HUVEPHARMA®

Let's Talk About Enzymes...

Impact of calcium on phytase activity and phytate breakdown

Phytase is widely used to improve dietary phosphorous (P) availability, reducing P excretion and improving nutrient utilization (both energy and amino acids). However, the magnitude of response of phytase is not always consistent and is dependent on the amount of substrate (phytate) in the diet, the level of added phytase and the intrinsic properties of the phytase used.

As phytate is a negatively charged molecule due to the presence of 6 phosphate groups, positively charged ions, like calcium, can bind to the phosphate groups, hindering the hydrolysis of phytate by the phytase and consequently the release of P.

Research has demonstrated that an excess of calcium (high calcium to available P ratio) has a negative impact on the degradation of phytate by a phytase as shown in Figure 1. Moreover, the particle size of calcium can also influence phytate hydrolysis, especially when a very fine calcium source is used instead of a course one. *(see Figure 2)*

An efficient breakdown of phytate by a phytase will keep the calcium in solution, contributing to its better digestibility and absorption.

Regarding OptiPhos®, it is strongly recommended to use the calcium matrix values together with the P values to counteract the negative impact of excess calcium and to increase the efficiency of OptiPhos®.
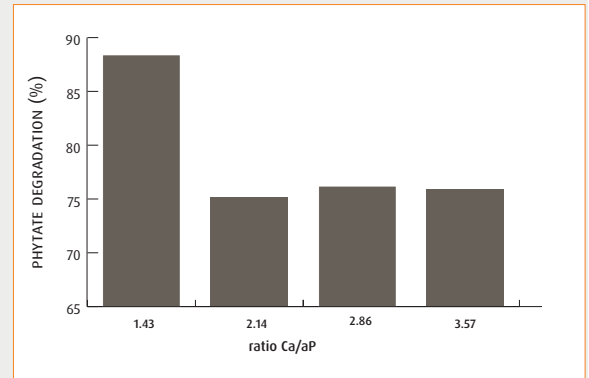

FIGURE 1
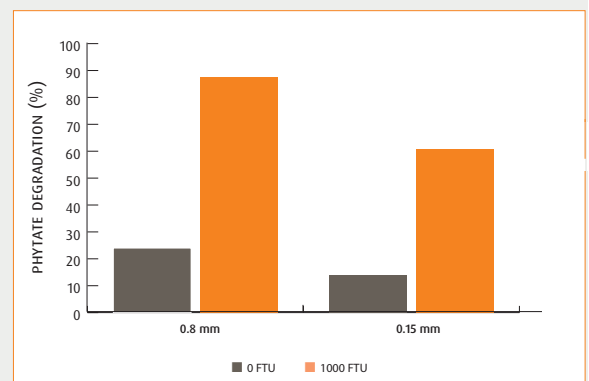Effect of increased levels of calcium to available P ratio on the degradation of phytate by 1000 FTU/kg phytase in broilers

FIGURE 2
Impact of particle size of limestone (0.15 mm versus 0.8 mm) on phytate degradation by 1000 FTU/kg phytase

key facts

- A high calcium level in the diet hinders the action of a phytase, in particular when the calcium source has very fine particle size

- OptiPhos® should always be formulated in the diet with its calcium and phosphorous matrix values to assure optimal efficiency

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Hostazym® X outperforms Axtra® XAP in broiler productivity

Commercially available NSPases vary significantly in content and type of enzymes in each product; this makes the comparison between products a technical hurdle.

The majority of times, different products (enzyme content or substrate target) are compared. Nevertheless, in current market conditions these different products compete in the same segment. An example which illustrates this is Axtra® XAP, an enzyme formulation containing xylanase, amylase and protease, which is positioned alongside fibre degrading enzymes.

To understand if an additional performance benefit could be taken from the presence of amylase and protease, a broiler performance and carcass characteristics grow-out trial was set at the Texas A&M University (USA) using corn – soybean meal based diets (pelleted) till 49 days of age.

