Eradication of swine dysentery via biosecurity and medication

Swine dysentery is still one of the most important diseases in the modern pig industry worldwide. Infections with Brachyspira hyodysenteriae have a significant negative impact on several technical parameters such as daily growth, feed conversion and mortality rate and result in increasing treatment costs.

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Furthermore, infected pigs are difficult to market because of the high risk of spreading further. For decades, the long survival time of the pathogen in the surrounding environment and the asymptomatic carriers pose a real challenge to deal with this enteric infection.

Therefore, eradication is the best option to overcome the subsequent high economic losses. Each eradication programme should always be based on a combination of biosecurity and a medication programme, both going hand in hand.

Symptoms

The clinical symptoms of dysentery in the pig shed, the farm history and the typical lesions at necropsy give a first indication of its presence.

Easily recognisable symptoms of a B. hyodysenteriae infection are a bloody, mucoid diarrhoea together with a different consistency and colour of the faeces.

However, blood is not always observed and a large number of pigs are even subclinically infected, showing no obvious symptoms at all.

The pathogenicity of B. hyodysenteriae depends on the virulence factors of the strain. The infection spreads slowly through the pen. When performing a necropsy, a fibrinic-necrotic infection of the large intestines with oedema of the mesenterium and swollen lymph nodes is observed, mostly accompanied by a bloody content.

B. hyodysenteriae is the most pathogenic of all spiral-shaped, haemolytic Brachyspira species with an anaerobe metabolism. Symptoms caused by B. pilosicoli are milder and are described as Porcine Intestinal Spirochaetosis.

Recently, B. hampsonii was isolated, also demonstrating a significant impact on technical performance. Laboratory testing is required for a final confirmation.

Fresh faeces samples or large intestine tissue should be sent to the laboratory under anaerobe conditions in a well-stocked and sealed receptacle immediately.

Different laboratory techniques can be applied: culture on specific media, Polymerase Chain Reaction test, immunofluorescence and histopathology.

Any suspicion or positive diagnosis of 'haemorrhagic' colitis requires quick intervention of the pig veterinarian in order to reduce further economic impact.

Antimicrobial treatment should be initiated as soon as the first symptoms occur.

Epidemiology

Pigs may appear clinically healthy after the initial treatment but, unfortunately, subclinical carrier pigs can excrete the organisms for more than three months after 'healing'.

The organism is spread from faeces to mouth. Both pigs with clinical symptoms, as well as the above mentioned subclinical carriers, can introduce the disease on dysentery-negative farms by faecal shedding.

Contaminated footwear and equipment transmit the infection easily. Brachyspira survives for several months in the faeces in the environment and in the manure under cold and wet conditions.

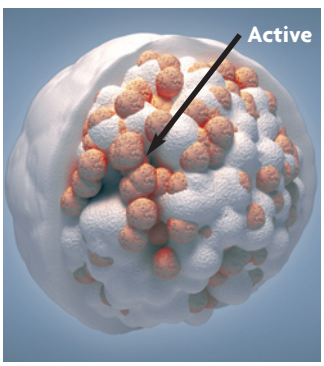
However, in a dry and warm environment, the survival time falls dramatically.

The period between the intake of the pathogen and the first clinical symptoms can vary from 10 days to three months. Hence, relapses are frequently observed in the field. Repetitive antimicrobial treatments are frequently initiated. However, medication alone is not sufficient to stop dysentery in the long run.

Taking into account this typical epidemiology, one can better understand why biosecurity is also crucial to control swine dysentery.

Clinical case of dysentery (courtesy of Dialab).

Microgranulation of Vetmulin premix.



Biosecurity

Both external and internal biosecurity should be optimal and implemented before the start of an eradication programme in order to reduce the risk of introducing the pathogen in a farm and to avoid further spreading within a positive farm. Planning ahead is key to stop the faecal-oral infection route successfully.

External biosecurity

The health status of purchased animals needs to be certified and all quarantine rules respected. A strict distinction between possible 'dirty' vectors (such as trucks, persons, boots and materials) that may be transmitting the bacteria and the 'clean' herd by clearly indicated barriers is indispensable.

Make sure that trucks entering the farm are cleaned, disinfected and dry and that the drivers do not enter the house when pigs are loaded.

The place for the disposal of cadavers should always be properly cleaned and disinfected. A single entrance with a shower as well as overalls and boots provided on farm are a must to avoid (re-)introduction of the pathogen.

Internal biosecurity

Correct cleaning, disinfection and drying of the environment is key to stop further transmission within the farm, along with a strict all-in all-out policy and vacancy management.

Footbaths and general hygiene in the sheds and in the adjacent areas are crucial. Rodent control should be established in advance as the pathogen can survive for up to six months in mice and two days in rats. Dogs, cats, birds and flies can also transmit the bacteria and should be kept away from the herd.

Stress caused by high density housing, mixture of animals, feed changes, inappropriate climate control and concurrent enteric infections facilitate outbreaks of dysentery. Daily tasks should be

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performed with respect of the logical work lines. The sows should be washed and the slurry pits emptied before the start of the elimination programme.

Eradication

Eradication is by far the most effective and cost-efficient way to improve technical performance, depending on the severity of the clinical symptoms. Each eradication protocol should be based on the farm-specific production system. Logically, indoor housing, multi-site pig production and batch farrowing systems increase the success rate.

On the other hand, group housing of sows favours further spreading. A tailor-made programme should be written down and all biosecurity measures and the exact instructions for treatment should be mentioned.

The reason for each separate step of the protocol should be clearly explained to all the farm staff and evaluated on a regular basis.

