Optimising breeding herd performance for profitable production

A simple literature search will show that much has been written about the importance of optimising the sow unit and often the topic relates to best practice management and feeding. The performance of the breeding herd is an integral part of profitable production.

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Maintaining or optimising the sow unit does require an ongoing focus on proper management, correct nutrition and a willingness to try new and different solutions when needed.

When considering the different phases of the breeding cycle, it is obvious that each phase has different nutritional requirements and objectives. The correct integration of gilts can have a lifetime effect on subsequent performance.

Gestating sow diets influence foetus development and growth, whereas lactation diets focus on milk production and maintenance of body condition. The commonly recorded parameters, such as number born alive, still born, pre-wean mortality and sow body condition, are all influenced by the above. Feed additives, such as probiotics, can also play a part.

Probiotics – mode of action

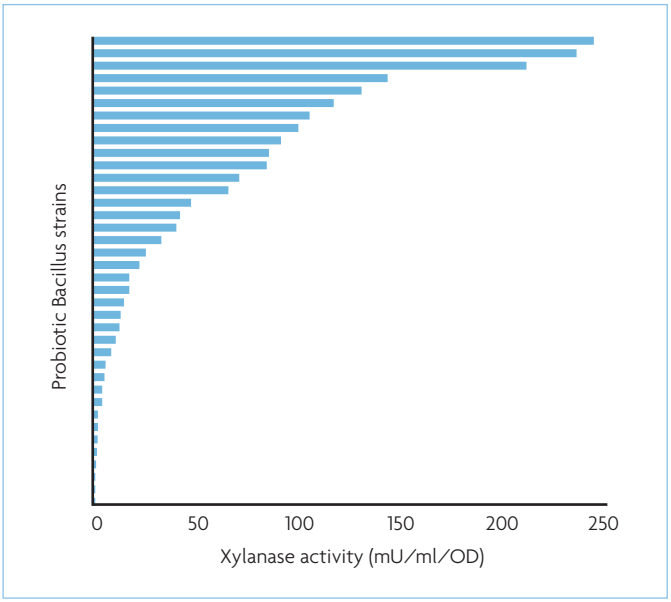
The feed additive market is growing, and it is often seen that feed additives are used in sow diets.

Probiotics are one of these additives and many probiotic products consist of Bacillus spp. These bacteria excrete enzymes into the surrounding environment as part of their lifecycle. These enzymes can degrade fibres and protein in the gastro-intestinal tract (GIT) to small molecules which are transported into the bacterial cell.

This break down of nutrients by the bacteria is similarly beneficial for the pig as more nutrients will be available for it to use.

However, the level of enzymes excreted differs among Bacillus strains. Not all strains are capable of excreting enzymes to a level where the host animal can benefit from it. Fig. 1 shows variability of the activity of xylanase secreted by various Bacillus strains.

Fig. 1. Xylanase activity secreted by different Bacillus spp. strains.



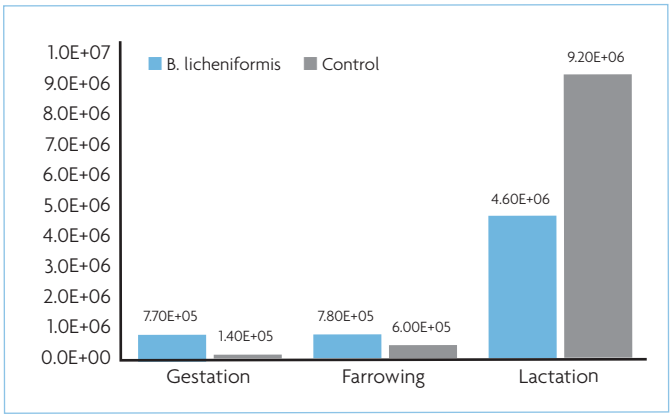


Fig. 2. Effect of feeding Bacillus licheniformis to lactating sows and shedding of Clostridium perfringens in faecal matter of sows. Results from a study including 5,000 sows.

Furthermore, probiotics can help to prevent GIT disorders in pigs caused by pathogens and improve the performance of the animal.

This is possible as the epithelial surface of the intestines and the content in the lumen of the GIT is affected by various mechanisms of probiotics.

It has been shown that probiotics stimulate both the innate and the acquired immune functions.

The suppression of enteric pathogenic growth will enhance the functionality of the GIT of the sow. Probiotic supplementation will also result in more lactic acid bacteria and fewer harmful bacteria shed through her faeces into, for example, the farrowing pen. This will lead to a more favourable environment for the suckling piglets, helping them to get a better start in life.

Fig. 2 shows the effect of feeding Bacillus licheniformis (DSM5749) to sows and the shedding of Clostridium perfringens in the faecal matter.

What is shown is that the addition of Bacillus licheniformis (DSM5749) to the lactation feed lowered the shedding of clostridia which reduced the prevalence of clostridial related diarrhoea among the piglets in the farrowing pen. This result might look different if another Bacillus licheniformis strain or probiotic strains were chosen.

