Phytase Unit Myth!

Today, there are many commercial enzyme products in the market, each with a seemingly ambiguous system of units and dosing recommendations. The plethora of measuring unit systems is because the analytical method of quantifying each enzyme activity is specific to this unique product. Each unit system is often developed by the enzyme producer and the overriding purpose is to control and document enzyme activity in the enzyme product and finished feed or premix. In addition, as each enzyme product is derived from a distinct manufacturing process (enzyme source, activity strength, and formulation) that determines its efficacy, different products can have different recommended dosages. Obviously, this situation makes it extremely difficult to compare the efficacy of two enzyme products, and as such, enzyme units are not a suitable tool for this purpose.

In the case of phytases, the major manufacturers have worked together in standardizing the analytical procedure for measuring the activity in enzyme products and feed samples. This was done under the auspices of FEFANA (EU association of feed additives and premixure operators). The standard method was evaluated in an inter-laboratory study in cooperation with the European Commission’s Community Reference Laboratory (CRL). Finally, the method became an ISO (International Organization for Standardization) standard. In brief, one phytase unit (U) is the amount of enzyme that releases 1 micromole of inorganic phosphate per minute under specified laboratory conditions: ie. from a 5 millimolar solution of purified sodium phytate at pH 5.5 and 37 °C.

Here it should be noted that activity and concentration are two different things. As such, units describing activity (such as those provided for labeling purposes) have absolutely no value in comparing two different products. Moreover, it is important to stress that enzyme activity refers to the ability to perform a certain action under the specific assay conditions. And, as the assay conditions are quite different from the conditions inside the animals, it is clear that the ability to perform under assay conditions is not the ideal way to predict which of two different phytase products will be most efficient in the animals.

So, what is the best way of comparing two phytase products?

First of all, products should be compared based on the cost of application or saving potential (or ‘cost of treatment’) and not on the cost per unit of phytase or cost per kg of product. The only valuable method to compare enzyme products is the performance of the recommended dosage in carefully planned and conducted efficacy trials with the relevant animal species. The real value of a given enzyme product is therefore the value obtained in the animals (better performance or reduced feed costs) relative to the application cost. Naturally, other quality parameters such as stability under storage and processing, mixability and safety should also be taken into consideration. In conclusion, two phytase products can be compared only on their in-vivo efficacy, net feed costs savings and other benefits. The units must be reserved for analytical purposes such as quality control and product documentation.