As these bacteria do not like dryness and hot temperatures, summertime is the ideal season to install the programme.

There are three options to eliminate dysentery:

- Total depopulation and repopulation.
- Eradication by strategic medication:
  - On farm establishment of strict physical barriers.
  - Partial depopulation of all weaned pigs and fatteners.
- Treatment of all animals present.

Total depopulation and repopulation

Total depopulation and repopulation with Brachyspira-free pigs after thorough cleaning and disinfection of the whole farm. The premises should be kept empty for at last two weeks. This is the most straight-forward method of disease eradication but, unfortunately, it also means a high economic gap, due to cessation of production.

Eradication by strategic medication

The cash flow disruption is less with this alternative due to lower production losses and the maintenance of the genetic potential and parity profile of the sows. Diseased pigs should be removed from the herd before the start of the medication programme. New animals should preferably not be introduced on farm during the treatment period.

After initial stabilisation of the symptoms of diarrhoea, the programme requires an oral treatment of all sows present on the farm and the injecting of suckling piglets.

- Administration of tiamulin hydrogen fumarate in feed or drinking water of the sows for eight weeks:
  - First four weeks: 8.8mg/kg bodyweight/day.
    → Elimination of the organism from the animals.
  - Last four weeks: 5mg/kg bodyweight/day.
    → Stops re-infection and allows the bacteria to die out in the environment.
  - Pigs refusing to eat during the treatment should be injected or removed from the herd.

- Injection of suckling piglets (at 10mg tiamulin hydrogen fumarate/kg bodyweight)
  - Every fifth day starting from birth.
  - For the first four weeks' treatment period of the sows.
  - Preferably weaned at three weeks of age.

Table 1. Protocol of eradication by strategic medication.

An antimicrobial susceptibility test should be performed as a decreased susceptibility to some antimicrobials is sometimes noted. Most strains are sensitive to pleuromutilins such as tiamulin (Vetmulin, Huvepharma).

The determination of the Minimal Inhibitory Concentration (MIC) of an antimicrobial for the detected strain of B. hyodysenteriae is a tool to check the susceptibility. However, there is no standardised test method for Brachyspira and the results should be interpreted with care.

Often, isolates showing a MIC ≤1µg/ml are reported to be susceptible to tiamulin, whilst an MIC >4µg/ml is sometimes considered to indicate resistance.

Tiamulin reaches very high concentrations in the colon where Brachyspira infections occur and is classified by the World Health Organization in the lowest level of importance for resistance development in humans.

In case of decreased susceptibility, the synergistic combination of tiamulin with apramycin (Apravet) or doxycycline (HydroDoxx/Doxx-Sol) can significantly lower the MIC values and improve efficacy.

During eradication, daily cleaning and disinfection should be performed. This higher biosecurity level and the antimicrobial treatment also facilitate the control of concurrent infections such as mycoplasma. The treatment protocol can be summarised as shown in Table 1.

The main goal is to finally have negative progeny originating from a negative sow herd. Piglets born after the medication programme of the sows are dysentery free and should always be transferred to perfectly cleaned and disinfected pens.

Contact between 'clean' and 'dirty' compartments can never be tolerated, underlining once again the enormous importance of strict biosecurity. Cleaning tools marked with different colours can be used for specific pig houses.

Eradication by strategic medication can be performed in two ways:

- On farm establishment of strict physical barriers. These barriers should be installed between compartments housing:
  - Dysentery-free pigs born after the medication programme of the sows.
  - Pigs that are possibly still clinically or subclinically infected.

Some pigs might be moved to another location to create the obligatory vacancy. The younger dysentery-free pigs should be inspected first and, afterwards, the older pigs, which are still possibly infected. The herd can only be declared negative when the last dysentery-positive pigs are removed.

- Partial depopulation of all weaned pigs and fatteners with a strict implementation of the above mentioned protocols.

Treatment of all animals present

The feasibility is determined by the herd size.

Treatment

Huvepharma has more than 60 years of expertise in fermentation and formulation of antimicrobial products, guaranteeing optimal efficacy in the field.

Vetmulin (tiamulin) is presented in several formulations meeting the requirements of each field case:

- The water soluble granules and oral solution show a perfect solubility and 24 hour stability in water of differing hardness, pH and temperature.
- Vetmulin premix and oral granules are produced by a unique microgranulation technology, ensuring that tiamulin is fully embedded in a matrix of starch.

Compared to simple powder mixtures, this technology offers four benefits:

- Perfect homogeneity in the final feed → efficacy.
- Less risk of carry-over and subsequent cross-contamination → safety.
- Better flowability → easy administration.
- Protection against heat and moisture → stability.

- The injectable formulation offers a perfect way to start the treatment which can be followed by oral therapy.

Tiamulin is a time-dependent antimicrobial resulting in improved efficacy when bacteria are constantly exposed to the drug. To guarantee optimal results, dosing should be based on bodyweight, regardless of the application form.

Incorrect dosing is avoided by taking into account the changing ratio of bodyweight versus water or feed intake. Correct dosing can easily be achieved with the Huvepharma dose calculator. This free of charge and handy application can be downloaded on all mobile devices.

Conclusion

Brachyspira eradication is the best option to improve the commercial feasibility of pig farms dealing with recurrent dysentery outbreaks. Therefore, a well-considered combination of different biosecurity measures and a strict antimicrobial therapy programme should be initiated.

With the full commitment of all the staff, elimination always results in a higher health status, improved technical performance and animal welfare, whilst reducing the repeated use of antimicrobials.

Huvepharma is your reliable partner for advice on the control of dysentery and farm specific eradication programmes. ■

The Huvepharma dose calculator.