HUVEPHARMA®

Matrix values for OptiPhos® in pigs: new update required?

As phytase liberates phosphorus from the phytic-acid molecule, it replaces the inclusion of inorganic phosphorus (for instance from mono-calcium phosphate (MCP)) in feed formulations. To calculate how much MCP can be taken out of the feed formula when a phytase is used, many trials have to be performed with different inclusion levels of phytase to be able to have a reliable estimate.

In pig nutrition, mostly the P value of a phytase is expressed as digestible P (Dig. P), which represents that proportion of dietary total P that is not recovered in faeces. The determination of dig. P requires animal studies with quantitative determination of P intake (by feed) and P excretion with faeces. The difference is considered to be absorbed from the gut and represents the dig. P. Normally it is considered that an inorganic P source as MCP is 80 % digestible. The amount of phophorus that can be replaced by phytase can be calculated by dividing the found dig. P by 0,8. This value is the amount of P from inorganic sources which can be replaced by P liberated from phytate through the action of a phytase.

Matrix values for OptiPhos® have been established in the past based on peer reviewed data and are shown in Table 1. Feeding trials have also led to the establishment of energy values and protein values for phytase, mainly due to the reduction of the antinutritional effect of phytate in feed by the use of a phytase.

Table 1. Advised Matrix Values for OptiPhos® in pigs

	250 OTU	500 OTU	750 OTU	1000 OTU
P (g/kg)	1,2	1,48	1,7	1,95
Dig. P (g/kg)	0,96	1,2	1,36	1,56
Ca (g/kg)	1,2	1,48	1,7	1,95
Crude protein (g/kg)	2	3	3,8	4,2
ME (kcal)	9,5	14,25	18	19,5

A recent pig digestibility study in the Netherlands has yielded dig. P values which were higher than those mentioned in Table 1 (Figure 1. For additional information see Technical Bulletin 23). In this trial, a negative control (1,1 g dig. P background) was supplemented with 1,3 g P as MCP (positive control) or with 125, 250 or 375 OTU OptiPhos®. Results indicated that OptiPhos® equivalence was 1,23, 1,55 and 1,63 g P at 125, 250 and 375 OTU OptiPhos® respectively. Although this is only one trial, it confirms the fact that the proposed OptiPhos® matrix values for pigs are conservative and are on the safe side.

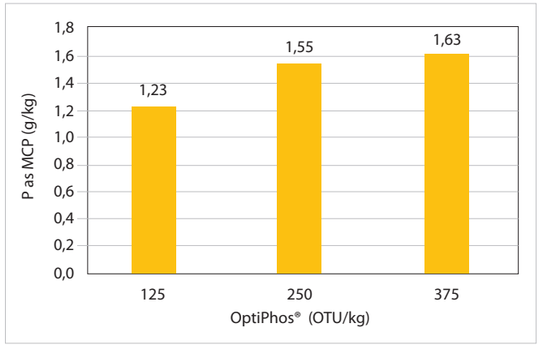

Figure 1. Equivalence between phytase activity (OTU/kg feed) and P as MCP (g/kg feed); TB23

CONCLUSION:

- ***The currently advised Matrix Values for OptiPhos® in pigs are scientifically proven and supported by its successful field application.***

OptiPhos® The Advanced Phytase

Enzymes Newsletter Q1 / 2015

HUVEPHARMA®

Let's Talk About Enzymes...

OPTIPHOS® SUPERDOSING = DOUBLE DOSING

Recently a lot of papers have been published raising attention about overdosing of phytase, with as goal to obtain better growth and feed conversion. Although for many phytases this is claimed to be a 'new effect', already 10 years ago, the ability of OptiPhos® to improve growth and feed conversion in broilers was proven by Cornell university, leading to a patent already granted in 2008 (patent no US 7972805)

Mode of action behind overdosing phytase

Phytate is the natural storage form for phosphorus, present in all raw materials of vegetable origin. It's a molecule which consists out of a ring-structure of 6 carbon atoms (inositol ring) onto which phosphate groups are attached. Phytate is a very difficult molecule to break down by nature. Pigs and poultry lack the ability to produce sufficient phytases themselves to breakdown phytate, so only with the help of added phytase to the feed the phytate molecules can be destroyed.

