in place until spore counts drop below these levels.

## Faecal spore count monitoring

Ingested spores are not destroyed during passage through the digestive tract and can quite readily be counted in samples of collected faeces. Faecal spore counts (measured as spores per gram of faeces) are a more direct measure of the number of spores ingested, but again do not provide all the information required to measure total toxin intake. This is necessary to know the total weight of faeces voided per day.

Faecal spore counts give a measure of the number of spores that are being ingested but are not always directly related to the amount of liver damage. In the trial described before, liver damage was lowest in the low grazing pressure group (lowest pasture and faecal spore count); highest in the moderate grazing pressure group (intermediate spore counts in pasture and faeces) and intermediate in the highest grazing pressure group (highest spore counts in pasture and faeces).

Faecal spore counts have the disadvantage of measuring spore intakes after the event as it takes about a day for the spores to pass through the gut, plus the delay between collecting and dispatching the sample, for counting, and receiving the results one or two days later.

Thus, when pasture spore counts are very high and/or are rising rapidly, this delay of two to four days may result in animals ingesting a toxic dose of sporidemin before the results are known. Therefore faecal counts are most suited to monitoring risk early in the season when counts are low; with the view to switching to pasture counts when the faecal spore count begins to rise—in an effort to identify and graze the pastures with the lowest risk.

The “danger levels” for faecal spore counts are less well defined than for pasture counts and the relationship between pasture and faecal counts depends heavily on grazing pressure. Faecal spore counts on a dry weight basis are five to six times pasture counts at low grazing pressures, but increase up to more than 10 times the pasture count at high grazing pressures. As for pasture counts, whether the spore count is trending upwards and the total number spores ingested over time, are the more important factors indicating the need to take preventative precautions and estimating the risk of liver damage.

## SUMMING UP HILL COUNTRY STRATEGIES

- » Prepare the safer areas of your farm for rotational grazing through the FE risk period.
- » Encourage covers in your pastures and consider the advantage of some paddocks of lower fertility grasses. You can build up a feed bank to ease grazing pressure on other parts of the farm.
- » Avoid heavy grazing.
- » Quit trading stock early.

In sheep faecal spore counts of 300,000-600,000 spores/g dry weight are thought to present a low risk of FE; counts of 600,000-1,000,000 represent a moderate risk; and counts higher than 1,000,000 spores/g dry faeces to represent a high risk of FE. But again, as for pasture spore count, continued exposure to lower counts than these resulting in a cumulative spore count of 2,000,000-2,500,000 is likely to lead to significant liver damage and subsequent production losses and FE prevention measures should start as soon as faecal spore counts trend upwards and reach 100,000 spores/g dry weight of faeces (30,000 if the counts are based on the wet weight of faeces).

## Interpreting spore counts

It is more important to pay attention to the trends in spore numbers and the current and prospective weather than to try and determine risk of FE from single spore counts on individual paddocks, unless the counts are already high.

Watch the spore count notices provided by local veterinary practices and Beef+Lamb New Zealand and note whether the counts are rising or falling. If pasture counts are 20,000 or greater and trending upwards farmers should take action. But remember district averages may not represent the conditions on your farm where counts may be higher or lower. It is best to be regularly sampling pastures or faeces and submitting them for spore counting, as this is the only way of assessing danger on individual farms with certainty.

Breeders selecting for FE tolerance, and farmers who have been buying rams from these breeders for some years, will be able, with care, to delay taking action until spore counts are somewhat higher.



## Safer grazing

The first thing is to avoid building up litter in the pasture. Keep pastures under control in spring—it is better to let some pastures build up a feed bank than let all pastures get away. Topping pastures and leaving the litter behind guarantees conditions favourable to FE. If topping, use a silage bucket and remove all clippings. Hay and silage paddocks are generally safer.

The urine patches are favoured by *Pchartarum* fungus because there is high nitrogen content, more dead leaf from urine scald and a denser, more sheltered environment.

Your best response is to move the sheep on before the pasture—and particularly in these danger spots—is grazed down hard.

While light grazing will reduce the spore intake and the risk of FE, the trouble with it is that you can quickly run out of paddocks, unless the farm stocking rate has been reduced to match the feed available. That could mean not retaining great numbers of young stock over the summer in order to achieve larger carcasses.

