One of the largest problems facing poultry producers is the rising cost of feed, which can account for up to 70 percent of total production expenses. Enzyme feed additives, which improve digestibility and release of nutrients to the bird, allow producers to manage feed costs while optimizing performance and return on investment (ROI).

**Why Use Feed Enzymes?**

Feed enzymes provide an array of nutritional, economic and environmental benefits for animal producers.

**Nutritional Benefits:** Enzymes increase the availability of nutrients to the animal. Enzymes make proteins, carbohydrates and minerals easier for the animal to digest, helping to promote cell growth, physiological balance and tissue maintenance.

Enzymes also improve feed digestion by breaking down components in feed not easily digested by the animal’s endogenous enzymes. Finally, enzyme supplementation can be used to naturally enhance feed digestion in young animals, which have relatively low levels of enzyme production.

**Economic Benefits:** By optimising the release of energy sources to the animal, enzymes allow producers to manage changing costs of animal feed ingredients. Enzymes can also reduce the effects of variable feed ingredients by enhancing the animal’s ability to obtain nutrients from feedstuffs. Additionally, feed enzymes allow producers to improve animal performance and growth.

**Environmental Benefits:** When animal feed is supplemented with enzymes, less nitrogen, ammonia and phosphorus are released into the environment. Exogenous enzymes, which are derived from naturally occurring substances, have low toxicity, making them safe for animals, people and the environment.

**Classes of Enzymes Used in Poultry Production**

There are three main classes of enzymes used in poultry production: phytases, carbohydrases and proteases.

Phytases break down phytate, a substrate that contains phosphorus, which is an essential nutrient for growth, cell maintenance and tissue repair. For example, corn, a major component of a typical poultry diet, contains significant amounts of phytate. Adding phytase to poultry feed allows the animal to use more of the phosphorus within the feed.

Carbohydrases break down fibre to improve the digestibility of carbohydrates in feed, thus increasing the amount of nutrients an animal can use for energy and growth. The primary types of carbohydrases used in animal nutrition include xylanase, which breaks down arabinoxylans; beta-glucanase, which breaks down glucans; and beta-mannanase, which breaks down beta-mannans.

Although chickens naturally produce enzymes that aid in the digestion of carbohydrates, they do not produce enzymes needed to break down the fibre within feed.

Proteases break down complex proteins into shorter proteins, called peptides, and amino acids, which are the building blocks of protein. They are also capable of breaking apart proteins that bind starch within feed ingredients, thus making more of the energy found in starch available to the animal.

**Selecting a Feed Enzyme Product**

Selecting a feed enzyme additive from the multitude of products available on the market today can be challenging. We have identified eight key factors to consider when comparing feed enzymes to help you select the best ones for your operation.

**Do you want to reduce feed cost or improve performance?**

This is one of the most important questions a nutritionist or decision-maker should ask when considering enzyme options. Based on your enzyme-use strategy (diet reformulation or on-top application), you can calculate your potential return on investment (ROI). On average, the use of an enzyme feed additive in poultry diets should provide two to five times ROI, depending on feed prices, formulation, quality and the performance parameter being measured.

**Reformulation**

Use the matrix value information provided by the enzyme manufacturer and least-cost formulation software to calculate potential feed cost savings.
On-Top Application

To calculate the value of performance improvement from on-top application of the enzyme product, consider improvement in feed conversion ratio (FCR), higher body-weight gain, fewer days to market, reduction in mortality, improvement in eggshell quality or other related factors.

Does the enzyme improve the digestibility of your specific feed formulation?

It is important to select the class and type of enzyme that works well with the feed ingredients being used. This can be broken down into two parts:

a. Class (es) of enzymes: The type of feed ingredients impacts the type and amounts of substrates present in the feed. In general, the majority of commercial poultry diets have substrates for phytases, proteases and xylanases, while the need for other enzymes like beta-mannanases, beta-glucanases and others may depend on the specific feed formulation.

b. Enzyme types (within each enzyme class): Certain types of enzymes within each class work better with certain types and amounts of substrates. For example, certain types of xylanases work better than others in low-fibre diets such as corn-soy. Whether your feed formulations contain wheat, corn, soybean meal or other ingredients, it is important to select enzymes optimised for those specific diets. Reviewing the results of animal feeding trials and speaking with trusted experts will provide more insight.

Is there a proven mechanism of action for the type of enzyme being considered?

Each class of enzyme under consideration should have a clear and scientifically proven mechanism of action in poultry nutrition. For example, xylanases are known to work by reducing digesta viscosity, leading to improved access of nutrients by the endogenous enzymes and freeing encapsulated nutrients trapped in the grain cell wall.

Is the enzyme product thermostable enough to withstand pelleting under your feed mill conditions?

If you plan to mix the enzyme in your feed before pelleting, it is important to select an enzyme product that is thermostable and capable of withstanding the high temperatures inherent in the pelleting process. Pelleting conditions, including temperature, conditioning time, how fast the pellets are cooled, dye size and other factors, have an impact on whether or not the enzyme “survives” the pelleting process. Enzymes achieve thermostability either intrinsically or through coating. Coated products may take longer to break down and dissolve in the animal’s gut, allowing less reaction time with feed. Intrinsically thermostable enzymes are specifically developed to withstand high temperatures without coating and therefore be more effective.