Hostazym® X and Axtra® XAP were compared and trial results *(summarized in Figure 1)* show that:

● Only Hostazym® X had significant effects when compared with the control group (+80g and +130g body weight and 6 points and 8 points lower FCR, at day 42 and 49 respectively - $p < 0.05$)
● Hostazym® X group had better zootechnical results when compared to Axtra® XAP (+70g and +90g body weight and 3 points and 5 points lower FCR, at 42 and 49 days respectively - $p < 0.05$)
● WOG (= whole chicken with breast, legs and wings) results with Hostazym® X fed broilers were higher when compared with control and Axtra® XAP groups (78.7 % *versus* 78.2 % and 78.1 % respectively)
● White meat yield (=breast meat and tender meat) results with the Hostazym® X fed broilers were higher when compared with control and Axtra® XAP groups (26.0 % *versus* 24.9 % and 25.0 % respectively)

Based on the additional performance benefits, the economic calculation shows that Hostazym® X can give an extra net savings of 6 and 10 Euro cents per chicken at 49 days when used instead of Axtra® XAP.
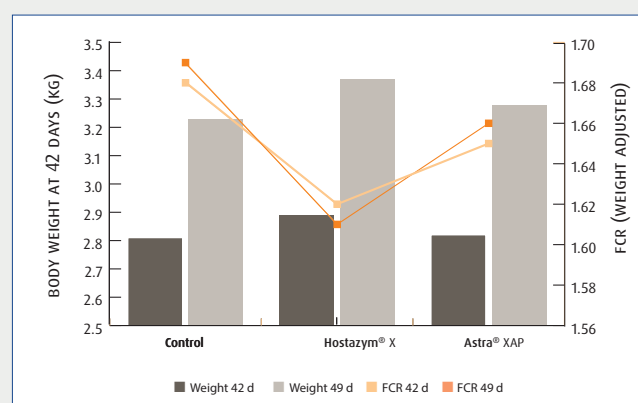

FIGURE 1
Hostazym® X outperforms Axtra® XAP in broiler performance: final weight and FCR at 42 and 49 days of age

key facts

Hostazym® X outcompetes Axtra® XAP with:
● **Extra technical performance: up to 90g higher final weight and 5 points improved FCR**
● **Better carcass quality: up to 1% more meat yield**
● **Better economic performance: up to 10 Euro cents extra per broiler at 49 days**

Added value of Hostazym® X and B-Act® combination

Probiotics are increasingly used in commercial animal production to positively influence gastrointestinal microflora and, as a consequence, improve animal health and productivity. Probiotics gained special attention as a tool to reduce the use of sub-therapeutic antibiotics, due to the international pressure for the responsible use of antibiotic in animal production.

It has already been demonstrated that competitive exclusion mechanisms, impairment of gut wall colonization by pathogenic bacteria, production of bacteriocins and immune modulation are part of the probiotics' mode of action, and that the mode of action is dependent on the microbial strain used therein.
In addition to the use of probiotics, it is already common nutritional practice to use enzymes as digestibility enhancers. In particular, phytases and fibre degrading enzymes are standard in modern broiler production.

The results of the trial are summarized in Figure 1 and clearly show the added value of the combination of products. When B-Act® was added to the control diet, final body weight increased by 156g and reduced feed conversion by 10 points. Using Hostazym® X in addition to B-Act® increased the broiler performance further, with an extra 48g in final body weight and an extra 2 points reduction in feed conversion.

Moreover, an economic evaluation *(see Table 1)* shows a benefit up to 51€ per 1000 birds when the product combination is used (versus 32€ benefit when B-Act® is used alone).