AgResearch trials have shown that keeping lambs until March puts extra pressure on the breeding ewes and increases the severity of the FE experienced. More ewes die, and those that survive produce fewer lambs the following spring. The costs far outweigh the added return from the six weeks' extra lamb growth.

So in FE prone areas the strategy should be to aim for an early, compact lambing so that you can wean early and then finish the maximum number at good weights. If you are not able to finish your lambs early, then they should be off the farm by the end of February.

*“The hidden costs of FE were revealed when trials on a Gisborne farm and Whatawhata Research Station were affected by what appeared to be only minor FE outbreaks. Despite there being only two or three clinical cases among the Gisborne ewes, blood tests revealed that two-thirds of the ewes had liver damage, and scanning showed that among those affected, there were more barren ewes and far fewer twins. The more severely affected ewes had only half the number of lambs as those unaffected.*”

*Worse still, the Whatawhata trial showed that the ill-effects carried through the life of the ewe. The productivity of the flock of ewe hoggets affected by FE was recorded until they were culled for age. Among those affected by FE, there was a higher death rate and lower lambing percentage over the next four years.”*

*Dr. N. Towers, AgResearch Ruakura*

## Growing a forage crop

This is another option that allows you to reduce the grazing pressure on possibly toxic pasture. A crop is also useful where other fungal toxin problems, such as ryegrass staggers and zearalenone-induced [*Fusarium*] infertility, are also causing animal health problems and production losses.

If pasture renovation or redevelopment is planned, then a crop may fit into the programme. Use the crop to supplement the most important stock classes (replacement ewe lambs and hoggets).

## SUMMARY

# BEING PREPARED FOR FACIAL ECZEMA

- » Being prepared is being in control
- » Use spore counts to warn of danger
- » Most large animal veterinary practices offer spore counting services
- » Spore counting is simple and farmers can do their own spore counts
- » Cumulative spore intakes determine the severity of liver damage and are more important than individual spore counts
- » Cumulative spore count = spore count x number of days grazing
- » Toxin (sporidesmin) intake = spore count x pasture eaten x number of days

### Pasture spore counting

- » Cumulative intake of 600,000 spores/g = liver damage and production loss
- » Risk of FE after short term exposure depends on the spore counts:
  - Counts of 40,000–50,000 spores/g pasture—*low risk*
  - Counts of 80,000–110,000 spores/g pasture—*moderate risk*
  - Counts above 200,000 spores/g pasture—*high risk*

### Faecal spore counting

- » Cumulative intake of 2,000,000–2,500,000 spores = liver damage and production loss
- » Risk of FE after short term exposure depends on the spore counts:
  - Counts of 300,000–600,000 spores/g dry weight—*low risk*
  - Counts of 600,000–1,000,000 spores/g dry weight—*moderate risk*
  - Over 1,000,000 spores/g dry weight—*high risk*

### Take action when spore counts reach trigger levels and weather conditions favour fungal growth

- » Pasture counts 20,000–30,000 spores/g pasture and rising
- » Faecal counts 100,000 spores/g faeces and rising
- » Warm humid weather with high overnight temperatures following light rain or heavy dew

### Actions

- » Start zinc dosing
- » Start strategic grazing of safer pastures/crops
- » Increase spore counting frequency

### Start breeding for FE tolerance



## CHAPTER

# 02

# LONG TERM MANAGEMENT OF FACIAL ECZEMA

## BREEDING FOR FE TOLERANCE

*Among the choices you have in facing up to FE, breeding comes first. It is a permanent gain, adding value to your flock and making the other annual precautions easier and less critical. It does not involve a great labour input and it is not affected by the difficult contours of your property. Genes can go anywhere!*

*There are tests to identify the most tolerant rams in a flock. Each ram passes on about 40 percent of his “talent” to his offspring.*

### **What difference does it make?**

In breeding terms, progress is relatively rapid and significant gains will be made in only a few years of concentrated selection.

Ram breeders using the RAMGUARD™ FE Tolerance Testing Service, provided by AgResearch, have on average multiplied the base tolerance level of their flocks two to threefold after eight to nine years of breeding. A few breeders who have used the service for more than 30 years have increased tolerance levels about six-fold. This means they can safely graze pastures with spore counts much higher than they could previously, but it does not mean they are now resistant to all dangerous pasture.

Commercial sheep farmers can rapidly increase the FE tolerance level of their flocks by buying rams from these breeders.

The practical results of breeding for FE tolerance can be seen from two FE outbreaks among the Ruakura flocks.