What is the pH activity profile of the enzyme?

Nutrient absorption takes place in the hindgut, where pH ranges from neutral to alkaline. Ideally, an enzyme should survive at the low pH ranges but be most active around the neutral pH – the range at which the majority of digestion occurs. A suboptimal pH activity profile may be compensated by higher dosing (adding more enzyme), which also increases inclusion costs. It is important to note that an enzyme’s activity can be reduced or eliminated if its structure is altered. When selecting an enzyme,
be sure to ask if it will withstand your pelleting process as well as the acidic conditions within the animal’s gut without losing effectiveness.

**Are the enzyme(s) compatible with other enzymes you are using?**

Supplementing animal diets with a phytase, a protease and a xylanase is becoming more common. Each type of enzyme acts upon different substrates and has a specific impact on nutrient release. Manufacturers of enzymes typically claim a matrix value for their products. It is important to select an enzyme whose individual effect is additive when used with other enzymes and to adjust the matrix to maximise animal performance and ROI.

**Under what quality standards is the enzyme produced?**

Given that enzymes are produced using microbial fermentation, it is very important to work with an experienced manufacturer with proven quality control. While the use of GMP (Good Manufacturing Process) standards provide good general quality control, the European Feed Additives and Premixtures Quality System (FAMI-QS) is the only certification specific to the manufacture of specialty feed ingredients for use in animal nutrition. FAMI-QS certification includes requirements in the areas of quality and feed safety, management systems, traceability and product regulatory compliance. Most suppliers guarantee a certain minimum enzyme activity that can be verified by standard analytical methods.

**Does the enzyme product contain other enzymes or side activities?**

Certain enzyme products in the marketplace include side activities of other enzymes. While having other enzymes in the product may seem attractive, paying for enzymes that do not provide proven value may reduce the product’s ROI. When evaluating an enzyme blend product, it is important to consider whether all of the enzymes are necessary. This can be determined by the following:

- Which enzymes in the product have a clear, scientifically backed mechanism of action?
- Which enzymes in the product have guaranteed activity levels?
- What do the activity numbers (dosage) mean in terms of incremental performance improvement in the animal?
- Is there enough substrate in the feed for additional enzymes in the product?
- Does the animal have its own endogenous version of the same enzyme?

Not all enzymes are created equal. There are a wide range of enzyme feed additive products on the market, and a lot of information to digest. Taking the time to research various options upfront will increase your chances of success in improving animal nutrition, performance and feed costs.

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**About the author**

Gaurav is a biotechnologist with extensive experience in the feed enzymes space. He helps BRI’s customers and network of distributors apply enzyme solutions to reduce feed costs. Gaurav earned his Bachelors degree in Biotechnology Engineering from Mumbai University (India) and Masters degree in Microbial Biotechnology from North Carolina State University (USA).

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**About BRI**

Founded in 1999, BRI is a global biotechnology company specialising in the research, development and manufacture of high-performance enzyme feed additives that help poultry and swine producers optimise animal nutrition. BRI products are effective tools for managing rising feed costs and feed ingredient quality variations in a way that is safe for animals, humans and the environment. The company has earned a reputation as a team of trusted enzyme experts who utilise their scientific expertise to create innovative products that solve nutritional and sustainability challenges facing meat producers around the world.

The company recently celebrated its 15th year of innovation animal nutrition, attributing its success to the growing demand for its market-leading protease enzyme (Versazyme®), the launch of a new enzyme feed additive (Xylamax™) and expansion into new markets through a network of strategic partners in high growth markets, including South Asia and Latin America.

**Product Portfolio**

The BRI product portfolio was launched with the protease enzyme feed additive Versazyme®, which delivers optimum protein digestibility and feed cost management. Valkerase® is a keratinase processing enzyme developed to improve feather processing and the quality of feather meal as a sustainable source of digestible proteins and peptides.

In 2014, BRI introduced two new products, Xylamax™ and XylaQuick™. Xylamax is a high-performance xylanase enzyme scientifically proven to help producers economically deliver more high value protein in a safe and sustainable way. XylaQuick is a companion qualitative in-feed colorimetric kit for on-site testing.

**Research**

BRI continues to strengthen its position as an industry leader in the research and development of innovative biotechnology solutions for animal nutrition.

The company recently published new research showcasing the efficacy of xylanase enzymes in boosting feed digestibility and uptake in poultry fed corn-soy diets.

BRI also presented findings from previous research studies at the International Poultry Science Forum (IPSF) earlier this year. In addition, the company was granted new patents for the use of its protease enzyme in sorghum diets for poultry.

**Quality**

BRI is GMP and FAMI-QS certified for its US manufacturing facility.

“As a company, we like to talk about our progress in terms of three P’s – People, Products and Processes. Our people have worked tirelessly this past year to meet the challenges of a high-growth environment, making great strides individually and as a team. We continue to leverage our scientific expertise to develop and launch new high-performance products. As our processes continue to improve, we’ve seen our revenue increase at a compounded annual growth rate in excess of 20 percent, and production levels are expected to more than double from 2012-2015.” Giles Shih, CEO, BRI

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