HUVEPHARMA®

Let's Talk About Enzymes...

The importance of a fast-acting phytase in animal feed

Phytases are commonly used in animal feed. The main objective for this is to reduce the cost of feed. Because phytase liberates phosphorus, which is bound in the raw materials as phytic acid, the amount of added inorganic phosphate (like Mono-Calcium-Phosphate) can be reduced. Another benefit of using phytase is the improvement in growth and feed conversion that can be realized. Intact phytic acid (IP-6) binds to nutrients like minerals, fatty acids, amino acids and carbohydrates blocking their digestibility. When phytic acid (IP-6) is broken down by the phytase to Inositol Phosphate-4 (IP-4), this anti-nutritional effect of a phytic acid is removed. The nutrients are released and can be utilized by the animal which results in better growth and a lower FCR.

FAST PHYTASE = BETTER RESULTS

Phytic acid or phytate is the indigestible storage form of phosphorus in plants. The phosphorus bound to this phytate has to be broken down, so the phosphorus becomes available to the animal. Only with the help of an efficient phytase is this possible. As already mentioned, the intact phytate binds to nutrients such as amino acids and this can occur quite early in the upper digestive tract. To reach the maximum phosphorus release and the extra nutritional effect of the phytase it is of utmost importance that the phytate molecules are destroyed as quickly as possible and as early as possible inside the upper digestive tract.

The efficiency of breaking down phytate molecules is determined by the speed of the phytase, which can vary a lot between different phytase enzymes. Each phytase molecule can only attach to 1 phytate molecule at the same time. This means the capacity of the phytase molecule is limited, and the faster the attaching, releasing and separation takes place, the more phosphate can be released by 1 molecule of phytase per second. This is expressed as the so called V_{max}.

The maximum speed of a phytase (V_{max}) is measured by bringing a fixed known amount of phytase in contact with an oversupply of substrate, which ensures all phytase molecules are always in contact with substrate. The amount of phosphorus released per second is measured and expressed as V_{max} in mmol phosphorus released per second.

Fig. 1 shows the V_{max} of four enzymes at different pH values. From this figure, it is clear that large differences (up to 40 %) exist between phytases.

Conclusion

- *The faster a phytase works the more efficient it is*
- *The faster a phytase works the lower the effective dose can be*
- *OptiPhos® is the fastest phytase of all tested phytases*