In January 1989, lambs from the tolerant and control (no selection for FE tolerance) flocks were run on toxic pasture with an average spore count of 400,000. The results of a blood test for FE liver damage 14 days later showed that the tolerant group had no liver damage and the control group all had liver damage.

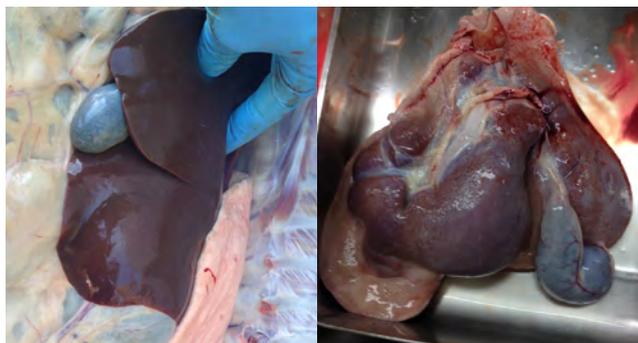
The control animals were removed from the toxic pasture and the tolerant lambs stayed on another 14 days. Ten weeks later:

- » Tolerant group—38 percent clinical FE; 23 percent dead.
- » Control group—100 percent clinical FE; 93 percent dead.

In April 1990, 160 FE tolerant hoggets and 110 control hoggets were tested for liver damage after grazing on pastures with low to moderate spore counts since January.

- » Tolerant flock—only 20 percent had any liver damage and this was generally minor.
- » Control flock—76 percent had minor or moderate liver damage.

Continued selection for tolerance meant that the difference between the flocks was even bigger when the breeding trial finished.



Healthy liver (left) and FE-damaged liver (right). RAMGUARD™ performance testing ranks rams on their ability to withstand a challenge with sporidesmin, the fungal toxin that causes FE.

## Breeding rams

If you are a ram breeder, you should make selecting for FE tolerance a major breeding goal. That means you should begin testing potential flock sires for FE tolerance.

Breeding tolerant rams is a long-term commitment that will involve considerable expense. You should therefore have clear ideas of why you are doing so, and what your overall selection priorities will be. RAMGUARD™ can help you make these decisions.

You will find the RAMGUARD™ performance test described below. It ranks the rams in your flock, and is not a basis for comparison with other flocks. It will cost approximately \$250 to \$300 to test each ram.

## The performance test

This test ranks your rams on their ability to withstand a challenge with sporidesmin, the fungal toxin causing FE. Potential flock sires are dosed with small amounts of toxin. If this causes liver damage, an enzyme known as *gamma glutamyl transferase* (GGT) leaks from the damaged tissue into the blood. By measuring the GGT, the laboratory can detect liver damage when there are no outward signs of FE.

A single dose is the standard test and the dose rate is set in consultation between the RAMGUARD™ coordinator and the ram breeder.

The whole process takes about one month. RAMGUARD™ provides the sporidesmin, organises the blood testing and a report on the ranking of each ram; your local vet normally doses the rams and collects the blood samples for testing.

RAMGUARD™ provides each breeder with a certified copy of their results each year and a history of their testing programme for display to ram buyers as evidence of their commitment to breeding FE tolerant flocks. Records of the results are kept on file and used to select the toxin dose rates for the following year's tests.

## Field challenge

A less accurate way of ranking of the ram team is to take blood samples after the FE season for a GGT test. Rams with the highest GGT values are the most susceptible and should be culled. Similarly you could have your replacement ewe hoggets tested for GGT levels at the end of the FE season and cull accordingly. Even in low spore count years the GGT results will vary enough to make a decision on which you can cull.

This information can be used in SIL analyses. Selecting rams on their own GGT response rather than waiting for that information to be produced in a breeding value is not recommended however, as it does not take into account all available information.

RAMGUARD™ has developed a field challenge protocol and this is available from the RAMGUARD™ co-ordinator (email Neville Amyes [neville.amyes@agresearch.co.nz](mailto:neville.amyes@agresearch.co.nz)).

## Genomics

Genomics is another tool that can help ram breeders select their most FE tolerant sheep. In this test DNA obtained from an ear plug is tested against a “chip” containing 5,000 (Sheep5K) or 50,000 (Sheep50K) small DNA sequences bound to the chip in a pattern [array]. If the sheep's DNA matches a sequence on the chip it binds to that spot and the spot is said to “light up”.