Phytate, an anti-nutritional factor

Phytate, especially when it is fully intact, acts as an anti-nutritional factor (ANF). Due to its negative charge it binds positively charged minerals, amino acids, fatty acids and even starch which are then unaccesible for the animal. High phytate contents in feeds can therfore lower the zootechnical performance of animals dramatically.

When the phytate molecule is disintegrated by the phytase, and phosphate groups are removed, the phytate molecule loses its ability to bind the nutrients. The binding of nutrients by the phytate typically takes place at higher pH levels, say above pH 4. This is why it is very important to destroy the phytate molecules early in the upper digestive tract where the pH is low (below 4), and before the phytate binds the nutrients.

OptiPhos® has shown, compared to other phytases, to be the fastest working phytase at low pH and in a relatively wide pH range (pH 2-5). OptiPhos® works between pH 2 and pH 5 constantly at its maximal capacity and it resists the breakdown by naturally present pepsin in the stomach. Because of this, OptiPhos® is the ultimate phytate destroying enzyme under the conditions present in the animals digestive system.

OptiPhos® super dosing effects already present at double dose

When OptiPhos® is applied at a dose higher than required for phosphorus release only, animals will show a better growth and feed conversion. This effect is the so called overdosing or superdosing effect of OptiPhos®. Because OptiPhos® is a highly effective enzyme, even at double the basic recommended dose the superdosing effects can be seen. Several trials have shown that double dosing of OptiPhos® can yield extra live weight up to 50-100 g and improve feed conversion up to 5 points. When calculating the return on investment, it is clear that this extra growth without increasing the feedconversion gives much higher revenue than formulating on phosphorus release alone.

KEY FACTS:

- ***Superdosing effect was already noticed 10 years ago with OptiPhos®. It has already been patented in 2008.***
- ***Overdosing phytase is a method to breakdown as much phytate as possible in order to eliminate the anti-nutritional effects of phytate***
- ***The super dosing effect of OptiPhos® is already achieved at double the normal dose.***
- ***OptiPhos® is pepsin resistant, has the ability to work at low pH, works at a broad pH range and works at high speed, which makes it the ultimate phytase to breakdown phytate efficiently under conditions present in the animal.***

OptiPhos® The Advanced Phytase

www.agrihealth.co.nz 0800 821 421 AgriHealth Evidence based vet medicines

Enzymes Newsletter Q1 / 2015

HUVEPHARMA
We add performance to your business

Supplier claimed matrix values for phytases in poultry diets: do they match with science?

In recent years, new phytases have been launched claiming to be more efficient than existing ones. The main reason for using a phytase is to reduce the costs of the feed by liberating P bound as phytate in raw materials. Inorganic P addition can be reduced, which saves costs and reduces P excretion to the environment. Each phytase comes with matrix values provided by the supplier. The higher these matrix-values are, the more interesting the phytase becomes for the nutritionist when calculating with least cost formulation. The question is, however, if all these matrix values are correct and reliable?

To build reliable matrix values many trials need to be conducted and with agreed and robust protocols. Most of the trials are done 'in-house' by the enzyme suppliers themselves, and as such can be strongly biased. Only trials done by independent research institutes, which are published in scientific peer reviewed journals form an adequate and solid base for determining and comparing matrix values of phytases.

For this purpose, a search for independent papers, published in peer reviewed magazines and journals, in the time period 2002-2013 was performed, and matrix values were derived from this search by meta analysis. Phytases with insufficient peer reviewed and published data were excluded from the meta analysis (see Table 1).

KEY FACTS:

- ***Commercially advised supplier matrix values for most phytases are more than 20% higher than the scientifically proven matrix values obtained from peer reviewed trials, with the exception of OptiPhos®.***
- ***The 2015 matrix values for OptiPhos® reflect better the true potential of this phytase.***

Table 1. Number of observations from peer reviewed studies (published 2002-2013) used for the calculation of the matrix values of the different phytases.