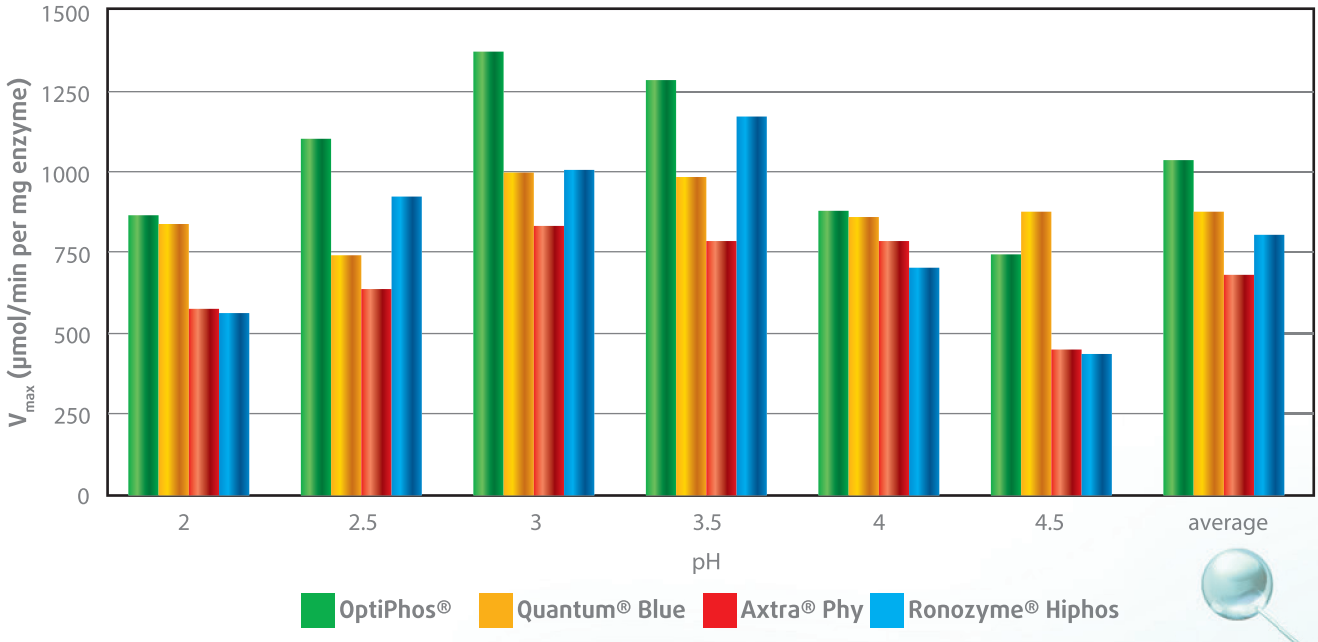


Fig.1: The maximum speed of phytic acid degradation (V_{max}) of several phytase sources.

OptiPhos® superdosing in pig(lets) = saving feed costs!

Recently, data have been published raising attention to superdosing of phytase in pig production to obtain better growth and feed conversion. This article gives some more details on this topic, showing that superdosing is a profitable way to improve animal production.

PHYTATE, AN ANTI-NUTRITIONAL FACTOR

Phytate is the natural storage form for phosphorus, present in all raw materials of vegetable origin. However phytate, especially when it is fully intact, acts also as an anti-nutritional factor. Due to its negative charge it binds to positively charged minerals, amino acids and even fatty acids which are then unavailable to the animal. As a consequence, high phytate levels in feeds reduce the performance of the animals dramatically.

When the phytate molecule is hydrolyzed by the phytase, and phosphate groups are removed, the phytate molecule loses its ability to bind the nutrients. The superdosing of a phytase therefore is intended not only to make more phosphorus available to the animal, but also to destroy phytate more completely and eliminate it as an anti-nutritional factor.

SUPERDOSING IN PIG(LETS): EFFECTS AND FINANCIAL BENEFIT

New research has demonstrated the effect of OptiPhos® / Hostazym® P on technical and economic performance when added at higher doses to a feed which is already sufficient in phosphorus.

In piglets, it was shown in a US study that supplying OptiPhos® / Hostazym® P at double dose improved (+38 grams or 8.6%) the daily gain significantly.

This led to an extra profit of 0.25 € per piglets produced. In another piglet trial conducted in Belgium, at 4 times the standard dose of OptiPhos® / Hostazym® P, an extra profit of 0.26 € per piglet was obtained.

In a US pig fattening trial, doubling the dose of OptiPhos® / Hostazym® P from single to double dose reduced feed conversion significantly by 0.09 (= - 3.5 %) leading to an extra profit of 2 € per pig slaughtered.

The compilation of all trials performed with double or four times the standard dose of OptiPhos®/Hostazym® P shows at double dose a 5% improvement in growth and almost 3% in FCR and a further improvement towards 4% in FCR at four times standard dose (Fig.1).

