When sh!t got real – salmonellosis in southern dairy herds, spring/summer 2024/25

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Introduction

As many people have heard, there was an at least 10-fold (Figure 1) increase in the number of dairy herds in the Southland and South Otago regions affected by Salmonella this past spring/summer.

This increase in the number of cases coincided with the wettest spring on record, and other factors such as changes in feed, waterlogged paddocks, cold weather, carrier cows and exceptional stress on cows (and farmers, and veterinarians) all meaning some of these outbreaks were very severe. This paper summarises a survey we carried out late in 2024 to try and investigate the size of the problem, and any patterns that were emerging. This was not intended to be a scientific paper with statistical analysis, more an indication of trends and gathering of ideas and experiences.

Background

Salmonella associated with disease in livestock belong to the species *S. enterica*. Of the six subspecies of Salmonella enterica, Salmonella enterica subspecies enterica is most relevant in dairy cattle (House et al). *Salmonella enterica* is further classified serologically according to somatic or O antigens, flagellar or H antigens and capsular antigens into serogroups and serovars. In New Zealand we know of around 128 different Salmonella serovars, with the most common *Salmonella* Typhimurium*, Salmonella* Brandenburg*, Salmonella* Bovismorbificans*, Salmonella* Hindmarsh and more recently *Salmonella* Give*. S.* Bovismorbificans tends to cause high mortality outbreaks more commonly than *S.* Typhimurium*:* morbidity and mortality are reportedly up to 46% and 8%, respectively, in adult cattle, and up to 75% and 50%, respectively, in calves (Hulme-Moir, 2020). The figures in this survey almost mirrored these results!

Salmonella infections are usually acquired through faecal-oral transmission. The number of Salmonella required to produce clinical disease is dependent on the virulence of the serotype and immunity of the host. The infectious dose for healthy adult cattle is approximately 10^9–10^{11} Salmonella (Jones 1992). When immunity is compromised by concurrent disease, or physiological or dietary stress, the infectious dose may be several hundred Salmonella (Grau *et al.* 1968). Salmonella is spread by healthy carrier animals which don't show signs of disease but shed bacteria (usually intermittently or at low levels). These bacteria go on to infect other animals. Carrier animals can shed Salmonella for months or even years. *Salmonella* is also spread by infected materials (e.g. faeces, aborted materials) which can be further spread by scavenging animals such as seagulls or hawks. While commonly implicated, ducks are not the main source of disease, or feed per-se.

Salmonella spp. can survive in the environment for a long period of time (e.g. months to years in ideal conditions like wet paddocks, effluent ponds, or dry, shaded areas such as cattle or sheep yards). Conversely, it can be killed on hard surfaces in days with freezing or heating.

An outbreak of enteric Salmonellosis causes, on average, 10% of cows to become sick, and approximately 1% to die (DCV 2020). The survey figures differed from this somewhat.

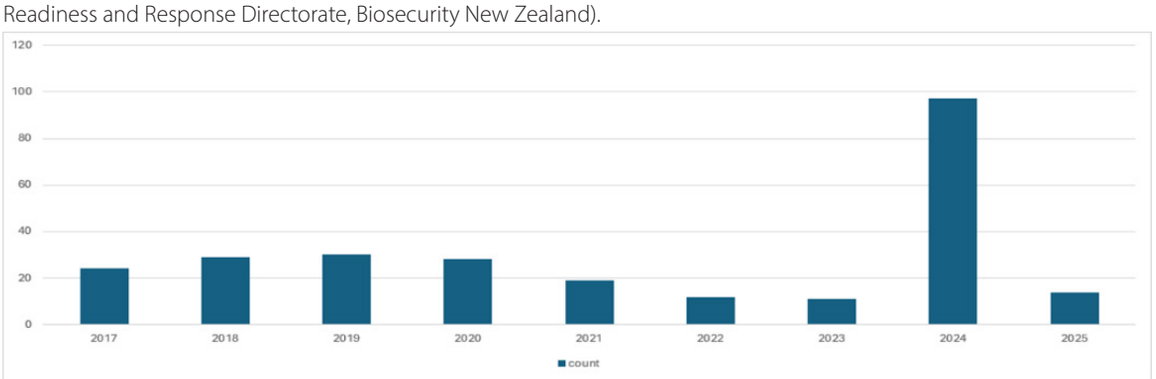
Southern survey (Southland/Otago)

The survey was developed as a way of gathering information from as many clinics as possible, to look for the size and severity of the problem. This data was collated, and the summary was presented back to the contributing Southern veterinarians in late March 2025. As suspected, there was a huge upswing in the cases, confirmed by MPI data (Figure 1).

The information from 79 farms was obtained via the veterinarians. The total numbers of cows that were calculated by herd size (if given) was around 40,000. The total sick cows reported was 3099, or around 8.6% of the herds on average and the total cows that were reporting as dying due to Salmonella was 411, which was around 1.1% of the total herd.

The incidence of disease within a herd varied dramatically, varying from as high as 46%, and down to as little as 0.1%. The death rate varied from as high as 7.7% of the herd, down to 0 with no deaths despite many sick cows. Most of the cases occurred from September until December, but with cases in January–March also. The normal peak of cases in Southland would be in Spring. Note 2025 data is year till end of March.

