

AMINORed®: Accurate and rapid assessment of processed soya bean quality

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Soya beans are an important ingredient in animal diets. Unfortunately, raw soya beans contain anti-nutritional factors that can severely depress the performance of these animals.

Common soya products used in animal feed are soya bean meal (a by-product of soya oil extraction) and full-fat soya (the roasting and extraction of the entire dehulled bean). Both processes require the application of adequate heat to destroy the anti-nutritional factors, the most well-known of which are trypsin inhibitors found in raw beans. Trypsin inhibitors block sites where the enzyme trypsin binds with proteins during the digestion process, thereby reducing the ability to liberate amino acids and small peptides. This leads to performance and

Table 1: Chemical analysis methods for processed soya beans.

	TIA	Urease activity	KOH	PDI	Reactive lysine: Total lysine
Underprocessing	+++	+++	+	++	No
Overprocessing	No	No	++	+	+++
Target values	<4mg/g	<0,3 pH rise <0,4mgN/g*min	73 to 85%	15 to 40%	>90%
Comment	Difficult	Most common		Simple method	Difficult

health issues such as poor growth and diarrhoea.

Although underprocessing of soya beans is always a concern, the opposite is also true. Overprocessing, where too much heat causes damage to the tertiary structure of proteins and reduces enzymatic binding, and thus digestibility of the amino acids of soya beans, is often overlooked.

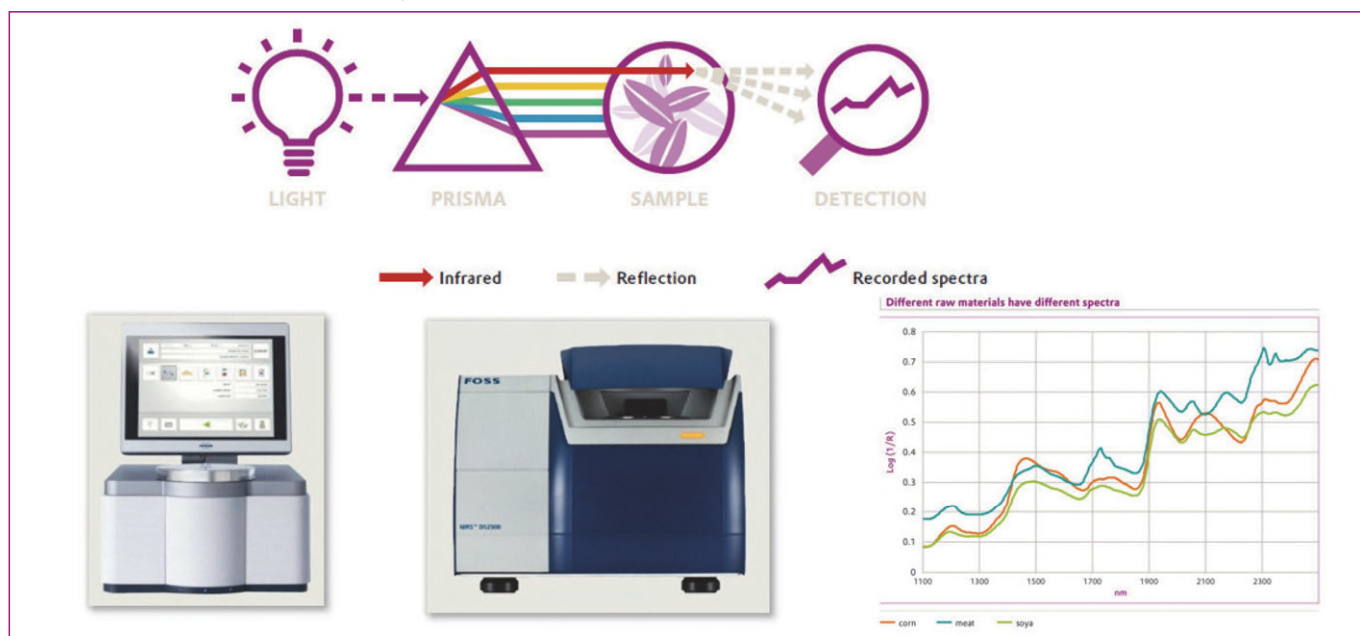
When formulating animal feed, nutritionists consider the amount of

digestible lysine in the soya bean meal or full-fat soya. Overprocessing leads to an overestimation of the amount of digestible lysine, and indeed many other amino acids, in the processed end-product.

Methods for processing evaluation

There are multiple chemical analysis methods to evaluate processed soya beans, all with various advantages and disadvantages (Table 1). Trypsin inhibitor

Figure 1: The basics of NIR technology.