The 5K and 50K chips have been calibrated by testing against DNA from animals from flocks with long histories of successful breeding for FE tolerance searching for particular spots [DNA sequences] that consistently “light up”. When the DNA from untested rams is tested against either the 5K, or 50K, chips and this results in the same or a similar pattern of key spots on the chip “lighting up” it is most likely that the animals will have an increased level of FE tolerance.

The calibration is done within breeds so the accuracy of the predictions of FE tolerance are greater for the more popular breeds such as the Romney, Coopworth, and Perendale than for less common breeds.

Genomics (Sheep5K) is a tool both commercial farmers and breeders can use to ensure the FE tolerance of their flocks is improving year on year, or to assess their flocks FE tolerance status. When combined with a RAMGUARD™ testing programme, Sheep5K aids more reliable decision making about which animals to keep or cull. Depending on the breed of animals, the genomic information could add accuracy to the breeding value estimate for an individual equivalent to having up to 9 progeny RAMGUARD™ tested. A group breeding for FE in the North Island almost doubled their genetic gain in both FE tolerance and key production traits by incorporating both Sheep5K and RAMGUARD™ testing, (Aymes *et al.* 2016), illustrating the potential of combining these technologies to make improvements to the NZ sheep industry.

## Buying rams

If you buy in your rams, you should buy from breeders who are selecting for FE tolerance. If your current ram breeders are not testing for FE tolerance, you should persuade them to start or, if you want rapid improvement, change to a breeder who is.

The breeder may ask for a premium for tested FE-tolerant rams; testing costs money and the breeder needs to recover these costs, but in general rams from a tested flock do not cost more than rams from susceptible flocks.

It is not sufficient to hear the breeders say they are testing for FE tolerance. You have to know about their programmes and you have to be sure that the rams you buy share the tolerance that has been developed.

### That will depend on:

- » The size of the flock and the percentage of the sheep the breeder is testing.
- » How long they have been selecting for FE tolerance. Ask for the FE certificate, issued by RAMGUARD™ (the dose rate should be increasing).
- » Whether the sires used are the top 5, 10, 20 or 50 percent of the tested rams. A breeder using only the top 5 percent will make much faster progress than one selecting from the top 50 percent.

When selecting a breeder there are a number of questions you should ask about the breeding programme that will show whether breeding for FE tolerance is a priority, and how well the breeder is doing the job—see the article on the RAMGUARD™ FE Tolerance Testing Service for details (page 20).

How well a breeder is selecting for FE tolerance is more important than how long the breeder has been testing. A new breeder testing a large number of rams and only using the most tolerant will quickly overtake a breeder who tests only a few rams or uses rams lower on the tolerance ranking list.

**FE tolerance does not affect other traits, so you can continue to look for higher growth rates or heavier fleece weights (for example) while pursuing your FE programme.**

## Stick with the chosen breeder

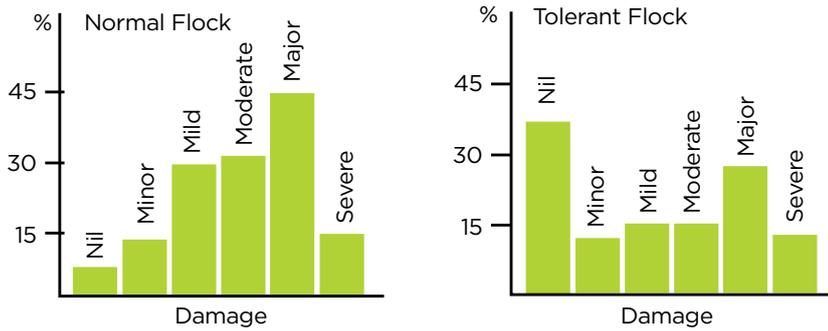
Having found a breeder in whom you have confidence, stick with that breeder. The breeder will retain the best animals for their own flock and will continue to make genetic gains. Their clients will make parallel gains about two seasons behind.

Consistency is the name of the game. If you buy rams or other susceptible stock from untested flocks, you could lose all the hard-won gains from breeding or buying FE tolerant rams.

