

Practical nutritional strategies to improve the gut health of piglets

Over the last two decades, intense genetic selection for increased sow prolificacy has significantly increased litter size at birth and weaning. While this is positive from a production standpoint, the increase in piglet numbers is also associated with a higher proportion of light-weight piglets in the litter, increased mortality rates and reduced lifetime growth performance.

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Pig producers throughout Europe are now also faced with the new challenge of zinc-free feeding, whereby the use of therapeutic zinc is no longer permitted to prevent and control post-weaning diarrhoea.

One way of trying to lessen these challenges is to ensure that piglets get off to a healthy start as soon as possible after birth because, as the saying goes, 'a piglet will never get over a good or a bad start'.

A healthy piglet will be capable of reaching its maximum growth potential and require less antibiotic treatment over its lifetime, therefore reducing reliance on antimicrobial use. Subsequently, overall farm productivity and producer profitability will be increased.

The key to producing strong and vigorous piglets is to promote gut health and development in early life. Gut health is a complicated topic but simply put, metabolism, physiology, disease defence and growth are all fundamentally linked to the gut. If the gut is not healthy and functioning optimally, the piglet's health, welfare and performance will suffer.

Given the challenges faced by pig producers across the globe, there is a need to develop novel nutritional strategies that both support gut health and development and help to ameliorate the multitude of issues associated with the weaning transition.

This article focuses on practical nutritional strategies that can improve the gut health and growth of pre- and post-weaned piglets for lifelong performance.



Protein for piglets

Weaning is undoubtedly a very stressful event for piglets, as they try to quickly adjust and adapt to new nutritional (a move from milk to a cereal-based diet), environmental (new pen mates and housing conditions) and psychological (separation from the sow and mixing with unfamiliar pigs) changes.

To successfully ease the transition from a milk diet to a predominantly cereal-based pelleted diet and minimise the 'growth check' that pigs experience during the immediate period post-weaning, producers incorporate highly digestible and palatable feedstuffs into piglet diets.

The effect of diet on pig performance largely depends on dietary ingredient choice, with diet composition regarded as one of the primary factors affecting gut integrity and microbiome development during early life.

As such, a good intake of an easily digestible diet will enable their guts to develop correctly, resulting in increased feed intake and growth, improved feed efficiency and minimised digestive disorders post-weaning.

Piglet diets are typically formulated to contain 30-60% cereals (cooked or

processed), as much as 15% soybean meal and 20% milk products. High-quality protein ingredients, such as whey, skim milk powder, soybean meal and, where approved, fish meal or plasma protein, are formulated into piglet diets to boost pig growth after weaning.

However, the recent sharp rise in the cost of certain protein sources, coupled with the fact that many countries have banned or restricted the use of fish and blood meal in piglet diets due to concerns over depleted fish stocks and bovine spongiform encephalopathy, has meant that alternative protein sources are increasingly important.

Yeast-derived ingredient for piglets

As previously mentioned, optimal pig growth performance is largely determined by dietary ingredient choice, with diet formulation often being the difference between a healthy start and a challenging one.

Therefore, the nutrition programme for young pigs should be designed to provide ingredients that stimulate feed intake, support the immune response and maximise growth in the pre- and post-weaning period.

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This is where NuPro, a yeast-derived protein (YDP; Alltech), can play a central role. This YDP is a consistent, easily digestible and traceable high-quality protein source with essential nutrients, developed to support the early stages of a piglet's life and drive performance.

NuPro is also rich in proactive properties, such as nucleotides, inositol and glutamine, which support piglet performance in early life. The benefits of these compounds include:

● **Nucleotides:**

Nucleotides are organic molecules that are the building blocks for producing nucleic acids such as DNA and RNA. These nucleotides provide cellular energy in the form of adenosine triphosphate, act within the cell signalling system and contribute to glycogen and glycoprotein synthesis. The nucleotides in yeast are considered an essential nutrient for the rapid growth of animals.

● **Inositol:**

Inositol plays a central role in nerve function, the maintenance and repair of the cell membrane, the breakdown of fats and hormone production – all of which are important in the development of the young animal at weaning. Furthermore, inositol helps prevent disturbances in the gastrointestinal tract during periods of stress, which is commonly seen around weaning.

● **Glutamate:**

Glutamate is a highly abundant free amino acid in milk and intracellular fluid and has several important functions in young animals. Glutamate provides energy to the gut tissue; is a key regulator of gene expression, cell signalling, and anti-oxidative reactions; and is considered essential for intestinal function, especially in immature animals. This amino acid also increases palatability and is, therefore, included in nursery and starter diets to promote nutrient intake around weaning.

