



Rochester Veterinary Practice, 72 Lowry Street Rochester 3561, Phone (03) 54842255 admin@rochyvet.com.au

Salmonellosis in Cattle- Overview and Management

***Salmonella* is a Gram -ve facultative anaerobic non-sporulating rod type bacteria.**

An outbreak of salmonellosis in a dairy herd can incur significant financial losses due to cattle deaths, loss of production and the cost associated with treating and managing the disease.

The most common *salmonella* species that affects cattle on Australian dairy farms is *Salmonella enterica* subspecies *enterica* serovar *Typhimurium* (*S. Typhimurium*) and *Salmonella enterica* subspecies *enterica* serovar *Dublin* (*S. Dublin*). Other *Salmonella* species that have been isolated in cattle in Australia include *S. Bovismorbificans*, *S. Newport* and *S. Zanzibar*.

Salmonella Typhimurium is not considered to be 'host-adapted' in cattle and is shed by a range of domestic and non-domestic animals, whereas *S. Dublin* is 'host-adapted' to cattle. Non-clinical carrier states can occur for cattle that have been infected with *S. Dublin*, however a non-clinical carrier states is uncommon for cattle infected with *S. Typhimurium*.

Within a dairy herd a salmonellosis outbreak are usually sporadic, stress-related and can last for several months and on some farms the disease may become endemic. Salmonellosis can spread by various means including asymptomatic (chronically infected) carrier animals, animals with an active infection, other species (other domestic animals, wild birds and rodents), fomites (overalls, gloves and feeding equipment), mechanical vectors (such as flies) and from contaminated environment (feed and water).

The route of infection is primarily through the ingestion of faecal- contaminated water or feed.

Salmonella may survive in the environment for up to 5 years in water and soil out of direct sunlight and may survive for up to 2 years in faeces in appropriate conditions (slurry in paddocks- 24 weeks!).

How Salmonella affects cattle

Infective dose = 0.1g faeces!!!!

Once ingested the incubation period 1-5 days, the bacteria produce toxins and multiply, gain entry to the blood stream and spreads to many organs in the body (heart, lungs, uterus etc) as well as invading the intestinal tract mucosa leading to malabsorption and maldigestion-> diarrhoea.

Risk factors

An outbreak of salmonellosis is more common in larger dairy herds and often occurs around the calving period. Other potential risk factors include overcrowding, sudden nutritional changes, intercurrent infections and other periods of stress (Calving, surgery, transport, deprivation of feed, water, over-crowding). The disease has also been associated with feeding Causmag (MgO) at levels

that exceed > 30g/head/day as it changes rumen pH to favor survival of the bacteria in the cow's digestive tract.

Clinical presentation of Salmonellosis

The clinical presentation in affected animals can vary from asymptomatic, to mild diarrhoea (acute or chronic) and severe diarrhoea generally together with pyrexia, dehydration, toxemia, depression, foetid odoured dysentery containing necrotic mucosal segments and fibrin casts. *S. Dublin* may cause abortions in pregnant cattle.

Calves that have salmonellosis may not necessarily have diarrhea. They may present with signs of septicaemia, meningitis or polyarthritis and pneumonia.

The clinical presentation is dependent on the age and immune status and age of the animal and pathogen load and strain. A diagnosis should be based on clinical signs and laboratory test findings and culture (although culturing can be difficult).

Fatality rate- 75% untreated 65% treated

Management of the individual animal in an outbreak

Supportive therapy early in the clinical disease process is most effective at limiting the duration and severity of the disease. A delay of up to 48 hours may result in severe dehydration and significant compromise of intestinal mucosa. Early administration of parenteral antimicrobials, fluid therapy either oral or intravenous with electrolytes and a non-steroidal anti-inflammatory drug (NSAID).

Management of an outbreak

The management strategy should be aimed at improving 'host' immunity, reducing the source of the infection, and reducing exposure to the bacteria.

