

Salmonellosis

Cause

Salmonellosis is caused by the Salmonella bacteria. Of the approximately 2,500 different Salmonella bacteria, mainly two serogroups are of danger to cattle: serogroup D (including Salmonella Dublin) and serogroup B (including Salmonella Typhimurium). Other serogroups cause only occasionally diseases in cattle.

Animals become infected by the salmonella bacteria through the uptake via the mouth. The bacteria then enter the gastrointestinal tract of cattle, where they cause infections. From the gastrointestinal tract, the bacterium can spread into the body through the lymph system and the bloodstream. After an infection of the Salmonella bacteria, the animals spread millions of salmonella via the manure for a few weeks. The uptake of one gram of contaminated faeces is sufficient to cause disease in a healthy animal. The most sensitive age for infection is between two weeks and three months.

Symptoms

The clinical symptoms of salmonellosis in dairy cows may be comparable to clinical signs caused by other pathogens and can be easily confused with other diseases, such as BVD.

The animals usually show symptoms for two to five days. The percentage of diseased animals can vary in an outbreak. The clinical symptoms on a farm are usually observed for one to three months. Salmonella bacteria can be transmitted from animals to humans.

Both S. Dublin and S. Typhimurium, the two major serotypes for cattle, often cause fever (high temperatures of 41°C), diarrhea (sometimes with blood), rejection of fetuses and mortality. Young calves (up to three months) are especially susceptible to salmonella infection and the infection can easily pass from one to another. The infection may also follow a sub-clinical course (without clinical symptoms).

Infection Route

The infection is transmitted among farms through the purchase of cattle, mixing of animals, supply of contaminated manure, and transmission of manure due to visitors, equipment, tools, clothing, tools or instruments. Also with manure contaminated water, feed and milk can be a source of infection. Salmonella bacteria can live for a long time outside the animal. For example, the bacterium can survive in manure for several months, and in water even longer.

Within the infected farms, the infection is transmitted mainly by direct contact between animals or through contact with manure from infectious animals. Measures to minimize the risk of transmission, such as the separate housing of the different age groups, are effective. Young calves are very susceptible to salmonella, so avoid transmission to young calves.

Economic considerations and cost estimations

There are large differences in the severity of the infection between farms, and therefore also in the damage costs caused by an outbreak of salmonellosis.

An outbreak of Salmonella Dublin causes a farm with 100 cows an average economic loss of € 4,637, mainly due to mortality, treatment costs (veterinary costs), and costs related to animal death. If the farmer does not intervene directly, the costs will rise up to € 10.000,- per farm. The damage costs related to an infection of Salmonella Typhimurium are not exactly known (not enough data available).

Every year there are hundreds of clinical salmonella outbreaks in cattle in the Netherlands. A plurality of farms will become salmonella infected, however without clear clinical symptoms (subclinical course). Based on these figures, the economic damage due to Salmonella infections in cattle in the Netherlands is estimated to be approximately two million Euros per year.

Effects on humans

Salmonella infected cattle can infect human when they get into contact. Research showed that at approximately 20% of the farms with a clinical outbreak of Salmonella Dublin, also family members have clinical complaints. The most frequent complaint is diarrhea and sometimes fever. Also, on farms with an outbreak of Salmonella Typhimurium, the infection may be transferred to the farmer and his family.

Diagnosis of salmonellosis in cattle

A suspicion of salmonellosis, based of clinical symptoms, can be confirmed by the investigation of manure (faeces) or blood samples. The combination of bulk milk testing and sampling of blood samples from five calves, older than 90 days, are suitable to get an impression of the presence of a Salmonella infection on a farm showing any clinical symptoms at that time (subclinical course).

An animal suspected of Salmonellosis

The suspicion of salmonellosis can be based on clinical symptoms. An infection of Salmonella may be confirmed by faecal and blood tests. In the manure, bacteria can be detected and in the blood sample antibodies (antibodies against the bacteria). The diseased animal will excrete large numbers of Salmonella bacteria during the first few weeks after infection. In the period of two weeks after infection, antibodies against the bacteria can be detected in the blood.