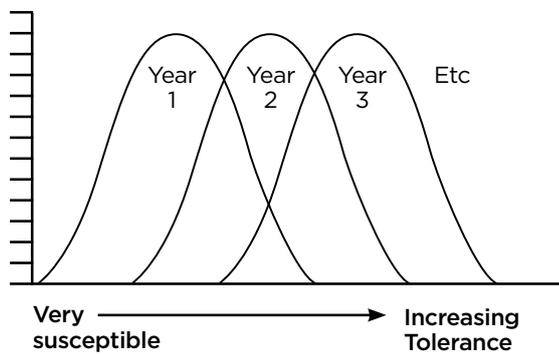
One of the advantages of buying FE tolerant rams and breeding for tolerance is the increase in your lambing percentage as the effects of FE are overcome. At 130 percent lambing or more, half your ewe flock can be put to a fast growing terminal sire so you get more lambs away before the onset of the FE season. The reduced stocking rate will make it easier to manage through the FE season.



## TWO FLOCKS UNDER CHALLENGE



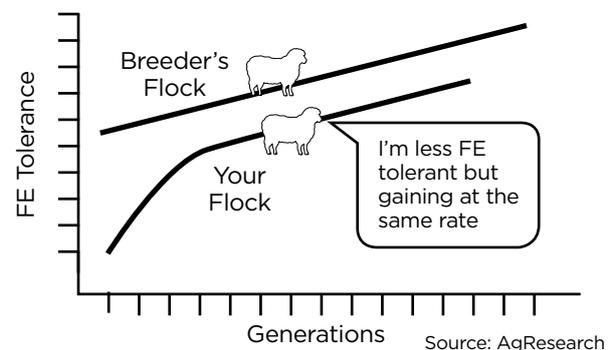
## IMPROVED FE TOLERANCE



Source: AgResearch

The bell curve represents the normal range of tolerance in a flock. With a breeding programme, it should advance 2.5-3.5 percent each year.

## MATCHING THE BREEDER'S PERFORMANCE



When you buy consistently from a ram breeder, you make the same progress, but about two seasons behind.

## Natural tolerance to FE

Since the release of the Finn sheep from quarantine into New Zealand in 1990, evidence has grown of this breed's higher natural tolerance to FE.

However, the use of the Finn in commercial sheep flocks is more likely to be that as a crossbred, so the FE tolerance status of the other breeds must be taken into account when selecting those animals for FE tolerance. If the other breeds used in the cross have come from flocks that have been breeding for FE tolerance then the FE resistance status is likely to be maintained.

If, however, the background of the crosses have had no tolerance selection then any advantage from the Finn (or any tolerant bred stock) will be reduced and may even be completely lost. If the Finn only makes up one-eighth of the crossbred it will only have one-eighth of the Finn advantage in FE tolerance, and this is unlikely to be significant.

Currently, the use of rams from flocks that have been tested with sporidesmin is the only certain way to ensure that a ram will pass FE tolerance on to its progeny.



## Finding ram flocks with FE tolerance

A lot of flocks claim to be breeding for FE tolerance but some of these cannot produce objective information to prove rams you buy are likely to have high levels of FE tolerance. Some people argue that selection for productivity in an environment where FE is prevalent will implicitly give some degree of FE tolerance.

However FE seasons vary greatly in the challenge they present to animals and when the challenge is low or non-existent such a system will not discriminate well across the range of FE susceptibility and tolerance.

The gold standard for a selection programme that includes FE tolerance as a breeding objective is use of the AgResearch RAMGUARD™ Service. Carefully formulated sporidesmin challenges provide the tool for maximum discrimination between animals for various degrees of FE tolerance, i.e. accuracy of the estimate of genetic merit for FE tolerance.

Most breeding flocks using RAMGUARD™ are also on SIL (Sheep Improvement Limited); the national performance recording and genetic evaluation service for the sheep industry. These breeders can provide estimates of genetic merit (genomic breeding values or gBVs) for FE tolerance and a variety of other important production or health traits. So you can purchase rams that will have FE tolerance and productive progeny.

SIL is funded by Beef + Lamb New Zealand as an industry good service for the sheep industry. It has a commitment to make relevant genetic information available to industry. On SIL's website ([www.sil.co.nz](http://www.sil.co.nz)) you can find several tools to help locate FE tolerant rams:

1. SIL updates annually a list of breeders using the Ramguard service with their contact details.
2. A tool called FlockFinder can be used to find flocks that are measuring performance in traits of specific interest to you as a ram buyer, including FE tolerance.
3. A powerful tool called RamFinder, designed for sheep breeders, to locate individual rams that can add to their breeding program, e.g. with FE tolerance and enhanced performance in other traits.
4. The SIL NZGE Trait Leader Lists identify the top 200 high genetic merit sires for a number of indexes and goal traits including FE. While some experts caution against comparing the merit of animals for FE tolerance between flocks because of the variance in responses to sporidesmin dosing determined by a wide range of factors, this leader list is based on the large across flock evaluation called SIL NZGE. However the list is restricted to sires used in those flocks with a minimum number of "genetic connections" between them for FE tolerance and does not include all flocks selecting for FE tolerance.

