

## Introduction

Stephens and Gill (1937) described New Zealand's first case of Johne's disease (JD), diagnosed 95 years ago in a cow imported from Jersey. Over the years, the incidence of Johne's diagnoses rose across New Zealand with new herds identified every year. By the 1970 and 80s high rates of clinical disease were observed. For example, in 1986 Milestone and de Lisle reported on a study of six JD-infected Taranaki dairy herds with annual clinical Johne's disease incidence rates up to 7.5%.

This paper reports on the analysis of culling data (including deaths, humane destruction and culling ie slaughter of dairy cows) recorded by dairy herd owners on the LIC National Database with cull reason "Johne's disease" (JD culling). Until the mid-90s the Ministry of Agriculture maintained a register of Johne's infected properties, which led to a reluctance to test for JD and thus under-reporting.

The data included in the study spans a decade from 1998/89 to the 2007/08 milking season. The annual NZ Dairy Statistics publications (1999 - 2008) provided the national dairy herd and cow population data – including regional, breed and age distributions.

## References

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- NHMS 1997 Johne's disease on U.S. Dairy operations 1997 USDA: APHIS, VS, CEAH, National Animal Health Monitoring System. Fort Collins, CO
- Ryan 1991 Surveillance 18 (1): 23-24
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- Voges 2008 Proc. NZVA Epidemiology Branch 191-202

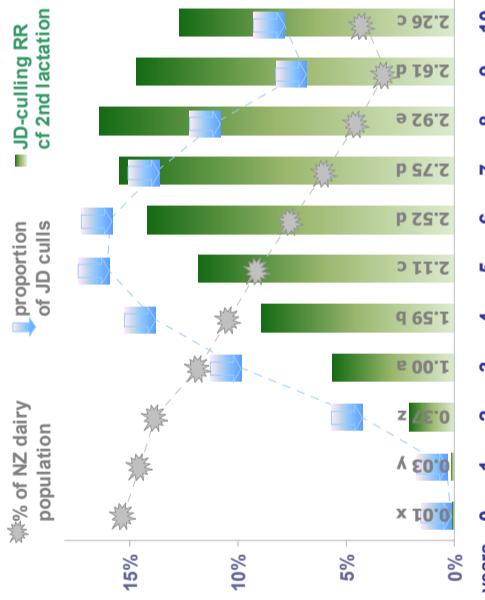
## Results

### Summary of findings

A total of 20,554 Johne's disease (JD) culled over the ten dairy seasons at 4,829 locations. The average number of JD culled per location over the entire study period was 4.26 (median: 2). 1,849 locations recorded a single JD cull, while the maximum number culled at a single location was 114 cows over nine lactations.

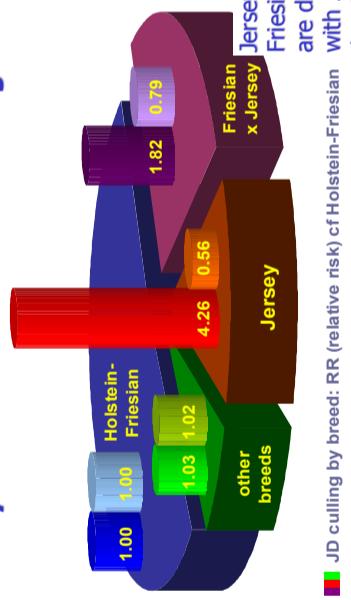
On average 1,092 herds – representing 8.47% of the national herd – culled 1.86 cows or 0.44% of the herd due to Johne's disease per lactation. The mean herd size amongst Johne's disease reporting herds was 416 cows – 45% larger than the national mean herd size over the study period.

### Age at time of JD diagnosis



Susceptibility to clinical Johne's disease rapidly increases with age. Risks rise three-fold from 1<sup>st</sup> to 2<sup>nd</sup> lactation. Lactation 3 and 4 cows make up the biggest number of JD culled, although the risk of JD culling peaks in the 6<sup>th</sup> lactation when cows are three times as likely to succumb to Johne's disease than during the 2<sup>nd</sup> lactation. Common letters denote ages not significantly different at  $p < 0.01$ .

### Dairy cattle breeds and JD culling



JD culling by breed: RR (relative risk) cf Holstein-Friesian

JD deaths (vs live cull) by breed: OR cf Holstein-Friesian

## Discussion

There is a general pattern of Johne's disease incidence with a general increase from North to South. Observed regional differences in herd prevalence as well as JD culling rates are generally consistent with previous NZ studies based on laboratory submissions (Nuttall 1991, Ryan 1991 and Stapes 1994).