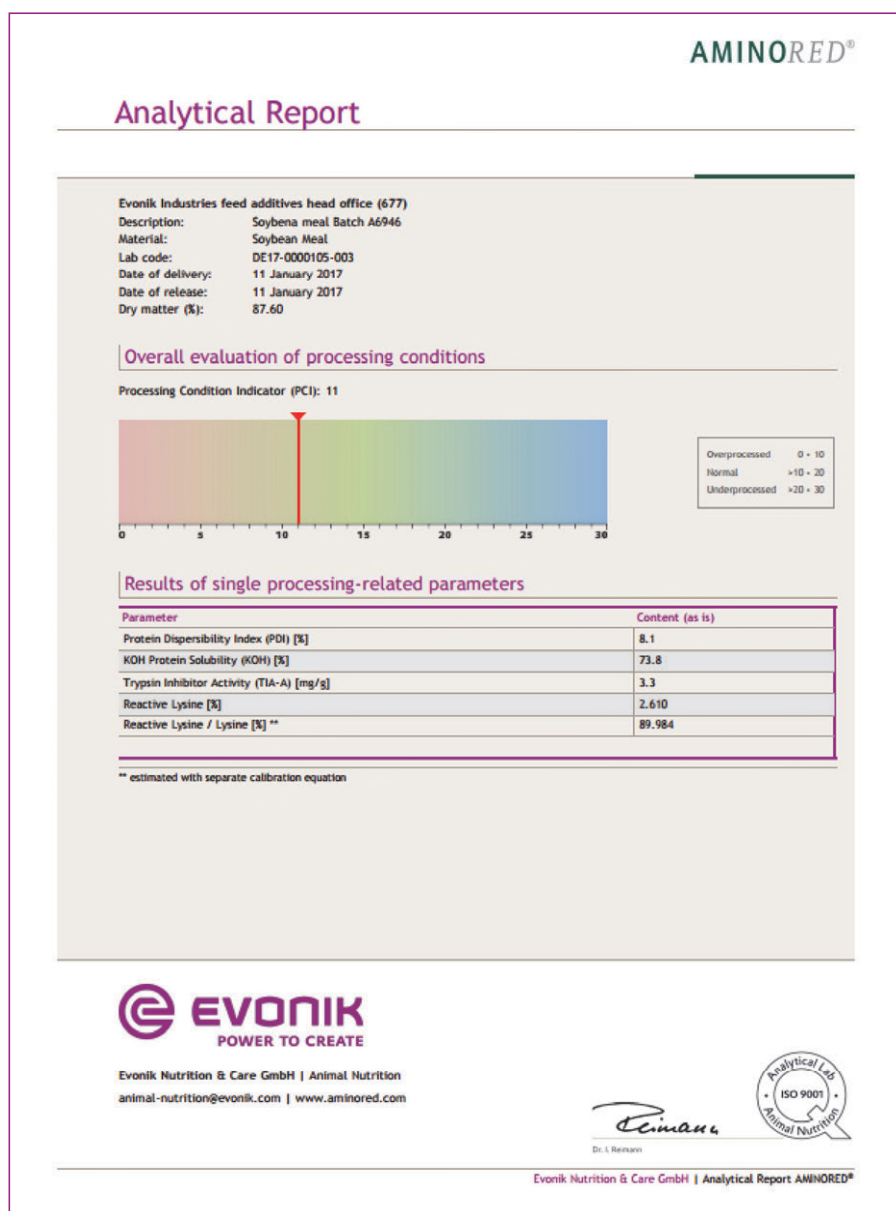
Different grades of processed soya bean meal used for the development of AMINORed® 2.0.

activity (TIA) is the most accurate test for determining underprocessing, but it is very difficult and costly to perform.

A urease test is simple and can be performed by most mills and processing factories, but results can vary depending on various factors,

including particle size and even room temperature. TIA and urease cannot give any indication of overprocessing either, whereas methods such as potassium hydroxide (KOH) protein solubility can indicate overprocessing, but not underprocessing.

Figure 2: AMINORED® analytical report depicting the PCI and predictions for parameters such as TIA and KOH.



While lesser known, the reactive lysine assay is one of the most accurate ways to determine the effect of heat treatment on amino acid digestibility and availability.

Near-infrared technology

One of the biggest breakthroughs in ingredient analysis over the past few years has been the development of near-infrared (NIR) technology. NIR spectroscopy enables the rapid analysis of raw materials by the application of infrared light to a sample and measuring the spectra of that light.

NIR is an excellent tool for quality control as it enables the analysis of thousands of samples per year with precision, accuracy and minimal cost per sample. Evonik’s expertise in this technology has enabled the development of a new calibration for the rapid assessment of soya bean processing quality – AMINORed®2.0.

This calibration was developed for the quality assessment of soya products and delivers predictions on well-established quality parameters used by the feed industry, such as TIA, KOH, and the Protein Dispersibility Index (PDI).

These parameters were combined with Evonik’s leading position in amino acid analytics, especially the reactive lysine assay, to design a new parameter – the Processing Conditions Indicator (PCI). The PCI can classify all soya products according to the degree of processing, from raw beans to heavily overprocessed samples, within minutes. (Figure 2).

Processed soya bean quality is a vital consideration for animal feed producers and soya bean processors alike. Using the latest technology will deliver benefits to all role-players in the soya bean value chain.

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