PHYTASE: the essential tool for efficient piglet production

Dealing with all the nutritional stress factors in piglet production is one of the biggest challenges in today's market environment. Cost effectiveness is paramount for any solution or individual additive used in piglet nutrition. However, when formulating diets, the relationship between health, nutrition, welfare and the environment needs to be taken into account.

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Amongst the wide range of feed additives promoted for piglet performance, the use of phytase enzymes in piglet diets is essential in optimised production systems because of the improvement and economic advantage which they offer. Phosphorus (P) is an essential nutrient and one of the most expensive when given as inorganic phosphate sources. The use of phytase to reduce inorganic phosphate use is an indispensable tool for cost reduction, aside from its direct benefit on animal performance and environmental impact (phosphorus excretion reduction).

Over the years, a significant amount of research has been published supporting the positive effect of phytase use on performance, nutrient digestibility and bone mineralisation in piglets and pigs. Yet, the discussion over the most efficient inclusion rate continues, especially in the current context of high prices of inorganic P sources promoting the need for increased use of phytase to keep feed formulations economically viable.

Several dose response research trials showed that phytate breakdown in the gut of pigs when 'standard' levels of phytase (500 FTU) were used is not more than 60%, while higher doses were much more effective. Moreover, it has been observed that the level and the source of calcium (Ca) has an impact on the efficiency of phytase in pigs, which means that this should also be considered when evaluating the best use of the phytase.

Table 1. Feed and nutrient composition.

Ingredient (%)	Weaner	Pre-starter
Barley	40.0	40.0
Maize	19.9	19.4
Toasted soybeans	10.0	5.0
Soybean meal	8.0	12.5
MCP	0.01	-
Others	22.09	23.1
Nutrients		
Crude protein	17.0	16.7
Calcium	0.55	0.56
P	0.44	0.44
Dig. P	0.15	0.15

Relying on OptiPhos Plus for optimised performance

Huvepharma has conducted several research and field trials to assess the added value of OptiPhos Plus in piglet nutrition. OptiPhos Plus is a highly efficient phytase and its efficacy in improving the zootechnical performance of piglets is linked to the release of extra nutrients from the diet. These effects combined are a strong contribution for piglet production efficiency.

To support the nutritional and economic value of OptiPhos Plus, a piglet performance trial was conducted in Belgium with 150 Pietrain x RA-SE piglets and four different treatments were compared.

A phosphorus deficient control (C) treatment was compared with three different OptiPhos Plus doses: 250, 500 and 1,000FTU/kg.

Piglet weaning weight was, on average, 8.2kg (mixed-sex) and they were allocated to the different treatments evenly.

Parameter	Control	250 FTU	500 FTU	1,000 FTU	P value
BW at end (kg)	23.3	24.9	27.2	26.9	<0.001
ADG (g/day)	351	387	440	436	<0.001
DFI (g/day)	567	603	677	657	0.017
FCR	1.61	1.56	1.54	1.51	0.007

Table 2. Relevant performance parameter results.

Parameter (%)	Control	250 FTU	500 FTU	1,000 FTU	P value
Phosphorus	33.1	47.6	53.6	61.6	<0.001
Calcium	52.5	60.2	59.4	65.2	0.005
Crude protein	79.5	80.6	80.5	81.2	0.041

Table 3. Apparent total tract digestibility of P, Ca and CP.

The aim of the study was to evaluate the effects of the phytase on performance, apparent total tract digestibility of Ca, P and crude protein (CP) and bone mineralisation.

Two different diets were formulated: weaner diet (0-14 days) and starter diet (15-42 days) (Table 1), both with digestible P reduced to 1.5g/kg, while Ca levels were maintained. The main trial results are summarised in Table 2 and Table 3 and show that:

- Final body weight (BW), average daily gain (ADG) and daily feed intake (DFI) increased per each increase of 250FTU/kg feed of phytase.
- FCR reduction by three points per each 250FTU/kg of phytase included.
- P, Ca and CP total tract apparent digestibility improved with increasing levels of phytase.

The performance and digestibility improvements seen can be attributed to the release of phytate-bound P replacing the deficient levels in the negative control diet. Moreover, the higher Ca digestibility due to phytase can be linked to the release of Ca complexed on the phytate molecule. Considering the increased digestibility of P and Ca, the effect seen on bone development (Table 4) was predictable. Increased levels of phytase resulted in increases in the dry weight and crude ash of the metacarpus IV.

Conclusion

Increasing levels of OptiPhos Plus improves piglet growth performance and improves Ca, P and protein digestibility leading to better bone mineralisation. Evidence supports phytase efficiency and its use and, with the current raw material market prices, especially inorganic P sources, pushes for its re-evaluation to ensure optimised piglet performance both in zootechnical and economic parameters. ■

References are available from the author on request

Table 4. Metacarpal bone parameters (metacarpus IV, right – front leg).

Parameter	Control	250 FTU	500 FTU	1,000 FTU	P value
Dry weight (g)	3.8	4.6	5.0	8.1	0.042
Crude ash (% Fat free DM)	44.2	47.9	49.4	52.4	<0.001