Not all Bacillus licheniformis bacterial strains will behave in the same way, so selecting the right strains really does matter.

When feeding spore-forming Bacilli to sows, the bacteria germinate in the GIT, multiply and form further spores, which can then be found in the faeces of the sows. As the suckling piglets perform their natural rooting behaviour they can ingest some of these spores, thus supporting the development of their own gut microbiota and performance.

Microbiota

Today, much research is performed to try to understand and map the microbiota in the pig gut and to determine what a healthy microbiota looks like.

It is said that the microbiota is fully developed when the piglet is about 10 weeks of age and it is known that the composition as well as the size of the microbial community differs between the different compartments of the digestive tract.

The microbiota is, however, not static. It will change and fluctuate

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over time especially during its development.

Probiotics can help stabilise the microbiota in the gut making a more diversified bacterial community and, just like excretion of exoenzymes, the degree to which probiotics consisting of Bacillus spp. do this will vary between bacterial strains.

But what does it really mean to have a stable, healthy gut? First, it means that the gut is balanced in terms of pH and the microbiota consists of beneficial bacteria, so pathogens are kept out.

Looking at the pig from the outside it can be difficult to see when the gut is completely in balance. It is easier to see when it is not, for example diarrhoea and reduced performance will occur.

This goes especially for piglets in the farrowing pen and around weaning but, as Fig. 2 shows, it can also have an impact on the pathogens shed by the sow.

Sow performance

Going back to the beginning of this article to look at sow performance and how to optimise this, a solution could be Bacillus-based probiotics as these have been found to have a positive effect.

Studies performed with a Bioplus dual strain probiotic consisting of Bacillus subtilis (DSM 5750) and Bacillus licheniformis (DSM 5749) fed to sows has been shown to have a positive effect on the performance of sows and her offspring.

As shown in Table 1, sow performance in terms of return to oestrus and number of non-productive days were lowered by adding these two strains to her diet.

	Probiotic *	Control
Return to oestrus (%) **	3	4
Non-productive days (No.) **	10	9
Stillborn piglets (No.) ***	1.3	1
Pre-weaning mortality (%) ***	14	10

* Bacillus subtilis (DSM 5750) and Bacillus licheniformis (DSM 5749)
** Results from a meta-analysis including 12,907 sows
*** Results from a study with 274 sows

Table 1. Effect on sow performance and performance of suckling piglets when Bacillus subtilis (DSM 5750) and Bacillus licheniformis (DSM 5749) were added to the sow diet.

Also shown in the table is the performance of the suckling piglets.

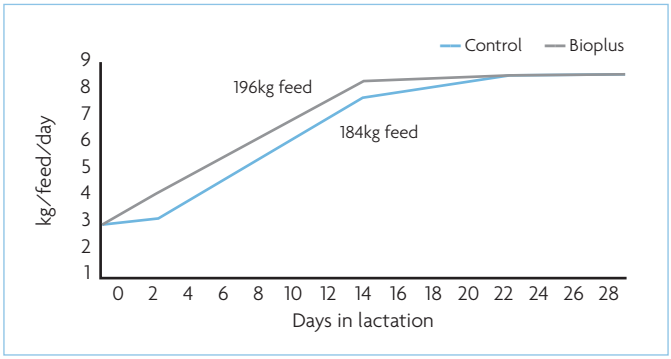
In addition, the number of stillborn piglets was lowered when these strains were fed and the pre-weaning mortality was reduced from 14% to 10%.

The suppression of enteric pathogenic growth will enhance the functionality of the GIT of the sow. Probiotic supplementation will also result in more lactic acid bacteria and fewer harmful bacteria shed through her faeces into, for example, the farrowing pen.

This will lead to a more favourable environment for the suckling piglets, helping them to get a better start in life.

Fig. 2 shows the effect of feeding Bacillus licheniformis (DSM5749) to sows and the shedding of Clostridium perfringens in the faecal matter.

Fig. 3. Feed intake in lactating sows fed Bacillus subtilis (DSM 5750) and Bacillus licheniformis (DSM 5749).



What is shown is that the addition of Bacillus licheniformis (DSM5749) to the lactation feed lowered the shedding of clostridia, which reduced the prevalence of clostridial-related diarrhoea among the piglets in the farrowing pen

A reason for these improvements could be that feeding the strains to sows has been shown to increase her feeding curve after farrowing compared to sows not fed the strains (Fig. 3). Getting her up in feed level fast after farrowing will have a positive effect on her milk production.

Sows fed Bacillus subtilis (DSM 5750) and Bacillus licheniformis (DSM 5749) have been shown to wean heavier piglets compared to sows not fed these strains. Having this is mind, together with improved performance of the suckling piglets, it can be concluded that feeding these strains to sows can help facilitate weaning as it is generally recognised that a piglet doing well before weaning is more likely to do well after weaning. ■