

## FE'nd™

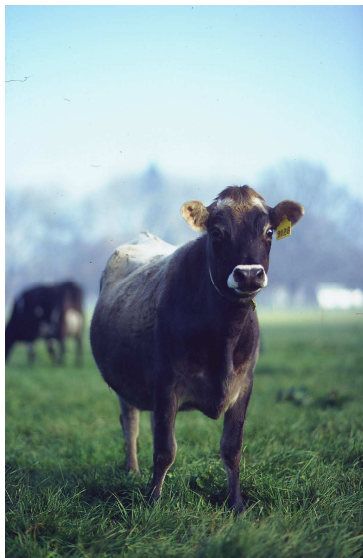
- **FE'nd™** is the first DNA test for resistance to Facial Eczema (FE) in dairy cattle.
- **DNA testing** for increased FE resistance is a new tool that can complement existing FE prevention and control methods such as zinc treatment.
- **The FE'nd™ markers** apply to Holstein Friesian or Jersey cattle and are offered as part of the Genomnz™ dairy parentage test (or as a stand-alone service).
- **Farmers** can make selection decisions for their own herd situation by including FE Breeding Values when choosing cows and heifers.



### **The Science**

- **FE** is caused by the toxin sporidesmin, which is produced by spores of a fungus found in many pastures in summer and autumn. The disease occurs mainly in the North Island and the severity of outbreaks varies from year to year.
- **Some animals** are more resistant to the fungal toxin than others and this resistance is inherited, which means that DNA technology can be a useful tool.
- **In susceptible animals**, the toxin causes liver injury with negative effects on milk production, and it can be lethal. The visible effects of FE are peeling hide and skin (especially in areas with white hair), and sensitivity to sunlight.  
A dose of the toxin in cows grazing a toxic paddock, after grazing non-toxic paddocks, will lead to a sudden drop in milk yield in the vat, but this is not often noticed by farmers because of day-to-day variation in yield, declining persistency towards the end of lactation and possibly hot, dry days also affecting yield.
- **The degree** of liver injury in animals possibly affected by FE can be determined by analysing GGT enzyme activity in blood samples.  
Cows with elevated GGT enzyme levels are likely to experience a reduction in milksolids yield (for example, a 38kg loss (approximately 11% of the herd average) in cows with GGT levels over 700 units).  
Normal GGT levels are 40 units or below.

- **Relative to** an average animal, an animal carrying all the favourable DNA marker copies will be more resistant to FE.  
For example, in Jerseys, the GGT enzyme levels are expected to be 48% lower on average, with lower milksolids losses during the FE season.
- **The FE'nd™ DNA markers** account for about 29% of the *genetic* differences in Jerseys, which is equivalent to accounting for 10% of the *overall* differences in Jerseys. A different set of alleles (DNA marker copies) in DNA tests on Holstein Friesians accounts for 7% of the overall differences. Markers for additional FE resistance genes are still being sought by AgResearch through further study.



- **The FE DNA** test result is presented as a breeding value (BV), in the same way as BVs are presented for each animal for other component traits of the NZ Animal Evaluation Unit's Breeding Worth.
- **The BV** for FE is a score of the GGT enzyme results and is on a scale from negative to positive (in log units and ranging from about -1.8 to +1.8), with negative signs representing the more desirable, resistant animals.
- **The Economic Value** is estimated at present to be \$36.86 in Jerseys and \$23.67 in Holstein Friesians per unit reduction in log GGT and the product of the BV and its economic value contribute to the Breeding Worth in dollars. As an

example, a resistant heifer with a BV for FE of -0.65 log GGT units would have an extra value of +\$24.14 which could be added to her Breeding Worth.

## Costs to the Dairy Industry

- **The annual cost** of FE to the dairy industry (mainly through lost milk production) was estimated in 2008 to range from \$9.55M in years with minor or minimal FE outbreaks, to \$95.2M in years with serious or widespread outbreaks, assuming \$6.00/kg milksolids.

## What We are Offering

- **The AgResearch team**, with research investment from Dairy NZ, Meat & Wool NZ, Foundation for Research Science & Technology (NZ), and AgResearch, have discovered DNA markers that can be used for genetic selection for resistance to FE.
- **The markers** are not the entire answer but, by beginning selection now, you can start to build a more resistant herd. Any particular herd is likely to have animals with a range of susceptibilities to FE. By using the **FE'nd™** DNA markers you can make decisions which will reduce susceptibility, thereby increasing animal welfare and production.