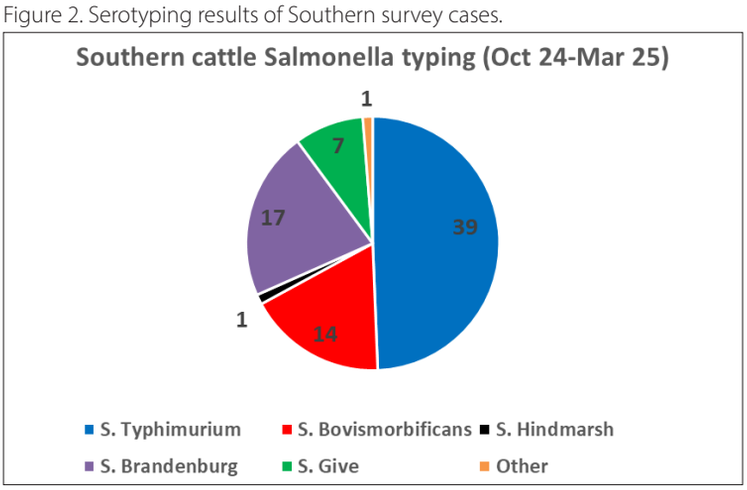
Figure 1. Salmonella cases in Cattle in Southland 2017-present (source: Biosecurity Surveillance (Animal Health) Diagnostics, Readiness and Response Directorate, Biosecurity New Zealand).



The cases showed variation in the course and severity of the disease, dependent on the type of Salmonella involved. A definite trend was that the herds affected by *S.* Bovismorbificans had higher incidence rates and death rates than the other types. *S.* Typhimurium was still implicated in around 50% of the outbreaks, *S.* Bovismorbificans around 17%, *S.* Brandenburg 20% and *S.* Give 9%. Historically there has been little or no *S.* Bovismorbificans seen, with *S.* Brandenburg and *S.* Typhimurium dominant.

Interestingly, there has been no increase reported in human cases for this period, despite the survey stating that at least four farmers became unwell. It seems that they were not all seeking medical advice but were showing very similar symptoms to their cows!

Figure 2. Serotyping results of Southern survey cases.



Risk factors

Known risk factors for shedding/outbreaks (from New Zealand and international literature):

- Recent history of clinical cases in the herd / geographic hotspot: This was the case in the Southern area with several cases of neighbours developing outbreaks.
- Mixing of cattle from different sources / large herd size: Increasing herd size is thought to be a risk factor for salmonella shedding on dairy farms (Warnick *et al.* 2001). However, in this survey, there was no statistically significant link between herd size and incidence or mortality.
- Stress/animal movements (shipping/fasting/yarding/calving). Common in Southern region. Terrible weather!
- Intensive feeding: (pelletised magnesium supplementation, continuous troughs, PKE).
- Unlike previous large outbreaks, e.g. Taranaki in 2012, no link has been seen so far.
- No/incomplete vaccination program: most of the farmers with outbreaks had not used vaccination prior.
- Fascioliasis (liver fluke)- this does not occur in the lower south due to lack of snail host.

Outbreaks happen when ingestion of an infective dose of *Salmonella* occurs at the same time as stress and a change in feed type or quality. Stress can be caused by stock movement or handling, bad weather, or calving/lambing. Usually, *Salmonella* would already be circulating or being shed at low levels in the flock/herd, but the diet change causes a change in the animals' gut environment (for example, an increase in pH or reduced production of volatile fatty acids). This reduces the number of bacteria that need to be ingested to cause illness and/or increases the number of *Salmonella* shed by carrier animals.

At the same time, stress, late pregnancy or immune suppression make the animals less able to fight off infection. It is at this time that animals become sick or abort; sick animals shed more *Salmonella* into the environment, which can infect other naïve flock/herd mates, perpetuating the outbreak. Environmental conditions (such as wet weather) may also contribute, as it will favour Salmonella survival in the environment and/or help spread *Salmonella* around. Removal of aborted material is essential as this a good source of bacteria.

Treatments used

In general, fluids, anti-inflammatories and antibiotics were used, or a combination of all. Around half the farmers vaccinated with Salvexin+B® in the face of the outbreak The farmers that used fluids felt they had better outcomes. Some used only fluids and NSAID's, and didn't need antibiotics if mild cases. Others found that antibiotics were essential. Many other things such as fish tonic, salt and yeast were used, with varying results.

Antibiotic use and implications

For the 34 farms that completed the survey and gave antibiotic usage, the total injectable tetracyclines used for the outbreaks was over 170 litres! There has been some emergence of resistance of especially *S.* Bovismorbificans to both tetracyclines and Trimethoprim Sulpha drugs, but in this survey, there was no resistance reported, other than to penicillin.

Overall, the resistance to commonly used antibiotics in New Zealand is low compared to reported rates overseas but do appear to be increasing. Further ongoing surveillance will be important to monitor antimicrobial resistance to *Salmonella* in cattle in New Zealand.

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