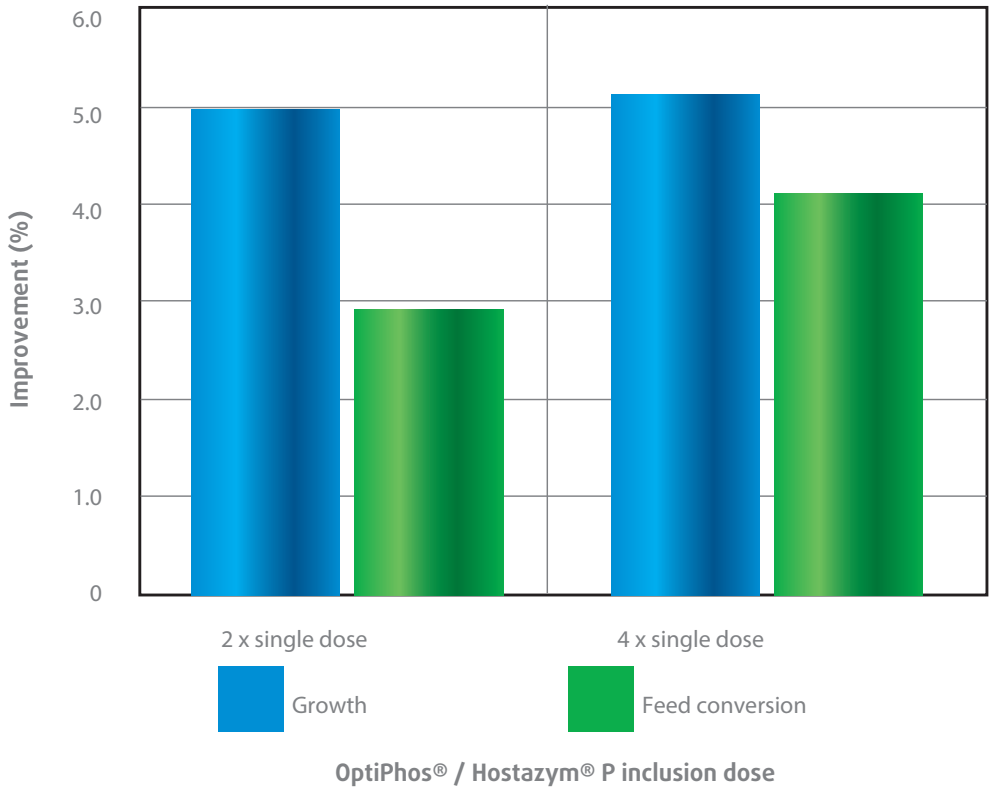


Fig.1: Summary of the average response of superdosing OptiPhos® / Hostazym® P in pig feeds

Conclusion

- *Superdosing OptiPhos®/ Hostazym® P is a method to break down as much phytate as possible in order to eliminate the anti-nutritional effects of phytate*
- *Superdosing of OptiPhos®/ Hostazym® P has shown to improve performance of pigs and piglets creating an extra profit of 0.25 €/piglet and 2 €/pig.*
- *The superdosing effect of OptiPhos® / Hostazym® P is already achieved at double of the single dose*

Effect of Hostazym® X supplementation on mortality rate of fattening pigs

Hydrolysis of Non-Starch Polysaccharides (can be dietary NSP fibres) by xylanase enzymes is known to deliver arabinoxylan-oligosaccharides, which are fermented into highly absorbable short-chain-fatty-acids. This so-called prebiotic effect may cause a drop in intestinal pH, alter microflora composition in the pig's hindgut and result in a better health status of the animals. Huvepharma performed a compilation of large-scale fattening pig trials to quantify the impact of Hostazym® X in reducing mortality.

In 4 different and representative pig trials (integration systems and commercial farms), the effect of xylanase addition (Hostazym® X, Huvepharma Inc.; Huvepharma NV) on overall mortality rate was evaluated. In all trials the animals had continuous access to water and feed.

- **Trial 1** (USA, 2014): the control group (N=1335 pigs) and xylanase-treated group (N=1294 pigs) at 1500 EPU/kg were fed a maize-soy-DDGS-based diet from 11 up to 116 kg of BW.
- **Trial 2** (Belgium, 2015): the control group (N=256 pigs) and xylanase-treated group (N=256 pigs) at 1500 EPU/kg were fed a wheat-soy-based diet from 23 up to 112 kg of BW.
- **Trial 3** (USA, 2015): the control group (N=468 pigs) and xylanase-treated group (N=468 pigs) at 1500 EPU/kg were fed a maize-soy-DDGS-based diet from 11 up to 111 kg of BW.
- **Trial 4** (USA, 2015): the control group (N=530 pigs) and xylanase-treated group at 1500 (N=530 pigs) and 3000 EPU/kg (N=530 pigs) were fed a maize-soy-based diet from 11 up to 127 kg of BW.

RESULTS

This compilation of large-scale pig trials demonstrates the consistent effect of Hostazym® X in lowering mortality rate (i.e. -1.4% absolute and -26.09% relative). This effect is linked to a prebiotic interaction between the xylanase hydrolysis products – distinct oligosaccharides – and the hindgut microflora. This is in full accordance with what was already observed in other pig trials and multiple broiler trials using Hostazym® X.

24th International Pig Veterinary Society Congress

IPVS

8th European Symposium of Porcine Health Management

Conclusion

Hostazym® X has a significant impact on overall pig mortality rate. Mortality was reduced by 26% using Hostazym® X in the diet.

Table 1: Compilation of trials with fattening pigs (full fattening period) showing the effect of Hostazym® X enzyme addition on pig mortality reduction.