	Natuphos®	OptiPhos®	Phyzyme®	Ronozyme® P	Quantum®	HiPhos®
Total number of observations	48	31	39	26	12	24
Trials with bone-ash response	33	27	10	23	5	5
Trials with digestibility response	15	4	29	3	7	19

Fig. 1 and 2 show the results of this survey for single and double advised dose of every phytase. Blue dots represent the scientific matrix value (aP). Brown dots are the supplier matrix values. Grey dots represent the earlier advised values.

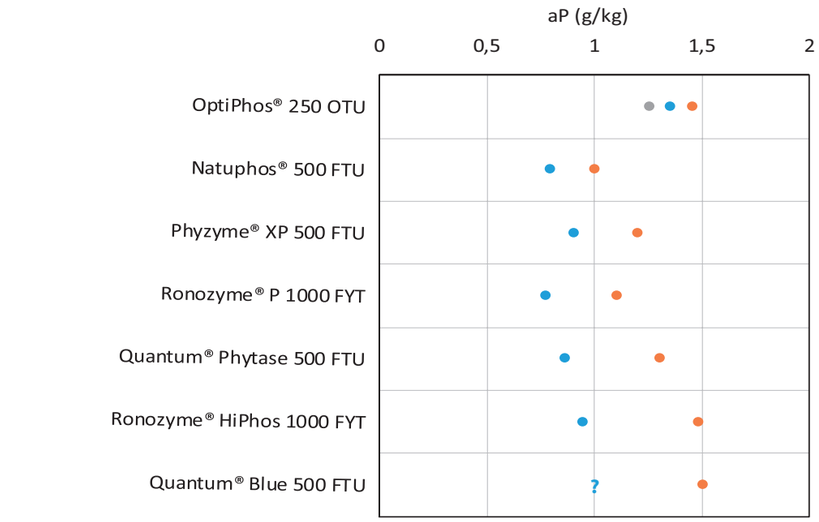

Fig. 1: Commercial vs. scientific matrix values at single dose.

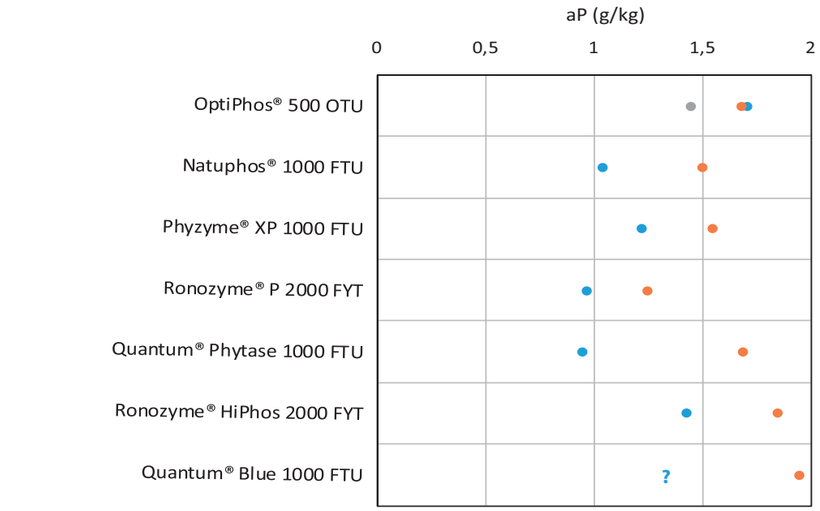

Fig. 2: Commercial vs. scientific matrix values at double dose.

From these figures it is clearly shown:

1. The earlier advised OptiPhos® matrix values were a real underestimation of the potential of this phytase.

2. All phytase sources, except OptiPhos®, have supplier matrix values which are more than 20% higher than the scientific matrix values.

3. The 2015 matrix values for OptiPhos® are in accordance with the scientific matrix values.

CONCLUSION:

- ***OptiPhos® is the only phytase where the supplier claimed matrix values are close or equal to the scientific matrix values derived from peer reviewed trials.***
- ***OptiPhos® has proven in trials at research institutes, but also in practical feed formulations to release phosphorus efficiently and in coherence with the advised matrix values, and thereby improves the zootechnical results while lowering the costs of meat and egg production.***

OptiPhos® The Advanced Phytase