Short term management in an outbreak

Initially advise herd owners to take rectal temperature and administer treatment to cattle that are suspected to be in early stage of the disease. These animals may present with a sudden reduction in milk production and/ or lethargy/depression. This advice is valid as a rise in rectal temperature often precedes the clinical signs of diarrhoea by 24-48 hours.

In conjunction with this advice, clinically affected cattle should be isolated from the herd as treatment with antimicrobials may increase the risk of cattle developing a carrier status (if infected with *S. Dublin*) and/or increase the duration of bacterial secretion. In cases where abortion is the only clinical presentation, these animals should be isolated. Other measures include reducing exposure of cattle to contaminated water and feed sources, reducing stressors on cattle (lower stocking rates, prevent mixing of stock and no sudden dietary changes) and improve sanitation protocols.

Vaccination

Vaccination is only warranted in outbreaks where there is an abortion storm or a number of acute clinical cases in the herd or the disease is established in the calf rearing system. In Australia, a killed vaccine is available and protects against *S. Dublin* and *S. Typhimurium*. In outbreaks that are not related to *S. Dublin* and *S. Typhimurium*, some vaccine companies offer vaccines that will cover other strains such as *S. Bovismorbificans* and *S. Zanzibar*.

Long term management of an outbreak of salmonellosis in a herd

The principles of short-term management apply, however other measures that can be put in place to manage the outbreak in the long term include:

General practices

- Maintain a closed herd or if there is a need for purchasing cattle, do so from low-risk herds
- Minimize stresses (outline above)
- Minimize faecal contamination of water troughs and feed, feeding areas and equipment
- Minimize cattle access to dams and channels where wildlife or rodents may co-inhabit (Not as important for *S.Dublin*)
- Equipment that is used for manure clean up and disposal should not be used for handling or mixing feed
- Actively control rodents and pests on the property particularly around feed and feeding equipment
- Effluent must be rested for a minimum of month prior to spreading on paddocks, preferably not on paddocks grazed by cattle
- If feeding Causmag, monitor levels being fed and do not exceed >30g/head/day
- Disinfect work boots and equipment

Calving period

- Minimize stress on close to calving dry cows by allowing adequate space and time in a clean calving area
- Having a separate area from calving cows and sick cows

Calves

- If possible, have an all-in-all-out calf rearing system
- Space- >2m², reduce drafts 8-10 calves per pen
- Limit contact between calves and adult cows
- Don't use colostrum or milk from cows' diagnoses or suspected to have had or are carriers of *salmonella*
- Ideally feed pasteurized milk or calf milk replacer
- If vaccination is practiced, calves should be fed colostrum from vaccinated animals
- Disinfect water troughs and equipment with a phenylphenolic compound
- Offer roughage off the ground
- Thoroughly disinfect all surfaces of the calf rearing facilities between batches of calves
- Calves reared during an outbreak should be isolated for a minimum of 6 weeks

Vaccination

- As mentioned above this may be a useful option to reduce the severity and reduce mortalities in a herd
- Vaccinate cattle twice, 3-4 weeks apart followed by an annual booster around 3 weeks prior to calving to maximize colostral protection for neonatal calves
- Calves can be vaccinated at any age with two vaccinations 3-4 weeks apart
- Not 100% effective

Zoonotic potential

Salmonella is a serious disease with a great zoonotic risk, therefore strict hygiene practices need to be adhered to when working with animals with the disease.

Reference material:

Holschbach, C. L., & Peek, S. F. (2018). Salmonella in dairy cattle. *Veterinary Clinics: Food Animal Practice*, 34(1), 133-154.

Mohler, V. L., Izzo, M. M., & House, J. K. (2009). Salmonella in calves. *Veterinary clinics of North America: Food animal practice*, 25(1), 37-54.

Parkinson, T. J., Vermunt, J. J., & Malmo, J. (2019). *Diseases of cattle in Australasia: a comprehensive textbook*. New Zealand Veterinary Association Foundation for Continuing Education. Massey University Press, Auckland, 0745, New Zealand.