FIGURE 1
Effect of different treatments on weight gain and FCR at the end of the trial

TABLE 1
Economic performance calculation per 1000 broilers at different broiler prices

Treatment group	Broiler sales income* (€/1000 birds) at a broiler price of (€)		
	0.8	1	1.2
Control	797	1321	1846
B-Act®	920	1476	2031
Hostazym® X	952	1517	2082

* sales price minus feed cost
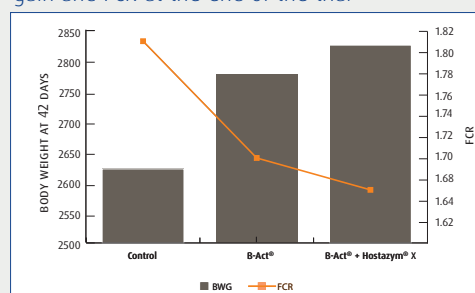
key facts

Hostazym® X in addition to a feed containing B-Act® can:

● **Increase final body weight - extra 48g and reduce FCR by 2 points**

● **Increase economic gain of up to 0.05€ per broiler produced**

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HOSTAZYM® X IMPROVES FEED DIGESTIBILITY
AND PIGLET PERFORMANCE IN LACTATING SOWS

It's accepted that improved feed digestibility and a heathier digestive process support fermentation processes and energy metabolism. These processes are of interest as they help the sow to keep a good physical condition.

Additionally, a link between a healthier sow during lactation and progeny performance can be expected. To support the efficacy of Hostazym® X in lactating sows and its direct link to piglet performance, a trial was set up. The trial was conducted at IMASDE – Spain using 32 lactating sows (Landrace x Large White) individually housed. Sows were (equally distributed by parity and body condition to one of the two treatments (16 replicates of one sow per treatment). The trial compared a control group fed with barley, wheat and corn based diet with a group fed with the same diet supplemented with 1500 EPU/kg feed of Hostazym® X. The trial started at day 110 of gestation and lasted until weaning (day 21 *post-partum*).

Technical performance of the sow (feed intake, back fat thickness at P2) and of piglets (weight at birth, growth, and born alive) was measured. Additionally, the total apparent faecal digestibility was calculated. Results, summarized in Table 1 and Table 2, clearly show that:

● The number of piglets per sow in the Hostazym® X group was higher (+0.4 piglets)
● Despite the piglets' weight at birth being lower (-0.25 kg, P< 0.05) on the Hostazym® X group, the piglet performance was better, leading to better growth (+10 g/d), catching up for the lower starting weight
● Hostazym® X addition led to a significant increase in total apparent faecal digestibility of dry matter, crude protein, fat and insoluble fibre (P<0.05)
● Hostazym® X addition improved gross energy, crude fibre, cellulose and hemicellulose digestibility (0.05 < P < 0.10)

TABLE 1
Effect of Hostazym® X in lactating sows and piglets

Parameter %	Control treatment	Hostazym® X treatment
Loss of backfat thickness P2 (mm) during lactation	2.4	2.3
Average feed intake (kg/day)	5.32	5.32
Number of piglets born alive	12.4	12.8
Piglet weight at birth (kg)	1.76[a]	1.51[b]
Piglet weight at weaning (kg)	5.7	5.7
Daily gain (g/d)	202	212

* a,b: values in the same row with different superscript are sign. diff. P < 0.05

TABLE 2
Total apparent faecal digestibility of feed nutrients during lactation (d 18-21 post-partum, %)

Parameter %	Control treatment	Hostazym® X treatment
Dry matter	72.9[b]	75.4[a]
Crude protein	75.1[b]	78.3[a]
Fat	73.8[b]	76.6[a]
Gross energy	74.5[y]	76.4[x]
Crude fibre	29.1[y]	34.6[x]
Cellulose	40.5[y]	45.6[x]
Hemicellulose	49.0[y]	53.8[x]
Total NSP	48.4	51.4
Dietary fibre - *total*	36.4	40.8
Dietary fibre - *insoluble*	72.2[b]	79.2[a]
Dietary fibre - *soluble*	55.1	58.3

* a,b: values in the same row with different superscript are sign. diff. P < 0.05 x,y: values in the same row with different superscript are sign. diff. 0.05 < P < 0.10

key facts

Hostazym® X at 1500 EPU/kg:
● **significantly increases the digestibility of lactating sows' feed**
● **improves progeny performance by giving extra piglets with better growth (without losing body condition or increasing feed intake of the sow)**

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