



OptiPhos®
The Advanced Phytase

OptiPhos®

OptiPhos® is a new generation phytase developed by the University of Cornell (USA). Researchers at this university discovered an E-coli bacteria, which was producing a very potent 6-phytase.

They identified the gene responsible for expressing the phytase production, isolated it, and transferred it into a yeast, Pichia pastoris.

This yeast, with the genes encoding for Phytase production inside, now is capable of producing large quantities of the E-coli phytase, OptiPhos®.

OptiPhos® is used in feeds for monogastrics to hydrolyse phytic acid and release phosphate groups, which thus come available for the animal, and can be absorbed in the lower digestive tract.

Because monogastric animals lack the enzyme phytase, normally they are not capable of breaking down phytic acid, and thus cannot use the phosphorus, stored in this molecule.

By adding OptiPhos® to the feed, the phytate bound phosphorus, which is about 70% of all phosphorus in plant raw materials, can be released in the animal.

In this way, the extra phosphorus gift, by adding inorganic phosphorus from monocalcium- or dicalcium phosphate, can be reduced.

OptiPhos® improves the digestibility of the natural present phosphorus from phytic acid in vegetable raw materials in the feed.

This saves feed costs, but also lowers the output of phosphorus via the litter to the environment.

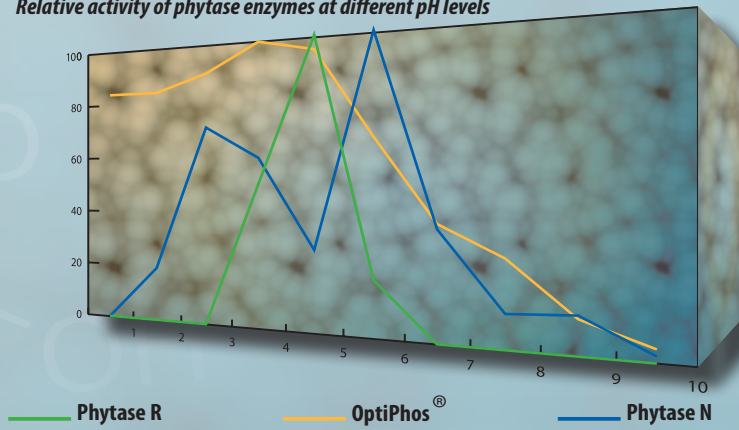


pH dependency

All phytases have their own specific optimal pH level, at which they function optimally. It is well known that phytic acid (the substrate for phytases to work upon) must be in solution for the phytase to be capable to hydrolyse the phosphate groups from the inositol ring structure. Phytic acid is largely found in solution at pH levels below 5,5, which means that phytase is active in vivo only in the upper digestive tract (the stomach area). As soon as the feed/chime is entering the duodenum, the pH goes up to 6 and higher, which make the phytic acid form a complex with calcium. This complex precipitates and phytase is largely hindered to hydrolyse the phosphate groups.

The optimum activity of OptiPhos® can be found at pH range of 1-5,5. This is a very broad range, which gives the advantage to OptiPhos® that it is capable of hydrolysing phytic acid in the whole upper digestive tract area. Moreover, the effectivity of OptiPhos® in this range is very high, which makes OptiPhos® operational for the full retention time of the feed in the upper digestive tract area. Because of this, the total phosphorus release by OptiPhos® is amongst the highest of all phytases in the available market.

Relative activity of phytase enzymes at different pH levels

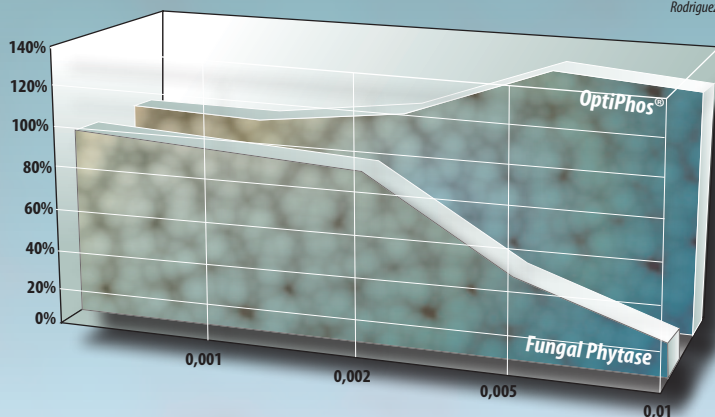


Pepsin break down sensitivity

Besides pH, degradation of the phytase by pepsin is also a factor to consider. Phytases are proteins, and in the normal digestive system of animals, proteins are degraded by pepsin into smaller pieces to be digested. Pepsin is especially active at low pH levels in the stomach area, and it can break down phytase. Research shows that OptiPhos® is almost fully resistant against this degradation by pepsin, which means that actually the full quantity of OptiPhos® that is present in the stomach will be effective, no losses of effectivity due to the pepsin break down of OptiPhos® are seen.

Relative amount of iP released from soybean meal (%) influenced by pepsin concentration

Rodriguez, et al, 1999



Thermostability of OptiPhos®

Thermostability of phytases is a hot topic. It is well known that phytases in general, are sensitive for inactivation by heat, more than xylanases, for instance. This implicates that at pelleting temperatures of 75-80 °C important losses of phytase activity can take place. To prevent this loss of activity, the phytase has to be protected against the heat-treatment, without protecting it too good, otherwise release of the phytase in the animal will be hindered.

To protect OptiPhos® against the temperature at pelleting conditions up to 85 °C, a coating has been developed. This coating has shown to protect the OptiPhos® against this pelleting temperature during processing, but not hinder the release of OptiPhos® in the animal. This is backed up with many trials performed with the coated OptiPhos® product, which all show good effectivity and response in vivo.

The non-coated OptiPhos® is a granulated product, produced in a patented microgranulation process. In this process the active ingredient, OptiPhos®, is fully embedded in a matrix of starch, which protects OptiPhos® against all kinds of influences from chemicals to adverse storage conditions.

For processes where liquid phytase is preferred, such as higher pellet temperature, liquid OptiPhos® is available for post pelleting application (PPLA).

Pelleting recoveries at different conditioning temperatures