			Pig mortality rate (%)		
Group size (N)	**Diet composition**	**Xylanase units in feed (EPU/kg)**	**Control group**	**Hostazym® X group**	**Relative reduction by Hostazym® X**
Trial 1 (1335)	maize-soy-DDGS	1500	3.35	2.26	32.54
Trial 2 (256)	wheat-soy	1500	4.30	3.10	27.91
Trial 3 (468)	maize-soy-DDGS	1500	9.67	7.07	26.89
Trial 4 (530)	maize-soy	1500 3000	3.59 3.59	2.87 1.79	20.06 50.14
Overall	**various types**	**1500**	**5.2**	**3.8**	**26.09**

It's all about consistency: the added value of Hostazym® X in layer nutrition

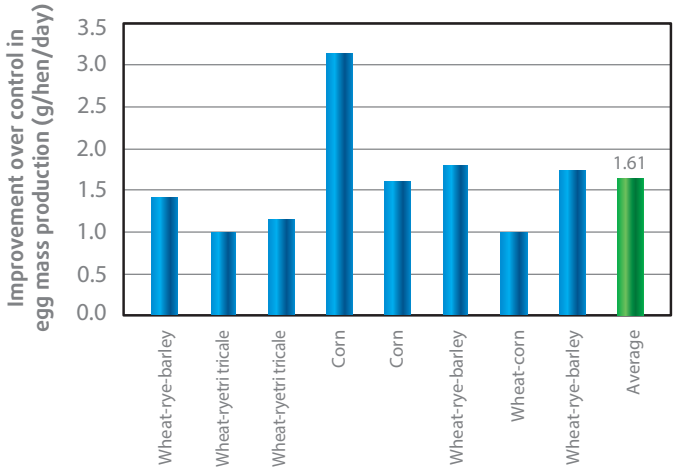
In past years several efficacy trials have been conducted with commercial laying hens to demonstrate the effect and added value of Hostazym® X supplementation in improving zootechnical results.

As previously demonstrated for other poultry species, Hostazym® X gives a consistent positive response by enhancing zootechnical performance, independent of the diet type.

Figure. 1 shows that Hostazym® X at the recommended dose boosts laying hen performance in a variety of cereal-based feeds. The trials summarized in Figure 1 had the following basic set-up:

- First-cycle (from week 20 of age) and second-cycle (from week 45 of age) of laying hens. Trial duration 24 to 26 weeks.
- Practical layer diets supplemented with Hostazym® X, in the range of 1050 to 1500 EPU/kg feed.
- Wheat-, corn- and wheat/corn diets (varying NSP fibre profiles).

The combination of all trials shows that on average Hostazym® X yields up to 0.061 lower Feed Conversion Rate (-2.97%) and +1.61 grams of egg mass (+2.95%) produced daily per hen. Moreover, an average increase of 1.13 grams on egg weight was observed in the trials (Figure 2).



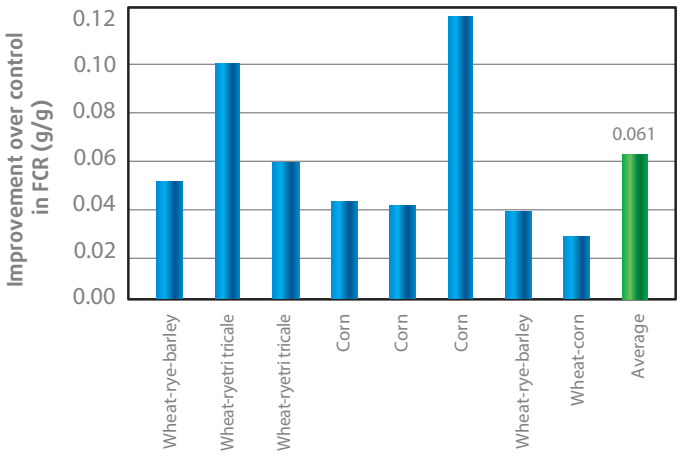


Fig. 1: Effect of Hostazym® X supplementation on laying hen performance for various (fibre) types of diet

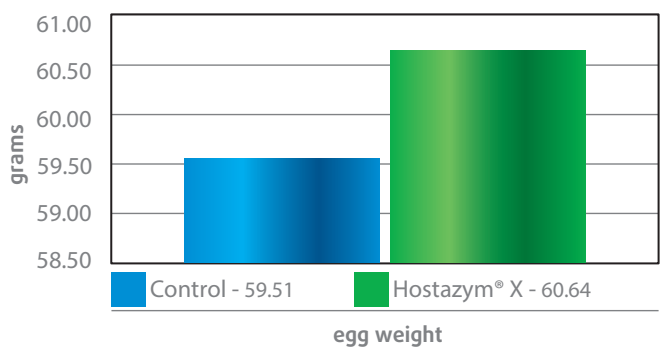


Fig. 2: Improvement in egg weight

Conclusion

Hostazym® X applied to layer feeds:

- ***+1.61 grams daily egg mass per hen***
- ***–2.97% lower FCR***
- ***+1.13 grams on egg weight***