

## PHYTASE CHOICE AND DOSING: SEPARATING FACT FROM FICTION

Despite widespread use of phytase in poultry diets there still remains a lack of clarity regarding how to maximise value by selecting the best phytase and dose. In this article we will separate fact from fiction regarding the value of different phytases and doses.

### **All phytases work economically at high doses – Fiction**

The value of a phytase dose can be affected by many different factors including the source of the phytase chosen. The latest generation of phytase products (e.g. Buttiauxella phytase) offer higher efficacy in dealing with phytate and phytate-protein complexes. They also work at increasingly lower pH levels to ensure speedier and more complete degradation of phytate earlier in the digestive tract. As a result, this next generation product offers available phosphorus release values that are 50% higher than the older generations at the same analysed phytase inclusion level.

### **It is important to choose a phytase that degrades phytate rapidly and more efficiently at low pH – Fact.**

To eliminate the anti-nutritional effects of phytate it is important to degrade it as quickly and as completely as possible in the upper gastrointestinal tract of the animal. The Buttiauxella phytase has an optimal pH that better matches the pH level found in the proventriculus and gizzard of a broiler, where pH can be as low as 2.5 and feed has a residency time of 40-60 minutes.

### **Feed type must be taken into account when selecting a phytase dose – Fact**

There is strong evidence that feed type and the efficiency of a high phytase dose are linked. Research shows that a new generation phytase more than doubles the rate of phytate degradation in a diet with average phytate levels. This effect is amplified in diets with higher phytate levels. Research also demonstrates that phytase not only improves digestibility of phosphorus but can also significantly increase fibre digestion. This is because phytate and fibre are present in a matrix in the feed and therefore any impact on either phytate or fibre will relax the matrix and impact hydrolysis of both. Hence response to a high dose of phytase may be influenced by the presence of other feed enzymes and their impact on antinutrients. More recently discussions have focused on impacts of calcium to phosphorus ratio on phytase efficacy. Reductions in phosphorus digestibility due to phytase addition have been observed when increasing the calcium to phosphorus ratio. This is thought to be due to higher amounts of calcium ions



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having more opportunity to chelate with phytate hindering the phytase's access to it. A higher dose of phytase would likely overcome this effect by hydrolysing the phytate molecules before they bind with calcium. The use of the latest, more efficacious phytases has been shown to be unaffected by changes in calcium level.

### **High doses always work well in all ages of animals – Fiction**

Performance improvements using a high dose of phytase are more consistently seen in young animals than in older animals and poultry. Benefits of a high phytase dose are influenced by animal age, gut physiology and differences in available diets/ingredients. In young animals, higher dietary phytate levels are typically seen (e.g. due to inclusion of high-protein meals) where a quick removal of phytate can result in strong performance benefits. Differences in gut physiology, including pH and digesta transit time, between young and older animals can also explain some of the different responses to phytase dose that can be observed. At the same time, older animals may benefit from a high dose if specific ingredients (e.g. high phytate and fibre ingredients) or nutrients (minerals such as calcium) are included in the feed.

### **High doses of phytase increase myo-inositol levels which improves performance – Fiction**

Research studies have shown phytase can effect myo-inositol levels in the blood and affect parameters such as serum glucose and serum lipids in poultry. Conclusive evidence for the complete dephosphorylation of phytate in feed does not exist so the mechanism is theoretical.

### **Conclusion**

In my opinion, the question is not necessarily whether phytase is beneficial at a higher dose; rather it is, when can a dose-specific recommendation bring maximum value? Phytases should be strategically applied at levels appropriate for delivering the greatest benefit to poultry producers dealing with particular species, dietary and other conditions.