Salmonella

Summary:

- **Salmonella pathogens abundant in the environment including raw milk.**
- **Death rates in infected calves can be up to 100%.**
- **Highly contagious to humans.**
- **Symptoms often confused with rotavirus, cryptosporidium and *E. coli*.**
- **Confirmation by lab test.**
- **Treat with electrolytes and antibiotics.**
- **Cows can be vaccinated at 4 weeks prior to calving as a prevention.**
- **Prevention is ensuring calves receive good quality colostrum soon after birth.**
- **Acidifying to 4.2 pH or pasteurising fresh milk will kill pathogens.**
- **Vaccinations of calves can reduce an outbreak.**
- **Calves can become carriers of the pathogen after recovery**
- **Outbreaks in cows under stress can occur.**

Salmonella is one of those pathogens which are abundant in the environment and is often found in raw milk and when conditions allow can cause acute intestinal infection in both humans and animals. In extreme cases, calf rearing facilities can experience high levels of sickness and death with death rates as high as 100%.

Salmonella is also highly contagious to humans causing diarrhoea, abdominal cramp and high fever.

Salmonella usually affects calves from 2-12 weeks old and is mainly spread when infected calves ingest bacteria present in the environment, or in feed or water.

Symptoms:

- High temperature,
- watery to mucoid diarrhoea containing intermixed fibrin and blood and often has a foul odour,
- can be confused with rotavirus, cryptosporidium and E. coli

Outbreaks can be controlled by,

- confirmation by lab testing of faeces from 5 - 6 calves to obtain a good diagnosis,
- isolating affected calves, electrolyte and antibiotics treatment,
- good cleansing and disinfection procedures.

The first line of defence against salmonella infections in calves is strong passive immunity from colostrum. Data from a salmonella case study showed that calves with blood serum total protein values less than 5.0 had odds of dying 2.3 times higher than calves with blood serum total protein readings of 5.0 and above.

Predisposing factors for calves are stress and poor immunity in intensive rearing units with prevention of infection revolving around,

- ensuring calves receive adequate colostrum within the first 6 hours from birth, a good goal is 80 percent of newborns fed within two hours post birth and 95 percent within four hours,
- adding Rotagen Combo, which contains specific immunoglobulins, to milk can be used as a preventative and treatment.
- ensuring the rearing facilities are thoroughly cleaned out at the end of each season and sprayed regularly with a disinfectant,
- daily cleaning and disinfection of water troughs and practising good hygiene practices e.g. changing or disinfecting boots, changing clothes, and washing hands and arms between areas of healthy calves and sick calves and disinfecting equipment such as feeders used in the sick pen, if using gloves discard between sick and healthy calves, avoid stuffing gloves into pockets,
- feeding younger calves first, do not return to younger calves without thoroughly cleaning boots, changing overalls and washing hands and arms,

- pasteurising or acidifying milk. Raw milk often contains salmonella bacteria but can be killed by pasteurisation (common on many calf rearing operations in Europe and USA) and acidifying milk can kill salmonella and E. coli bacteria (see 'Abomasal pH and milk feeding'),
- minimising stress especially during transport, avoiding overcrowding during transport and in calf sheds,
- sourcing calves from vaccinated cows.

The Salmonella bacteria is capable of surviving in the environment and can remain infectious for many months in semi-dried faecal material that frequently gets left behind when calf sheds are not cleaned out properly. However, Salmonella are susceptible to drying and sunlight.

It is spread amongst calves

- by contact with other infected calves or their faeces,
- from bought in calves that have passed through sale yards carrying salmonella strains that that they do not have colostral immunity to,
- adult carrier animals who start shedding due to stress e.g calving,
- wildlife e.g birds fouling calf meal, rodents,
- sewage, uncontrolled sewage or contaminated water,
- Human carriers - transmission between animals to humans is common but human workers can also spread the disease to calves,
- Fomites – Salmonella bacteria can be carried on a range of inanimate objects from boots, tyres and feedstuffs to old bedding and buildings as well as contaminated milk and colostrum.

Infection is by the oral route and can occur at any stage, however peak incidence is at 7-10 days old. The incubation period is 24-48 hours and calves become rapidly sick and will often die within several days from Septicaemia without showing much in the way of signs apart from scours which range from yellow colour to bloody depending on severity of disease and is often very smelly.

When diarrhoea is a feature of the disease, there is often blood and mucus in the scour and calves will frequently fail to respond to normal scour therapy. Prompt treatment with electrolyte solutions and antibiotics is critical to the survival of the calf and to stop the spread of the disease through the calf shed. As salmonella can rapidly develop antibiotic resistance it is important to use the correct antibiotic at the correct dose to treat the disease.

A vaccine is available and if instigated in the early stages of an outbreak, will control the disease from around a week after vaccination. In subsequent seasons, vaccination should be given prior to the period of challenge, due to the difficulty of removing Salmonella completely from the environment.

Many calves carry Salmonella bacteria in their bowel, but inadequate immunity causes overgrowth of the bacteria and then infection. Salmonella is zoonotic and so can cause infection in humans so hygiene, isolation and care is needed if this bacteria is diagnosed as the cause of calf scours.

Older calves (2-6 weeks) with less severe infections may have faeces that are a pasty consistency, yellowish grey in colour but with little evidence of the dramatic changes that accompany the acute form of the disease. These animals commonly grow slowly and potentially become carriers by shedding the bacteria in the faeces.

For colostral protection of calves, ideally cows should receive an annual Salvexin vaccination around 4 weeks prior to calving.

Adult cattle can also be affected with outbreaks during high stress periods such as calving involving a significant proportion of a herd with devastating effects.

Affected animals present:

- A massive drop in milk production, depression, reduced feed intake, gaunt appearance, high fever (40 – 41^0 C).
- Diarrhoea containing blood, gut lining (RFM afterbirth), dehydration, severely affected animals become recumbent and may die despite aggressive treatment.

Treated early good outcomes can be achieved.

Staff working with an outbreak can also be infected increasing stress levels and time off work.

References: *Dairy NZ Calf Rearing Fact Sheet 2.5*
http://atticacows.com/library/newsletters/CEFebruary2013.pdf
https://www.vetent.co.nz/dairy-disease-management/salmonella.html
https://www.anexafvc.co.nz/sheepfactsheets/calf-scours-due-to-salmonella