

Feeding to reduce *S. suis*

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As well as problems with enterotoxigenic *E. coli*, more problems related to *Streptococcus suis* (*S. suis*) infections have seemed to occur in the Dutch swine sector over recent years. In other countries this *S. suis* bacteria is also reported to cause health problems.

The most striking features of *S. suis* infections are early nervous signs like inco-ordination, inability to stand and staring eyes all caused by meningitis. Other manifestations are pneumonia, septicaemia, arthritis and endocarditis.

Streptococcus suis is reported to be found in tonsils and nasal cavities, intestines, faeces and in the genital tract.

More than 34 different serotypes of *S. suis* have been described. Worldwide, mainly type 2 is isolated from diseased pigs. Type 9 is most frequently isolated in The Netherlands, Belgium and Germany, while in the UK mainly type 14 is causing problems similar to type 2.

Transmission of *S. suis* infection occurs mainly through nose to nose contact, but is also transmitted by air, fomites, flies and humans. For serotype 2 it is shown that it can survive in faeces at 22-25°C (nursery room temperature) for eight days. In this way, faeces are an important risk factor in the spread of *S. suis*.

Other predisposing factors for *S. suis* problems are suboptimal conditions, for example, poor housing with inadequate ventilation leading to respiratory problems, but also overcrowding, excessive temperature fluctuations and mixing of litters.

Not all *S. suis* bacteria have virulence factors, however, they still cause health prob-

lems. The most important virulence factors known in type 2, found in European, but not in North American strains, are capsular polysaccharide (CPS), muramidase released protein (MRP), the extracellular factor (EF), haemolysin or suilysin and some adhesins. *S. suis* is able to induce an important release of pro-inflammatory cytokines.

Recently new methods like PCR became available to detect and differentiate the *S. suis* type 1, 1EF, 2, 2EF, 7, 9 and 14. In 10-14kg pigs it was shown that *S. Suis* type 2EF was able to pass the intestinal wall to mesenteric lymph nodes and to affect internal organs. This indicates that for *S. suis* the intestinal tract can be a route of entry.

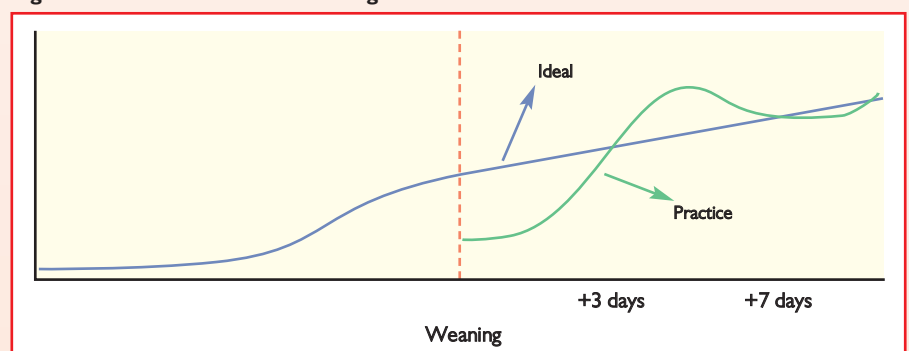
Effect of feed

In practice *S. suis* related problems mainly occur in week 2-4 after weaning in the heaviest piglets that have a high feed intake in relation to their body weight. Normally this kind of piglet has been drinking high levels of sow milk before weaning and adapts slower to solid feed after weaning.

As a consequence of a too low feed intake immediately after weaning, villous atrophy occurs. Subsequently, the gut wall has to recover in the days thereafter. This can also occur later on when the transition from one feed to another feed is too abrupt, causing a reduction in feed intake for a few days, followed by over consumption.

When piglets start eating large quantities of feed, relative to their body weight, the blood and oxygen supply to the gut wall could become limiting (hypoxia).

Fig. 1. Feed intake around weaning.



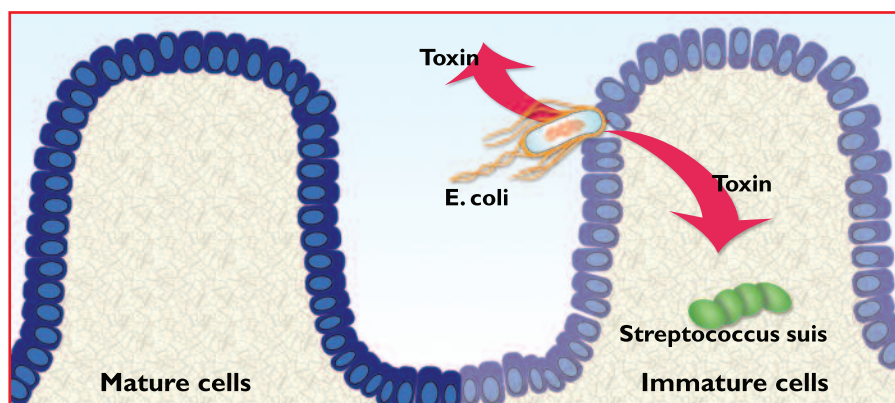


Fig. 2. Condition of intestinal cells determines the resistance against diseases.

Anaerobic metabolism with lactic acid production is necessary to fulfil the need for energy. This reduces the pH of the gut wall. This effect is reinforced in piglets with respiratory problems, because they have more trouble in excreting the carbon dioxide.

Due to the pH reduction, the permeability of the gut wall is increased allowing pathogenic bacteria like *S. suis* and toxins of *E. coli* to pass to the blood and internal organs.

In addition, toxic elements like ammonia produced through fermentation of undigested protein (at the end of the small intestine) can increase the permeability of the gut wall. In fact an adapted feeding concept is needed to prevent a too high permeability of the intestinal wall.

In 2006 Denkavit, being a specialist in young animal feed, decided to investigate whether the problems of *S. suis* infections could be reduced with a new feeding concept. For 18 months a safe feeding programme was followed on 12 different farms, housing in total more than 7,000 sows.

The programme starts with a prestarter, which is a very palatable and easily digestible 2mm pellet, containing a high level of dairy products and energy (11,6 MJ NE). From 2-3 days until approximately 24 days after weaning piglets are fed with safe diets low in crude protein but high in digestible protein.

Consequently, less undigested protein is available for bacterial fermentation.

Furthermore, ingredients are selected which slow down the emptying of the stomach allowing more time for protein digestion in the stomach.

A carefully chosen mix of acidifiers (Denkacid), yeast cell walls and plant

extracts helps to manage the microbiota and to prevent pathogens like *E. coli* attaching to the gut wall and producing toxins.

From approximately 3-4 weeks after weaning, when the most critical period for *S. suis* infections has passed, the piglets can be fed with a diet corresponding to the previous safe diets but now more focused on growth.

Practical results

On the farms using this new feeding concept, the most important observations included:

- A high feed intake directly after weaning.
- A gradually increasing feed intake thereafter.
- Better consistency of the faeces.
- Better vitality and colour of the piglets.
- Optimal growth.
- A 60-70% reduction of medication costs.
- More pleasurable working conditions on the farm.
- A better quality starter pig at the beginning of the fattening period.

Conclusion

Presently the safe feeding concept is being used in the Netherlands on many farms and much interest is arising in other countries as well.

It should prove to be the way forward in reducing the use of antibiotics on farm and to create a profitable but above all a sustainable pig sector. ■

Fig. 3. The Denkapig safe-line programme. Feed usage: 0.7kg prestarter, 3.5kg link feed safe, 6.5kg starter 1 safe and 23kg starter 2.

