



# Selecting the right NSP-enzymes to reduce poultry feed costs

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**T**he anti-nutritive activities of soluble and insoluble Non-Starch-Polysaccharides (NSP-fibre) are eliminated effectively by supplementation of NSP-multi-enzymes into pig and poultry feed. Firstly, such biological active substances cause a partial degradation of NSP-fibre to smaller molecules hence to reduce highly viscous ingesta.

Secondly, impenetrable cellulosic barriers caused by insoluble NSP-fibre are greatly removed. Furthermore enzyme linked feed energy upgrading systems enable nutritionists to precisely recalculate feed formulations on nutrient values and reduced formulation costs. The following article will lead through the specific NSPs subject transmitting practical feed formulation tools to reduce feed costs.

## **Analysing substrate fingerprints to fulfill enzyme lock-key model principles**

Feed ingredients consist of non-starch-polysaccharides (NSP) and specified NSP-fibre substrates if observed in context of enzyme physiology. NSP-fibre substrates refer to the largest heterogenic variety of polysaccharide molecules in nature and as monogastric animals do not synthesise and release any corresponding digestive enzyme, NSP-fibre substrates are practically indigestible. In contradiction, the chemically  $\alpha$ -linked polysaccharide molecules of starch substrates are highly digestible and can be depolymerised by body's own synthesised amylases enzymes.

NSP-enzymes exhibit a high specificity for the corresponding NSP-fibre substrate, hence each enzyme only breaks down a highly specific NSP-fibre substrate. As NSP-fibre substrates of different feed ingredients consist of various NSP-fibre types their typical NSP- molecule fingerprint, so called – the lock - has to be determined to develop the appropriated NSP-enzyme composition – the key. The lock-key-principle is the commonly used term to prescribe this unique one-to-one relation.

As the efficiency of multi-enzymes is linked to fine-tuned compositions and ratios of different NSP-enzymes, research on complexity of molecule determination of NSP-fibre substrates and a better understanding of NSP-enzymes implied in NSP-fibre degradation is an ongoing and one of the most targeted research focuses in feed additive business.

## **Categorising negative NSP-fibre effects in layer feed ingredients**

The negative effects of NSP-fibre play a crucial role in the digestion process of pig and poultry, this might lead to digestive limitations in the gut system and thus have to be considered in developing feed formulations. These negative effects can be categorised into two groups.

Firstly, NSP-fibre can increase the viscosity in the intestine by their high water binding capacity. As a consequence increased viscosity slows down the migration and absorption of nutrients, lowers the feed intake and reduces the access of digestive enzymes synthesised and released by the animal itself. The commonly used synonym to prescribe this phenomenon is the “Gel effect”.

Secondly, insoluble NSP-fibre can encapsulate feed nutrients which become less accessible for digestion and absorption in the relatively small intestine. These nutrients enter undigested the large intestine where they become a substrate for unintended bacterial fermentation. The commonly used synonym to prescribe this phenomenon is the “Nut shell effect”.

Digesting NSP-fibre of feed ingredients by cutting the glycosidical bonds of polysaccharide molecules and taking advantage of nutrients encapsulated by NSP-fibre, the use of a substrate adapted NSP-multi-enzyme in feed is the only available but also most effective choice.

### Fulfilling multiple feeding requirements using multi-enzyme concepts

Multi-enzyme functional activities work synergistically to break down fibre structures which result in enhanced feed digestibility. The composition and effect of these concepts have to be validated by many animal trials linked to the use of a wide range of feed ingredients and specific requirements for nutrient values of practiced local feed formulation systems for farmanimals worldwide.

Multi-enzyme concepts that combine high xylanase together with high  $\beta$ -glucanase and pectinase enzyme activity, like AVEVE Biochem’s AveMix® XG 10 and AveMix® 02 CS, have



been proven to be very efficient, reliable and cost-effective for use in different varieties of cereal-soy bean diets as well as diets with increasing use of ingredient by-products.

Besides these two main enzyme activities, such multi-enzymes are assembled with sufficient enzyme side-activities like mannanase and cellulase cutting glycosidical bonds of a broad spectrum of underrepresented NSP fibre types, e.g. mannan and cellulose.

The so called “energy-upgrading concept” using multi-enzyme can be practically approached via two different formulation exercises. Firstly, it can be added on top of the feed formulation to improve the animal performances or secondly, it can be used in feed reformulation to obtain the same or better animal performances with an increased incorporation of raw material in the feed. In practice, reformulation with regard to the energy-upgrading concept means that the nutritionist can create a new raw material matrix with adapted values for energy, linked to