Several research and commercial studies

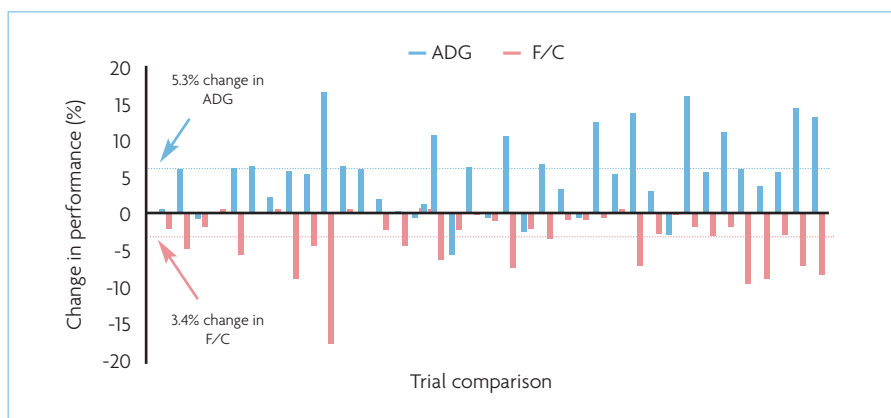


Fig. 1. An improvement in average daily gain (ADG) and feed conversion (F/C) in pigs with the dietary inclusion of NuPro yeast-derived protein.

have demonstrated the benefits of the dietary inclusion of NuPro. For example, a meta-analysis review, which compared NuPro with a range of highly digestible ingredients typically included in piglet diets across 38 studies, reported a 5.3% increase in growth rate and a further 3.4% improvement in feed conversion efficiency (F/C) with NuPro (see Fig. 1).

This improvement in growth performance resulted in piglets being approximately 1kg heavier than those on the other treatments almost four weeks post-weaning. The performance benefits achieved with NuPro imply that the response is above the sum of its nutrient content and can be attributed to several factors, such as an improvement in intestinal health, an enhancement of immune function and healing of gut wall damage in young animals.

The absorptive capacity of the gut may also be increased, as it has been demonstrated that gut morphology is improved (increased villi-crypt ratio in the gut wall), and as a result, nutrient utilisation is increased due to a greater absorptive surface area via the dietary inclusion of NuPro.

All of these benefits contribute to better gastrointestinal health and immune function, enhanced digestive competence and reduced metabolic stress, which result

in better growth, F/C and overall performance. Further research has also demonstrated that the YDP is a suitable and cost-effective replacement for highly digestible protein sources, such as plasma protein, without losses in piglet growth performance.

A previous study looked at the effect of supplementing plasma and the YDP in nursery diets on pig growth performance by comparing a diet supplemented with 5% plasma versus a diet supplemented with either 2.5% each of the YDP and plasma or 5% of the YDP alone for 38 days.

Results showed a 3% improvement in feed conversion ratio (FCR) for piglets fed the diet with YDP and plasma, whereas piglets who received the diet supplemented with just the YDP had a 7% improvement in FCR compared to piglets on the plasma-only treatment (Table 1).

Conclusion

The rearing ability of modern hyperprolific sow lines coupled with poor growth and gastrointestinal disturbances experienced by young piglets after weaning are major challenges and sources of revenue loss in commercial pig production.

The strategic use of a YDP can enhance pre- and post-weaning growth performance and stimulate gut health in young pigs, reducing the severity of the weaning transition and promoting optimal lifetime growth performance.

The advantages that can be gained from utilising highly digestible feed materials such as NuPro both before and after weaning will result in an overall improvement in gut health and intestinal function, as well as growth in young pigs.

With feed ingredient prices reaching unprecedented highs over the last few months, incorporating cost-effective dietary alternatives will also be important in protecting producers' profit margins. ■

Table 1. Effect of feeding plasma or a yeast-derived protein (YDP) on feed conversion ratio (FCR) in piglets at weaning (24-31 days).

Measure	Dietary treatment		
	5% plasma	2.5% plasma + 2.5% YDP	5% YDP
Body weight – day 24 (kg)	6.59 ± 0.92	7.00 ± 0.98	6.82 ± 0.84
Body weight – day 31 (kg)	7.49 ± 1.08	7.92 ± 0.97	7.74 ± 1.03
Average daily feed intake (g/day)	197.73 ± 37.68	209.08 ± 34.80	179.68 ± 46.14
Average daily weight gain (g/day)	111.81 ± 44.90	115.14 ± 18.40	115.38 ± 47.00
FCR (g/g)	1.89 ± 0.39	1.84 ± 0.33	1.76 ± 0.67

References are available from the author on request