If you have any queries about the use of this information, you can contact Beef + Lamb Genetics' Sheep Improvement Ltd:

Email: [silhelp@sil.co.nz](mailto:silhelp@sil.co.nz)

Phone: 0800 745 435

# RAMGUARD™ FACIAL ECZEMA TOLERANCE TESTING SERVICE

By Kees Wesselink, AgResearch Ruakura

*FE has been the curse of farming in many parts of the North Island for over 60 years. But, thanks to the work done at the Ruakura Animal Research Station since 1975, and with the help of farm consultants and some experienced sheep breeders, a solution to the problem of FE has come a lot closer.*

In the mid-seventies, it was realised that FE tolerance was strongly heritable and procedures were developed to identify tolerant sires by challenging them with a measured quantity of sporidesmin, the toxin that causes FE. Reactions to the challenge were measured by analysing a blood sample, taken 21 days after the challenge, for GGT levels. Blood GGT levels increase in proportion to the amount of FE liver damage each animal suffers. The most tolerant animals have no, or the lowest, increases in blood GGT concentrations. A successful test shows a range of values that allow us to rank the animals from the most tolerant to the most susceptible.

To prove that this procedure works, a demonstration flock was established at Ruakura and rams from the flock were tested each year using the RAMGUARD™ service. The most tolerant animals were retained for breeding, and the following year their progeny were tested and again the most tolerant animals kept as sires. After 28 years of breeding, the flock was still getting more tolerant and there is no suggestion that progress was slowing. Most importantly, selection for FE tolerance had no adverse effect on other productive traits such as ewe fertility or wool weights. Instead, we have found that FE tolerant sheep appear to be more resistant to ryegrass staggers and the fertility reducing fungal toxin, zearalenone, which also appears in pastures in autumn. These findings suggest that some of the genes conferring tolerance/resistance to a number of toxins operate in common.

This procedure has now been used successfully in the ram breeding industry for many years. Breeders who have used the RAMGUARD™ FE Tolerance Testing Service for at least 10 years have trebled the FE tolerance level in their flock. Those that have been testing for 25 years or more now have flocks that need a challenge up to six times higher than the base level to identify their most tolerant rams (the base level is the initial level of challenge required to give a reaction to the toxin in an untested flock).

Breeders who have consistently used the RAMGUARD™ service have made steady, lasting progress over the years. Although we have not yet reached the point where tolerance levels are high enough to cope with severe seasons like the autumns of 1999, 2010 and 2016 without any FE, the FE tolerant flocks were much less affected than their neighbours. Buying your rams from these breeders is the only way to permanently reduce FE problems on your farm.

Remember that the RAMGUARD™ FE Tolerance Testing Service is a tool used by ram breeders to identify FE tolerant rams for use in their own flocks rather than to produce individually tested animals for sale. So don't expect to be able to buy the ram breeders top tested rams, since they should be keeping them to improve their own flocks. However, these rams may be available as 4 or 6 tooth animals after the breeders have used them.

When "tested" rams are available for sale, ask to see the test results and make sure that they were among the rams tolerant to the toxin challenge ie, they "passed" the test.

The advice to "buy FE tested rams" is thus technically not quite correct. It should be to buy rams from breeders who are testing and using the most tolerant rams as sires in their own flock.

The commercial sheep farmer should also keep in mind that improvement won't be immediate. As with all genetic gain, it is slow but will be permanent.

A description of the performance testing procedure can be found on page 18.

So when you, the commercial sheep farmer, are off to buy your rams from a breeder who claims to have FE tolerant sheep, there are some questions you should be asking.

