The value of an intrinsic heat stable phytase with reliable matrix values

The application of phytases in feed was initiated more than 25 years ago and is now common practice in pig nutrition.

Phytases are used to liberate phosphorous (P), bound as phytate, in raw materials. This lowers the feed cost as less inorganic P needs to be added to the feed to provide enough digestible P.

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At the same time, the sustainability of animal production is improved as P excretion in the environment is reduced. However, phytases need to be well formulated in feed as too low a P level will lead to reduced bone growth and animal performance in general.

This is of particular concern in sow and piglet nutrition, as bad bone formation will lead to impaired mobility.

Avoiding P deficiency

Two factors may contribute to P deficiency, even when the phytase is dosed correctly in the mash feed.

First of all, the stability of the phytase: in particular, its heat stability when dosed in feed for pelleting. Secondly, the phytase needs to provide reliable P matrix values to avoid overestimation of its potential to release P from phytate.

Thermostability of phytase

Due to their protein nature, phytases can lose activity during the pelleting process.

This results in feed with a phytase activity, which does not meet the feed specifications on digestible P, and thereby will yield less efficient animal performance.

Therefore it is required that the phytase demonstrates a high thermostability to at least 85°C, which means that it must show more than 80% recovery of initial activity during the pelleting process.

A summary of three pelleting studies carried out at Ghent University, Belgium, showed that a newly launched intrinsic heat stable phytase (OptiPhos Plus G) yields recoveries that were 88.5% at 85°C and were even close to 80% at 90°C (Fig. 1).

Reliable P matrix values for the nutritionist's peace of mind

The capacity of a phytase to replace inorganic phosphates in the feed is summarised through P matrix values for available P and/or digestible P.

This can be assessed either by regular digestibility trials, or by bone

ash trials in which the response on P release from phytate is measured when adding the phytase at different doses to a P-deficient feed.

To provide reliable matrix values, multiple trials need to be conducted. For OptiPhos Plus for instance, 11 pig trials have already been conducted giving an average dig. P improvement for different inclusion levels (Fig. 2).

In addition to the average results of these 11 trial results, Fig. 2 also shows the average of the three trials giving the best response of OptiPhos Plus. From these response curves, it can be deduced that an OptiPhos Plus dose of 500 FTU/kg provides a dig. P matrix value of 1.12g/kg digestible P when considering all trials.

A value of 1.25g/kg can be estimated when only the best three trials are considered. Assuming a price of monocalciumphosphate of 0.45 €/kg containing 18.3% dig. P, a cost saving per tonne of feed of 2.75 and 3.07 €/T could be estimated when considering the average response of all 11 trials, or only of the best three trials respectively. The price difference (0.33 €/T) can be a trigger for a phytase supplier to promote the P matrix values of only these three trials in order to fight competition. However, this increases the risk for a nutritionist that, in some cases, P deficiency issues can occur.

In that case, the financial loss will surely be much higher than the saving on the formulation cost. Therefore, it is advisable to always work with the average P matrix values of all conducted trials, and not just to rely on the best ones.

Conclusion

It can be concluded that in order to avoid P deficiency in pigs, an excellent recovery of phytase in pelleted feed needs to be guaranteed. In addition, reliable P matrix values need to be provided from multiple trials.

Using P matrix values calculated from only the best trials, should always be avoided during formulations, as this can cause P deficiency at farm level. ■

Fig. 1. The recovery of OptiPhos Plus G in pelleted feed at different temperatures (Ghent University, Belgium).

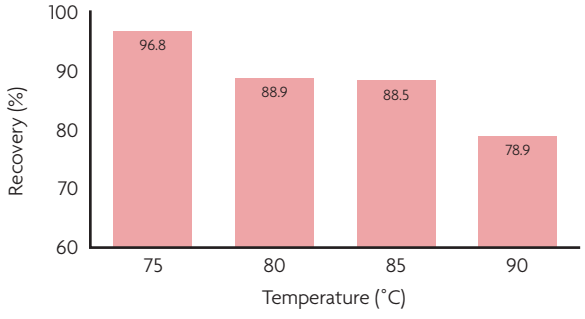

Fig. 2. Response in dig. P with different inclusion levels of OptiPhos Plus (average of all 11 trials, or only considering the three trials showing the highest response).