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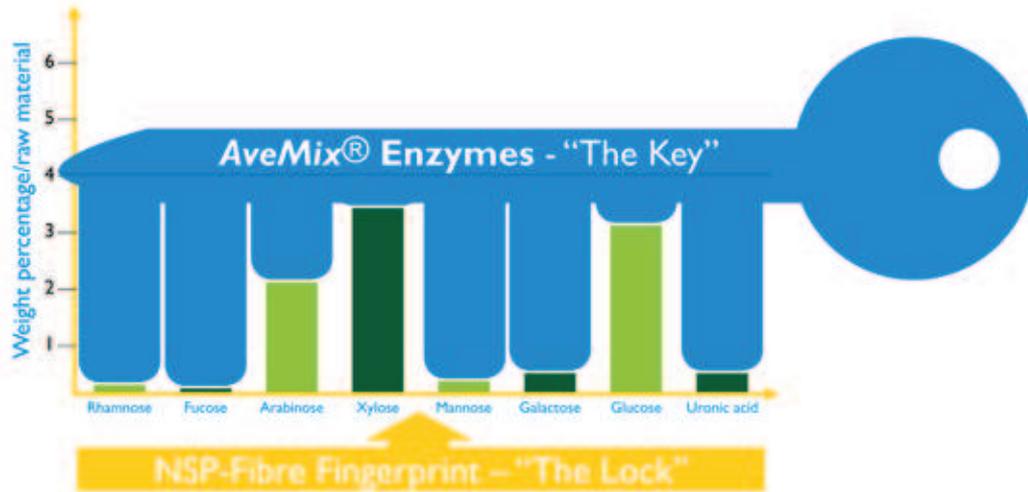
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Example: WHEAT 9,92% NSP



specific raw materials, e. g. corn and/or wheat, or by specifically reducing maximum energy requirements, considering feed formulations for young and mature animals.

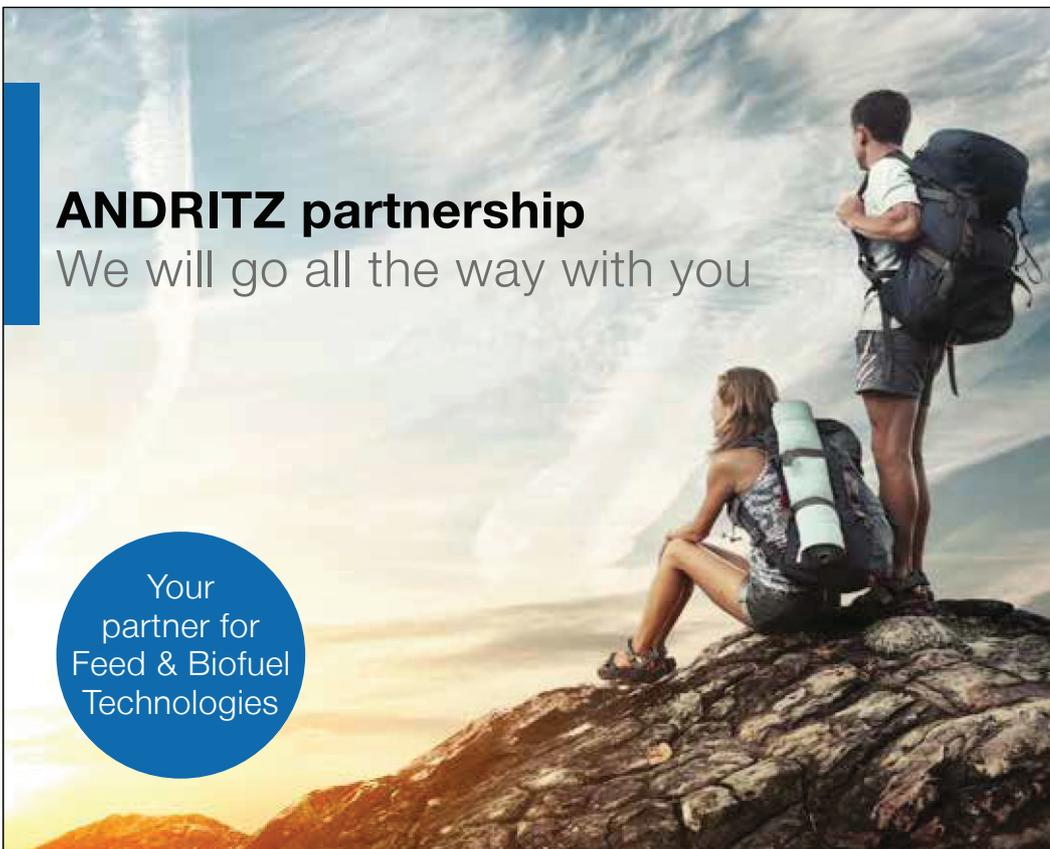
Multi-enzyme concepts are multitasking and highly effective tools for nutritionists. They allow a larger flexibility in use of raw materials and in feed formulating. At the same time, they increase animal performance and last but not least lower feed costs.

**Relying on necessary expertise formulating feed**

AVEVE Biochem NV is the feed additive division of AVEVE NV, Belgium, as AVEVE NV is the Belgian farmers' cooperative and one of the largest European agro business companies and

feed millers. AVEVE Biochem NV is the global provider of additives - Avemix® - for the animal nutrition business. Based on long lasting in-house research combined with practical application utilities, AVEVE Biochem NV has become a preferred partner of the international feed industry regarding the effective and practical use of Multi-Enzyme-Concepts (NSP-enzymes, Phytase, Protease).

In November 2009, AVEVE Biochem was granted its first European registration for the enzyme concept AveMix® XG 10 for broilers. Today AVEVE Biochem provides a broad spectrum of registered NSP-enzyme products and applications for pig and poultry feed state of the art. ☺



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