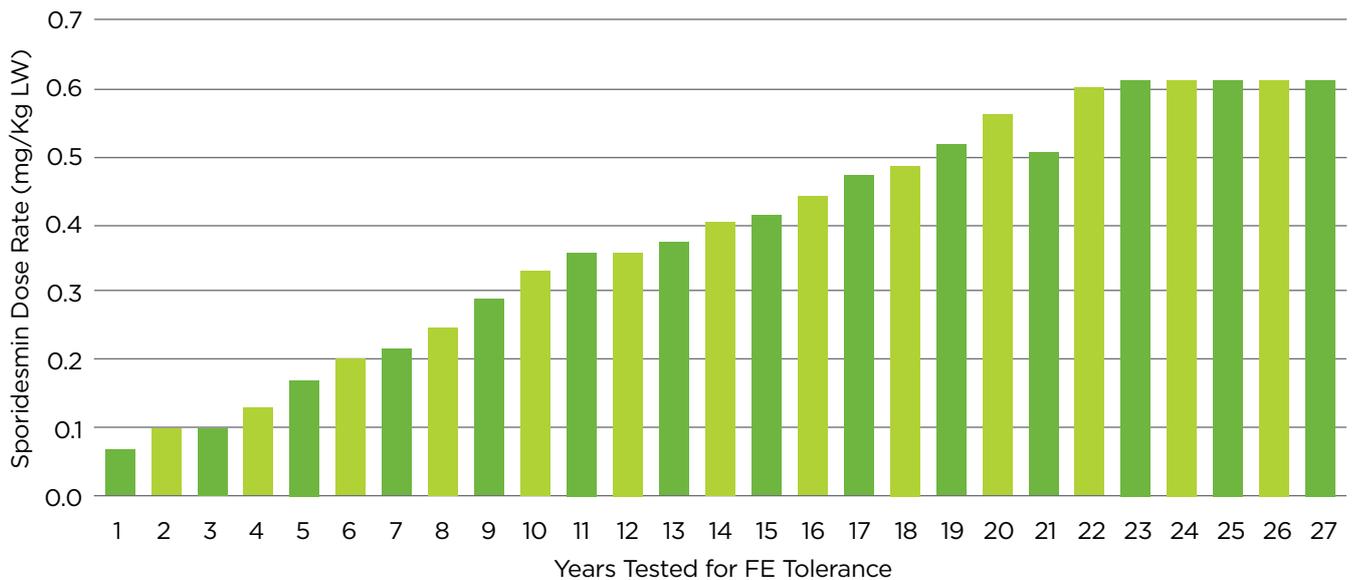
*"Stick with the breeder you trust.*

*Improvement won't be immediate,*

*but it will be permanent."*

## BREEDING FOR TOLERANCE-EXAMPLE

FE dose level that animals can tolerate increases with years of selection



### Here are a few pointers:

#### Ask whether the breeders used the RAMGUARD™ FE Tolerance Testing Service

RAMGUARD™ offers the only FE Tolerance Testing Service, and selecting for tolerance without using the service is extremely difficult. Breeders not using the service are unlikely to have made any significant progress.

#### If the breeder is using the Ramguard service, ask for the RAMGUARD™ FE Testing Certificate

The certificate contains the testing history of the breeder, and all reputable breeders will be happy to make it available.

#### Check number of years the breeder has been testing

The more, the better. So long as they have tested sufficient rams and have not introduced untested sires into their flock, the more years the breeder has tested the more progress they will have made.

#### Has the breeder introduced non-tested sires into the flock?

Introducing untested rams may slow or even reverse progress in selecting for FE tolerance.

#### Compare starting dose rates with current dose rates

There should be a trend showing a steady increase in the sporidesmin dose used in the testing year by year. For example, see the dose rate used in the Ruakura tolerance selection flock over the 27 years of testing shown in the figure above. The increasing dose rate measures the increasing level of resistance, so if the starting dose rate was 0.1 and the current dose rate is 0.35, non-reactors at 0.35 are at least 3.5 times more tolerant than those that reacted at 0.1 in the first testing year.

#### How many animals are tested each year?

The more the better, as this can allow a greater selection pressure to be applied.

#### How many animals were tolerant to the test?

The lower the number of tolerant animals, the higher the selection pressure. In tests where the sporidesmin challenge is too low, most of the rams will not react to the toxin and only the most susceptible will be identified. It will not be possible to separate the 'top' animals from the 'average' animals.

#### Check that the rams you are buying are the progeny of sires tolerant to the test and not of "tested" sires kept because they scored highly for other productive traits.

Not all "tested" sires are tolerant to the sporidesmin challenge used—in fact the test is designed so that about two thirds "fail", otherwise no selection progress would be made. Every breeder has a test result sheet showing the testing history of each sire, so be sure to ask for it.

