

Let's Talk About Enzymes...

Huvepharma's 6th European Nutrition Seminar highlights the importance of Calcium in animal nutrition

Huvepharma hosted its 6th European Nutrition Seminar dedicated to nutrition and health management of high performing animals. The seminar held in Krakow early May gathered 100+ guests from across Europe. The lectures focused on different aspects of animal nutrition and health and renowned speakers shared the latest insights and developments on their research fields.

One of the lectures highlight was the better understating of Calcium in modern broilers nutrition.

The research work of Prof. Roselina Angel (University of Maryland, USA) presented by Lode Nollet (GPM Enzymes, Huvepharma) set the ground for a better understanding of the impact of Calcium on phytase performance.

- The negative effect of high solubility and low particle size might be linked to a higher buffering effect in the gizzard/stomach, raising the pH to a level at which the phytase activity will be reduced. Also to consider that Calcium from fine limestone can complexate easier with the phytate molecule, making it less accessible for phytase to hydrolyse the inositol-P linkage;

- Additionally, it was stressed that most broiler feeds are over formulated in Calcium and that analysed Calcium levels in the feed are 3 to even 10 % higher than those calculated in the feed formulation.

A Ca/aP ratio of 2, as proposed some decades ago, should be replace with a maximum ratio of 1.7 in order to optimise Phosphorous digestibility and phytase efficiency.

Calcium got its spotlight again by the lecture of Dr. Audrey McElroy (Texas A&M University, USA) about opportunities in dietary management of necrotic enteritis (NE).

It is known that NE is caused by *C. perfringens* and the causes triggering the onset of NE are multiple, being the excess of protein and less digestible protein one of the frequent triggers and Calcium can play a role here.

Dr. McElroy has shown that the Calcium level in the feed (excess *versus* sufficient) leads to a higher incidence of NE and to higher mortality due to NE, which was linked to a higher pH in the gizzard/stomach and a negative impact on protein digestibility. Research has also shown a clear relation between Calcium level in the feed and villi: crypt ratio, demonstrating that higher Calcium levels result in shorter villi and deeper crypts.

Both lectures conclude that overdosing of Calcium has a negative impact on overall gut health.



The impact of Calcium, Calcium solubility and granulometry on Phosphorous digestibility and phytase performance in broilers was demonstrated and several key factors were highlighted:

- Limestone (Calcium source) with a fine granulometry is highly soluble but less digestible than coarse limestone, Calcium sources with a low granulometry may have a very negative impact on its performance/ utilization;

The Huvematic® concept: spreading worldwide!

The Huvematic® concept consists in the combination of the instant water soluble enzyme powders (WSP) and the provision of an equipment to dose this powder into water to produce batches of 5 – 15 litres of fresh liquid enzyme.

The Huvematic® concept has shown in the past years its many advantages compared to supplying liquid enzymes in IBC. While the feed mill manager welcomes the ease of storage (a 20 kg box – Figure 1 *versus* an 1 ton IBC in cold storage) and the safe handling (no more forklift manipulations), the benefits for the nutritionist are the freshness of the enzyme (no loss during storage) and the flexibility to produce any enzyme concentration desired.

The production of the water soluble enzyme powders (Hostazym® X WSP, OptiPhos® WSP and Hostazym® P WSP) is know-how of Huvapharma and part of its core business: fermentation and product formulation. The Huvematic® equipment has been built by an external company, on the directions and guides of Huvapharma (Figure 2).

FIGURE 1

A 20 kg box – Figure 1 versus an 1 ton IBC in cold storage



The Huvematic® concept has been spread worldwide in the last 4 years after its first introduction in USA 7 years ago. Already this year several countries have welcomed or will welcome the installation of their first Huvematic®, including Belgium, Mexico and Turkey. This adds up to 9 other countries where the Huvematic® concept has been already embraced, such as in Brazil, France, UK and Thailand.

The success of Huvematic® and WSP enzymes concept created the new standard on accurate application of liquid enzymes to feed!

FIGURE 2

The Huvematic® equipment



key facts

- Huvematic® concept has been implemented worldwide in the last years with great customer satisfaction
- The Huvematic® plus the WSP enzyme formulations concept is **THE** future of liquid application of enzymes



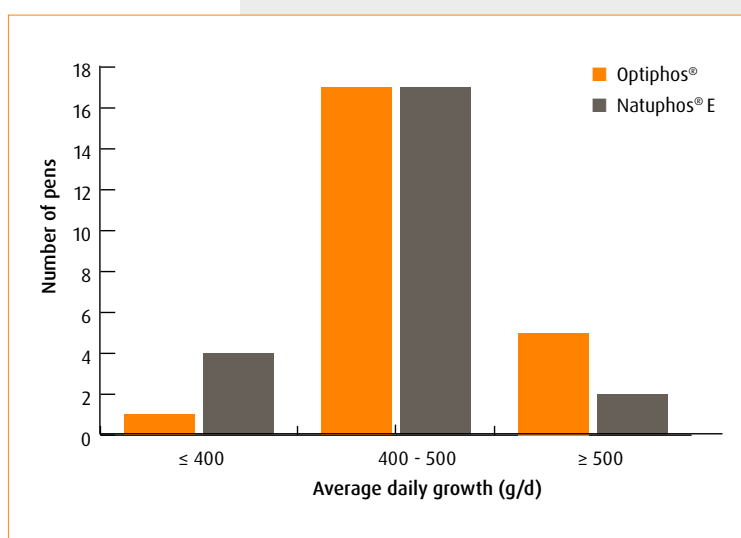
OptiPhos® shows off against Natuphos® E in piglets

The ability of a phytase to enter a feed formulation at a certain price depends mainly on the matrix values which the producer is claiming. In particular an increased P matrix value can lead to a particular replacement of MCP and DCP, making the feed cheaper. However, a lot of these "claimed P matrix values" of OptiPhos® competitors cannot be proven scientifically.

