


HUVEPHARMA®

Let's Talk About Enzymes...

OptiPhos® protein sparing effect

OptiPhos® recommended nutritional matrix contains, besides phosphorous (P) values, protein and amino acid values.

The question that often arises is how can a phytase have a protein saving effect?

The suggested mode of action works in 3 steps:

- First, a phytate molecule is negatively charged, due to the presence of 6 phosphate groups (HPO_4^{2-}), binding positively charged molecules (Figure 1). At low pH (stomach/gizzard), where a phytase needs to work, proteins carry a positive charge on their amino group (NH_4^+) and can bind to phytate molecules.
- Second, in an effort to digest the phytate bound protein, the animal produces more pepsin and acid in the stomach/gizzard. This requires energy and protein, which is then not available for growth.
- Third, the increased acid production triggers higher production of mucin as the animal reacts to protect the gut cells. Additionally the secretion of NaHCO_3 (bicarbonate) increases to buffer the acid content coming out of the stomach/gizzard. Mucin/Mucus contains very high levels of protein (> 50 % on dry matter) so production of mucus requires high amounts of protein, which cannot be used for growth.

From the mode of action, it can easily be understood that hydrolysing the phytate

- **OptiPhos® has a protein saving effect due to its fast degradation of phytate**
- **Enhancement of protein digestion by any phytase should be related to its ability to degrade phytate and thus to P release**

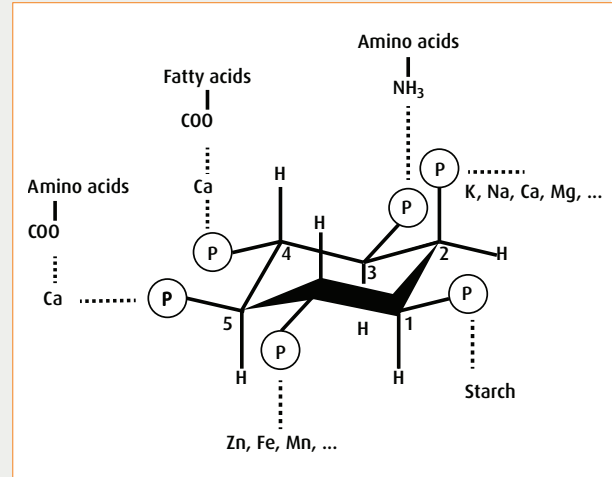


FIGURE 1
The binding of positive charged nutrients by the phytate molecule

molecules as fast as possible will alleviate the described negative impact and explains why the use of OptiPhos®, the fastest phytase, and also the superdosing of OptiPhos® to speed up phytate degradation, will have a protein (and energy) sparing effect.

Nevertheless, the improvement in protein digestibility by a phytase is always linked to its efficacy in releasing P, meaning that phytate degradation (and thus P release) is the key for the improved protein digestibility effect.

Since OptiPhos® is the fastest working phytase, its matrix values for protein should be the highest. It's critical to understand that feed has a certain ratio between the different amino acids and this ratio should be more or less kept in the claimed matrix values for amino acids. Phytase is not selective towards amino acids degradation.

OptiPhos® coating doesn't hinder the *in vivo* release of phytase

There is a reoccurring concern regarding the effect of coating on the release of the phytase activity. In order to protect phytases against heat during the pelleting process, different coating technologies are used by the different phytase suppliers. OptiPhos® coating technology allows it to be heat stable up to 85°C.

For practical reasons, in some situations, OptiPhos® coated is used in non-pelleted feed. To support this application different trials were conducted by Huvepharma and all show that OptiPhos® unique coating helps its stability in challenging environments and does not hinder the phytase activity release.

The trials set up compare OptiPhos® CT (coated) or OptiPhos® G (granular) formulations when added to a phosphorous deficient mash diet.

Results of one of the trials are shown in Figure 1.

The trial done at Perdue University, USA used OptiPhos® CT (coated) or OptiPhos® G (granular) added to a phosphorous deficient mash diet at different concentrations: from 250 to 750 OTU/kg.

Bone ash, as indicator of P digestion and uptake, was measured.

As expected, results show that increasing levels of OptiPhos® results in increased bone ash content. Additionally, results confirm that at any of the doses tested there was no difference between the different formulations OptiPhos®, demonstrating that there is no hindering effect of coating.

key facts

- The coating of OptiPhos® is not hindering phytase release
- The use of coated OptiPhos® in mash diets does not compromise P and other nutrient release as indicated in the matrix values sheets

FIGURE 1

Effect of supplementing 250, 500 or 750 OTU/kg feed of coated OptiPhos® or non-coated (Granular) on bone ash percentage