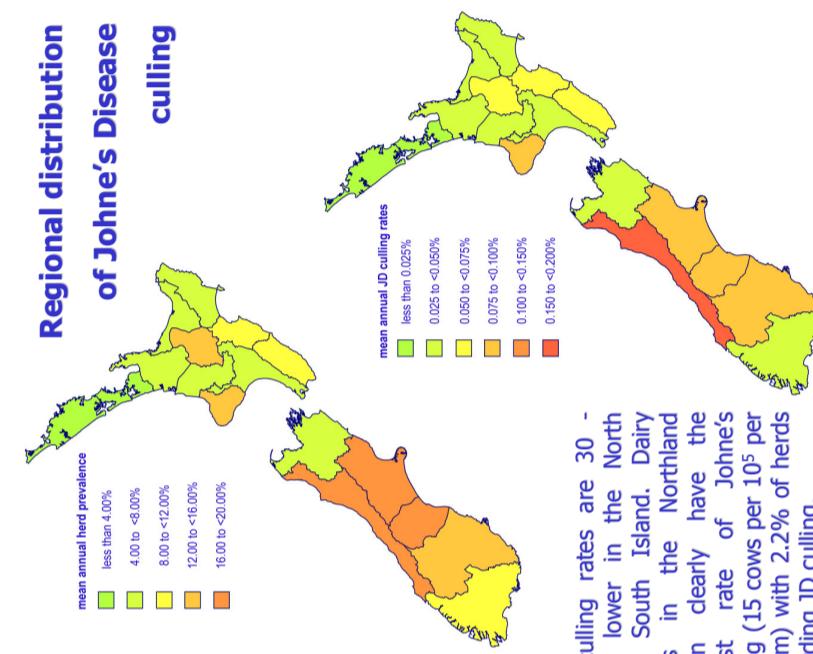
Parturition and other stressors will advance disease progression and may trigger onset of clinical signs (Downham 1950). A culling spike between August and October (JD culling rates twice as high as the remainder of the year) coincides with the seasonal calving pattern seen in NZ. The age pattern is similar to overseas data and demonstrates that the risks of clinical Johne's disease peak in the sixth lactation.

Susceptibility to Johne's disease infection and/or the progression and clinical manifestation of the disease appear to be dependent on cow breed. Similar to overseas studies, this dataset shows a strong association between the Johne's disease diagnosis and the Jersey breed. However, as Jakobsen et al point out, "classification of clinical disease may vary from breed to breed". In New Zealand Holstein-Friesian 'JD cull' cows appear more likely to have died of Johne's than Jersey's diagnosis.

When MAF ended the Johne's infected properties register in the mid-90s the number of dairy herds recording Johne's disease rose sharply from less than 100 to almost 2000 per annum. Since then the proportion of NZ dairy herds recording Johne's disease has risen gradually. At the same time with-in herd incidence has fallen slowly so that overall culling rates appear to have remained stable over the last decade.

In the NAHMS Dairy '96 study (1997), 2% of cull cows displayed clinical signs consistent with Johne's disease and 16% of US dairy herds culled at least 5% of their cows per year with signs of Johne's disease.

In contrast 8% of New Zealand dairy herds record that 0.5% of their cows succumb to Johne's disease annually.



JD culling rates are 30 - 40% lower in the North than South Island. Dairy herds in the Northland region clearly have the lowest rate of Johne's culling (15 cows per 10<sup>5</sup> per annum) with 2.2% of herds recording JD culling.

In contrast, Taranaki (NI) and South Canterbury (SI) herds cull nine JD cows per 10000 per year, while the highest JD culling is recorded on the SI West Coast (16/10<sup>4</sup>). 15 – 12% of Canterbury and West Coast dairy herds record Johne's disease incidence. Jersey cows account for 15% of the total dairy cow population in NZ (Holstein-Friesian: 55% & H-F x J cross: 26%), but more Jersey cows than any other breed are diagnosed with Johne's every year. Jersey's are 4.26 times as likely to be culled with JD than H-F cows. On the other hand, Jerseys are half as likely to be dead at the time of diagnosis. The differences are also apparent in herds with both breeds. Breed differences were highly significant,  $p < 0.01$ .