#### Stick with the breeder in whom you have confidence. Breeders will retain the best animals for their own flocks and will continue to make genetic gain at 1.5 to 2.0 percent a year. Their clients will make parallel gains about two seasons behind

Your ram breeder is responsible for 85 percent of the genetic gain that you as sheep farmer can make.

#### For more information, contact:

Neville Amyes, RAMGUARD™ Coordinator  
C/- AgResearch

Tel: 07 838 5012

Mobile: 029 838 5259

Email: [neville.amyes@agresearch.co.nz](mailto:neville.amyes@agresearch.co.nz)

# RAMGUARD™ FACIAL ECZEMA TOLERANCE TESTING SERVICE

## Facial eczema certificate—example

### Flock testing history for:

Name	F E Ramtol
Test season	2011/12
Address	RD Hamilton
SIL flock rating	****
Years tested	16

Year tested	Number of rams tested	Number of tested rams by UNTESTED Sires	Number of rams tolerant to final dose:	Dose 1	Dose 2
				Dose rates (mg/kg) used for challenge:	
1996	10	10	5	0.07	0.17
1997	27	20	4	0.14	0.25
1998	30	15	4	0.20	0.25
1999	30	10	5	0.22	0.25
2000	17	7	5	0.25	-
2001	12	2	7	0.28	-
2002	12	0	6	0.30	-
2003	15	0	5	0.34	-
2004	15	0	7	0.38	-
2005	20	0	8	0.44	-
2006	22	2	12	0.45	-
2007	22	0	15	0.48	-
2008	20	0	11	0.49	-
2009	22	0	17	0.50	-
2010	18	0	6	0.53	-
2011	12	1	5	0.55	-

### DECLARATION:

1. Fred E Ramtol., agree to abide by the rules set out for FE certification on the back of this certificate.
2. I used ...6... out of ... 7... FE tested sires in the 2010 mating. Rams used ranked in the top ...20%... of animals tested.
3. ...50... out of ...500... ewes not mated to FE tested sires in the 2010 matings.

**Signed:** F E Ramtol      **Date:** 9 October 2019

Dose rates can vary from year to year but in a successful programme the trend is upwards.

Dose rates **can not** be used to compare tolerance rankings **between** flocks because the effect of the dose rate is influenced by:

- » Previous exposure to toxic FE spores
- » Time between shearing and dosing
- » Condition of the animals tested
- » Time of the year the test is done
- » Animal weight gains and losses
- » Composition of the pasture
- » Age of the animals

# RAMGUARD™ FACIAL ECZEMA TOLERANCE TESTING SERVICE

## Ramguard final results 2011—example

<b>Breeder</b>	F E Ramtol
<b>Veterinarian</b>	A Vet
<b>No of years tested</b>	16
<b>Year</b>	2011
<b>Date</b>	1/09/2011
<b>Relative dose rate</b>	1st dose: basedose x 5.5
<b>% Tolerant to dose</b>	0.55 mg/kg: 50%

<b>Phone:</b>	99-876-5432
<b>Email:</b>	me@world.co.nz

Base dose is the dose rate used in the first round of testing in an untested flock.

Ram tag	Year born	Sire id	Sire tested Yes/no	Dose 1		Liver damage	Test rank
				0.55 Ggt pre	Mg/kg Ggt d21		
114	2010	401/07	Yes	67	70	Nil	1=
125	2010	835/08	Yes	91	77	Nil	1=
134	2010	401/07	Yes	50	60	Nil	1=
211	2010	899/09	Yes	53	53	Nil	1=
276	2010	899/09	Yes	71	72	Nil	1=
300	2010	401/07	Yes	75	76	Nil	1=
111	2010	835/08	Yes	66	107	Slight	7
456	2010	401/07	Yes	56	126	Slight	8
345	2010	401/07	Yes	74	256	Slight	9
10	2010	899/09	Yes	72	320	Moderate	10
987	2010	835/08	Yes	72	690	Moderate	11
444	2010	835/08	Yes	55	1000	Severe	12

**TEST RANK:** Where the animal ranked out of 12

### Liver damage classification

GGT levels:	Liver damage:
< 1.33 x Pre GGT	Nil
> 1.33 x Pre GGT but less 71	Marginal
71-300	Slight
301-700	Moderate
>700	Severe

Neville Amyes  
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