TABLE 1
Effect on weight and feed conversion

| | | OptiPhos® | Natuphos® E |
|------------------|------------------------------|-----------|-------------|
| Body weight (kg) | At start | 6.55 | 6.53 |
| | After weaner and pre-starter | 15.0 | 14.7 |
| | At end of the trial | 28.6 | 28.5 |
| Feed conversion | After weaner and pre-starter | 1.27 | 1.29 |
| | After whole period | 1.35 | 1.35 |

FIGURE 1
OptiPhos® versus Natuphos® E



Natuphos® E has been launched with quite high matrix values for pigs, claiming 1.12 g and 1.52 g dig. P per kg of feed at single and double dose respectively, while for OptiPhos® the claim is 0.96 and 1.18 g dig. P per kg of feed at single and double dose respectively.

In a recent large piglet trial (> 1500 piglets) conducted in Germany, Natuphos® E and OptiPhos® were compared at double dose. It could be concluded that:

- OptiPhos® gave slightly better piglet performance (Table 1). There were also more pens with average daily gain > 500 g/d for the OptiPhos® group (Figure 1)
- Faecal dry matter and P excretion were very similar showing that phytate degradation was equivalent between both phytase products
- Based on feeding cost and growth, a financial benefit for OptiPhos® of 100 € per 1000 piglets can be calculated

key facts

- OptiPhos® performed better than Natuphos® E in piglets, although the latter claims higher P matrix values
- A financial benefit of 100 € per 1000 piglets can be calculated when using OptiPhos® instead of Natuphos® E

How Hostazym® X contributes for healthier pigs

The consistent response of Hostazym® X to improve zootechnical performance and positively influence mortality rate of pigs over different diets and production conditions relies on its effectiveness in degrading fibre.

Fibre, specially the Non Starch Polysaccharides (NSP) fraction, is by far the most important dietary factor influencing the flow of nutrients from small to large intestine in growing pigs. In the large intestine, the rate of degradation of fibre polysaccharides is influenced by the chemical nature of the fibre, such as solubility. Thus, β -glucans, soluble arabinoxylans and pectin are all rapidly degraded, whilst the insoluble arabinoxylans and cellulose are degraded more slowly at more distal locations of the colon.

Research has already shown that the digestibility of NSP in the small intestine is low in pigs. Additionally, it is known that some NSP cause a reduced gastrointestinal transit time and also increased stool output. This is explained by the fact that the carbohydrates escaping digestion in the small intestine act as the main substrate to the colonic microbial fermentation and generate end-products such as short chain fatty acids (SCFA) and gases (H₂, CO₂, CH₄).

The SCFA are of particular interest to pig nutrition because of the interactions with the host in a variety of metabolic processes. The SCFA produced are rapidly absorbed from the gut lumen and subsequently utilised by the animal as substrate for energy metabolism (providing a substantial amount of metabolised energy).

The use of Hostazym® X will influence this process significantly both by increasing digestibility of nutrients (Table 1) and by making available for fermentation a specific combination of oligosaccharides (specially arabinoxylan-oligosaccharides, AXOS).

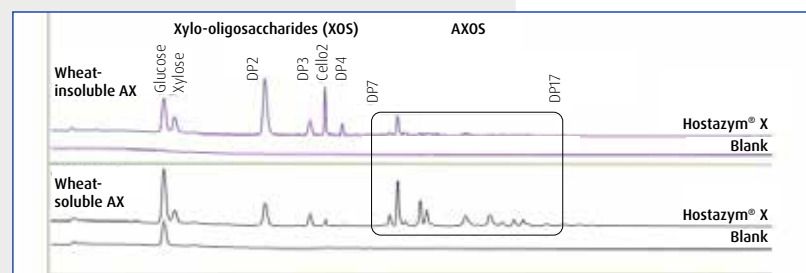
Figure 1 shows the specific degradation profile of wheat arabinoxylan when treated with Hostazym® X.

The AXOS formed by Hostazym® X hydrolysis will influence positively gut microflora (prebiotic effect) and promote positive fermentation processes (SCFA production) leading to additional uptake of energy by the pig. This effect will contribute to better zootechnical performance and / or production efficiency and to a better health status (mortality reduction).

TABLE 1
Nutrient Digestibility (%) improvement in growing pigs trial by the use of Hostazym® X at 1500EPU/kg feed

| Item | Control | Control + Hostazym® X 1500 EPU | P Value |
|----------------|---------|--------------------------------|---------|
| Dry matter | 81.50 | 83.17 | < 0.05 |
| Crude Protein | 77.03 | 78.89 | < 0.05 |
| Crude Fat | 45.29 | 64.90 | < 0.05 |
| Crude Fibre | 32.55 | 37.86 | < 0.05 |
| Organic matter | 83.42 | 85.17 | < 0.05 |
| Gross energy | 80.97 | 82.29 | < 0.1 |

FIGURE 1
Hostazym® X degradation profile of insoluble and soluble wheat arabinoxylan



Hostazym® X is a valuable nutritional tool to support efficient pig production, both by improved zootechnical performance and better animal health status

key fact