Rice-based diets support piglet digestive health and performance

There are many challenges facing pork production at present but, despite these, Robert Hoste, pig production economist from Wageningen University in the Netherlands, believes that global pig meat production could increase from 120 million metric tonnes (MMT) to 180 MMT by 2050. However, this growth is dependent on optimising factors like production management, feed quality, swine health protocols and genetic stock.

by Karel Thurman, Commercial Director of Animal Nutrition, BENEO. www.beneo.com

During early life, piglets face many social, environmental and dietary stresses that can have an impact on their growth performance, as well as increasing the risk of digestive disturbances.

This article discusses how feed producers can support piglet health and growth using rice ingredients, helping boost both long-term performance and farmer profitability.

Piglet weaning and feed transition impact long term performance

According to recent data from Eurostat, the number of breeding sows has remained fairly static recently, showing a small 0.5% decrease in number to 11,269,000 in Europe over the last year.

However, over the years the average litter size of sows has increased and there has been a reduction in piglet birth weight, with an increased proportion of small piglets (less than 1.0kg birth weight) in large litters. The long-term effects of a low piglet birth weight are higher morbidity and mortality, and lower growth rates.

Weaning weight is also an important influencing factor of post-weaning growth, morbidity and mortality. According to a study by Main et al., 'variation in weaning age can be a major contributor in live weight at the end of finishing, with weaning ages of 12, 15, 18 and 21 days compared and results showing that earlier weaning ages are associated with lower weights'.

Notably when farmers practice 'early' weaning to achieve a quicker return to oestrus and improve fertility for the sow, piglet weight can be negatively influenced. So, the challenge is how to achieve the best performance for both the sow and her piglets if early weaning occurs.

Like any young animal, piglets are sensitive to digestive disturbances. This is because their digestive tract and immune system are not fully functional and the intestinal microbiota is not yet well established.

Add to this the environmental stresses and contact with pathogenic organisms and it is no wonder that the switch from sow's milk to solid pre-starter formula feed can trigger a range of digestive issues, impacting both piglet health and long-term performance (for example, time to slaughter).

According to Professor Jana Seifert from the University of Hohenheim, the piglet's immune system is not complete until six weeks of age. At this stage they have a more established microbiome, both in the gut and on the skin, and the immune system can tolerate a greater concentration of illness-provoking viruses and bacteria in the environment.

By this time, it is possible to support piglets' growth and digestive health by switching them to a rice-based feed.

Improving diet digestibility and piglet growth performance

Compared to wheat, corn, tapioca and potato, rice has a very small starch granule size (2-8µm) and presents a neutral taste that is palatable for piglets. The unique granular structure of its starch fraction allows rice flour to be a highly digestible ingredient, making it of particular interest for use in feed for sensitive or young animals such as piglets.

While most cereal ingredients are further processed or cooked to gelatinise the starch and improve their digestibility, the rice flour can either be included raw or cooked, as in both states it is highly digestible.

In a digestibility trial, cooked corn was substituted with raw or cooked rice in feed for weaned piglets. The results showed a marked improvement in the average daily feed intake and apparent total tract digestibility for the piglets consuming the rice-based diets. Alongside improved digestibility, the research also showed that replacing corn with rice in piglet diets also significantly improved average daily growth and growth-to-feed ratio.

On top of benefitting from a highly

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digestible solution pig producers also get the opportunity to finetune the speed of digestion via the choice of rice variety used in their piglets' feed. According to research, using a rice variety with higher amylose content – such as indica – led to slower digestion rates than if a waxy rice variety with no amylose was used.

The slower digestion rate also achieved lower blood glucose levels, a factor that was accompanied with improved piglet growth performance. The impact that rice flour can have on piglet development has been further analysed by BENEO in trials where standard commercial piglet feed was compared with one containing 6% BENEO rice flour.

The results showed that piglets fed a diet containing rice flour had an average daily weight gain that was 7% higher than those on the standard feed.

In addition to its starch, rice flour contains a certain percentage of protein, that is an easily digestible source of plant-based protein with a well-balanced amino acid profile. Rice flour also has low ash and fibre levels (maximum 1% each).

This is important as too high ash levels in feed can degrade its quality and lead to intestinal disturbances. Additionally, high fibre content dilutes the energy and protein content of the feed, which is not optimal for maximising growth performance of production animals.

Rice-based diets support piglet digestive health

As well as promoting growth performance, the inclusion of rice in feed has been linked to a significant reduction in piglet removal rate. It has also been shown to be supportive for piglets facing various diseases, including postweaning colibacillosis (PWC), porcine intestinal spirochaetosis (PIS) and swine dysentery.

Many hypotheses have been put forward as to why this is the case. These include the fact that the high digestibility of rice flour and its low fibre content both decrease the amount of undigested substrates that reach the large intestine and that could be available for fermentation and growth of E. coli or other pathogenic strains.

Also, the low allergenicity of rice protein means it is well tolerated and generates low or even no digestive inflammation – which can be another noted cause of diarrhoea. Alternatively, there is the 'unknown health factor' or 'rice factor', which is the unconfirmed component of white rice that may play a role in reducing the incidence of diarrhoea.

None of these hypotheses alone, or in combination has – as of yet – been confirmed. Although research is ongoing to isolate why rice-based diets are effective in supporting healthy growing, day-to-day farming practices show that including rice in piglet diets may help with maintaining their digestive health and performance.

Rice flour is an ideal ingredient for piglets

BENEO's rice flour is an ingredient of choice for piglet feed, as it is highly digestible, has low levels of both ash and crude fibre contents and is a source of high-quality protein. On top of its nutritional benefits,

BENEO's rice flour shows good palatability in piglets.

Overall cereal taste is key in feed design and piglets show a preference for clean, soft flavours. In research conducted by Solà Oriol et al., rice-based diets were highly preferred by piglets compared to other cereal diets.

In addition, at BENEO, close attention is paid to the production process of rice flour to ensure the highest quality of the ingredient: from the transportation and control of the non-GMO raw material, to its controlled dry milling and sieving to ensure reproducible granulometry, and consequent stable digestibility.

In an era where antibiotics are banned from in-feed use, choosing the right selection of highly quality and functional ingredients is even more paramount to ensure a smooth weaning process and better animal performances. In contrast to wheat and maize, rice has not long been recognised as valuable ingredient for piglet formulation.

However, thanks to greater insights and a better understanding of digestion kinetics and the benefits of including rice flour to improve growth performance, this has changed and now feed formulators across the world are increasingly seeing the value of incorporating rice flour into the diets of young piglets. ■