NSP degrading enzymes in piglet nutrition – a tool for better performance

A cost effective and safe feed can be a challenge in current times and nutritional strategies to support the production of high quality, low cost and safe animal products are a must-have nowadays.

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When formulating piglet diets the relationship between health, nutrition, welfare and environment needs to be taken into account and Non-Starch-Polysaccharide degrading enzymes (NSPase), such as xylanase or xylanase-based enzymatic complexes, are of special interest to optimise animal production, bringing an economic advantage via increased zootechnical performance or lower feed costs.

The use of NSPase is becoming common practice in piglet nutrition but the difference between enzymes and their response in different diets and production conditions can be remarkable mainly due to the enzymatic complex present in the NSPase and its effectiveness in degrading fibre.

Fibre, especially the NSP fraction in it, is one of the most important dietary factors influencing the flow of nutrients from the small to the large intestine. Research has shown that some NSP cause a reduced gastrointestinal transit time and also an increased stool output, which is explained by the fact that the carbohydrates escaping digestion in the small intestine act as the main substrate for the colonic microbial fermentation.

Ingredient	Weaner (0-14 days)	Starter (15-42 days)
Wheat	29.8	34.1
Barley	25.0	20.0
Maize	15.0	15.0
Soybean meal	10.5	14.0
Whey powder	7.5	0.0
Wheat middlings	0.0	5.0
Others (including premix)	12.2	11.9
Nutrient composition		
Crude protein (%)	16.3	16.5
Crude fibre (%)	3.6	4.4
Digestible lysine (%)	0.96	0.90
NE pigs (kcal/kg)	2,300	2,200

Table 1. Feed composition.

The use of an NSPase will influence all digestive processes significantly by increasing digestibility of NSP in the small intestine and by the formation of oligosaccharides available for fermentation by the microbial gut flora in the large intestine; these newly formed fermentable oligosaccharides are as variable as the composition of the fibre present in the feed and dependent on the NSPase being used and the animal's overall health status.

The NSPase mode of action includes the hydrolysis of soluble arabinoxylans, which minimises the negative impact of increased intestinal viscosity – an increase in intestinal viscosity can reduce pancreatic enzyme activities and the digestibility of carbohydrates, proteins and fats.

Additionally, a slower feed transit can result in an increased proliferation of the gut microflora and poor absorption of nutrients.

Alongside efficient reduction in viscosity, the NSPase will hydrolyse insoluble arabinoxylans – this action will unlock nutrients (mainly starch, proteins and lipids) being trapped in the cell walls of the vegetable feed ingredients.

Different NSPase will have different efficiency rates in the hydrolysis steps

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Fig. 1. Average final body weight (different scripts: p<0.05).

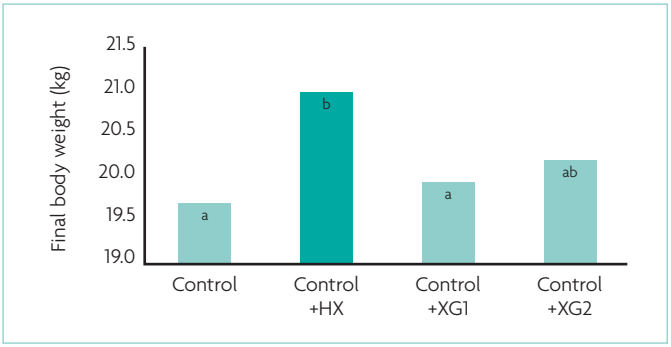
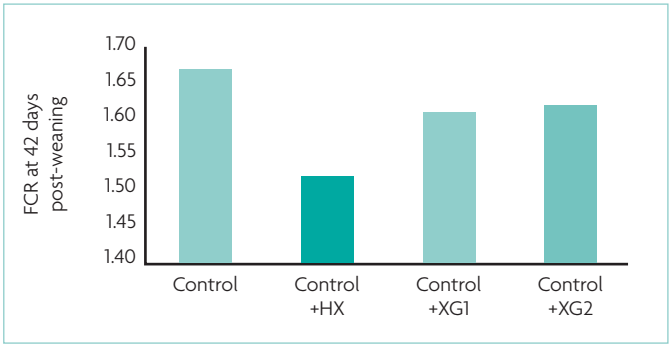


Fig. 2. Feed conversion over the 42 day trial period.



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depending on several factors, such as the microbial origin of the enzyme, type of enzyme, substrate selectivity properties, etc and such differences will be reflected in the zootechnical response of the animal.

Hostazym X concept

A fair amount of research is now available showcasing the beneficial impact of NSPase in piglet nutrition, but care should be taken in conclusions and the generalisation that all NSPase will have an equivalent response should be avoided.

Huvepharma has conducted several research and field trials to assess the added value of Hostazym X in piglet nutrition.

Hostazym X is an enzymatic complex targeting fibre degradation and its efficacy in improving the zootechnical performance of piglets is linked to improved gut viscosity, the release of extra nutrients from the diet and to the promotion of positive fermentation processes that impact the gut microbiome. These combined effects are a strong contribution for piglet production efficiency.

To understand if the contribution of an NSPase used under the same conditions is equivalent, independent of the chosen NSPase, a piglet performance trial was conducted in Belgium with Pietrain x Topigs piglets and four different treatments were compared. A Control treatment was compared with three different NSPase: Control supplemented with Hostazym X (HX), Control supplemented with NSPase 1 (XG1) and Control supplemented with NSPase 2 (XG2).

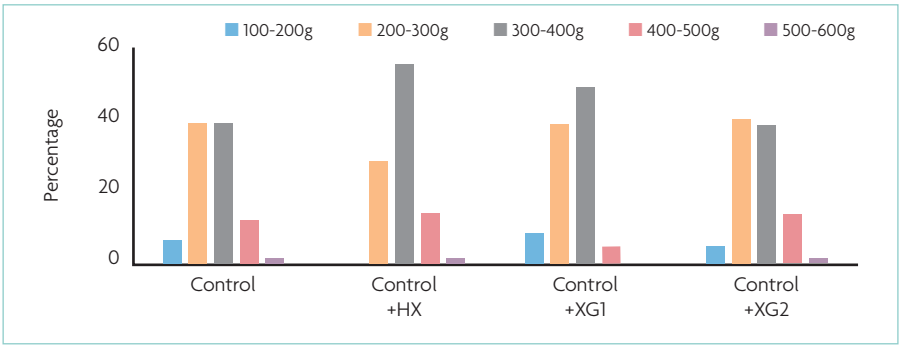

Fig. 3. Growth distribution (0-42 days) per treatment.

Piglet weaning weight was on average 6.9kg (mixed-sex) and they were ascribed to the different treatments evenly.

Two different diets were formulated: a weaner diet (0-14 days) and a starter diet (15-42 days) as shown in Table 1. All diets and treatments included phytase.

NSPase was dosed as per each commercial recommendation. The trial challenges the concept that all NSPase have equivalent zootechnical outcomes. The trial results shown in Figs. 1, 2 and 3 support the fact that despite NSPase having a positive impact on piglet performance, the magnitude of the impact is different and may represent a significant difference in the economic value of each NSPase. The choice of an NSPase needs to account for efficacy and efficiency simultaneously.

Piglets can definitely benefit from the use of an efficient NSPase, such as Hostazym X, as an effective tool for efficient animal production: optimal nutrition, better gut health and improved performance with a high economic return. ■

References are available from the author on request