In case the infection leads to rejection of the foetus, antibodies against salmonella bacteria can be detected several days after the rejection. After an infection, antibodies remain detectable in the blood for approximately six months. Due to the use of antibiotics, no bacteria can be detectable in the manure, despite the fact that the cow is still infected.

In some cases, the infected animals remain infected for a very long period. The bacteria remain present in the animal, and these animals are also known as 'carriers'. There are two types of carriers:

- 'Active carriers'; excrete the bacterium continuously in the manure, and the
- 'Latent carriers'; excrete the bacterium discontinuously in the manure.

Carriers can be detected by a combination of an examination of individual faecal and blood samples.

Examination of dead animals and rejecters

Dead animals and rejected fetuses can be examined on the presence of an infection by salmonella bacteria. As part of the Brucella abortus monitoring system in many countries, a blood samples needs to be collected, from the cow that rejected, within seven days after the rejection. In that case, the costs of blood sampling (veterinary costs), and the laboratory costs for the examinations, are paid by the Government. The same blood sample can be tested too for antibodies against Salmonella.

In the Salmonella Bulk Milk Program, the analyses of blood from rejecters can be combined with the bulk milk analyses for antibodies against salmonella.

A salmonellosis suspected farm

On many farms, Salmonella will cause infections with no obvious symptoms. An infection on these farms can be detected by the analyses of blood samples of five calves older than 90 days, in combination with bulk milk testing. This is the way to demonstrate a possible Salmonella subclinical infection.

Bulk milk investigations

The investigation of bulk milk samples is a simple method to gain an impression of the presence of a Salmonella infection on the farm, and forms the basis for a Salmonella Monitoring Program, and the associated Salmonella-free Certification Program.

Control of salmonellosis in cattle

What to do if your farm has been diagnosed as Salmonella-infected? It is advised to use the Salmonella Advice Document for infected farms, in which you will find a description of the seven steps that can help to control the infection.

Prevention

To lower the risk of salmonella infections, preventative measures will help you to reduce the introduction of infection and the spread of (possibly not yet noticed) infections within a dairy farm. Use the checklist "Salmonellosis on dairy farms" to determine the right measures to prevent the introduction of an infection.

Salmonellosis-unsuspected Certification Program

Farmers can monitor the salmonella situation of their farm with the Salmonella Monitoring Program, which is linked to the Salmonella Certification Program. In case the bulk milk testing is good (read: negative test results) twice in succession, the farm gets the "Salmonella unsuspected status". The farms with "Salmonella unsuspected status" have to analyse their bulk milk sample three times a year. The bulk milk is tested for antibodies against Salmonella bacteria, and blood from cows that rejected their foetuses is tested automatically on salmonella antibodies.

Combat Salmonella infections

After the introduction of salmonella bacteria on your farm, the infection may spread throughout the farm and may result in high fever, diarrhea, abortions and death. The farmer and family members can also become infected and get sick. The degree of spreading, and the duration of the infection will depend on the level of farm management. On most farms, the infection will end within 1 to 5 months after the start. The economic losses may rise up to € 10.000,-. Sometimes the infection stops spontaneously, without any special action of the farmer. In those cases, it is often not more than a small outbreak with a little number of sick animals where preventive measures have already been implemented.

A Salmonella infection on a dairy farm is distinguished between the "Outbreak phase" and the "Persistence phase". The "Outbreak phase" is the period in which clinical signs are observed. This period lasts for one to five months.

Not all farms with a salmonellosis outbreak undergo the "Persistence phase". On a large part of the farms with an outbreak, the infection stops spontaneously, and therefore these farms do not undergo a persistence phase. It is estimated that the infection on three-quarters of the farms with a salmonellosis outbreak, disappears within a year, thanks to good farm management. On the other one-quarter of farms, persistency of the salmonella infection occurs.

The approach of the salmonellosis during the outbreak phase is focussed on limiting the damage and the prevention of further transmission of the infection. The actions in this phase are therefore focussing on reducing the level of infection. This requires a plan of action that can be prepared in consultation with the veterinarian. In addition, it is advised to take measures to avoid that the infection will persist on the farm. These measures should also be described in the plan of action.