

THE SUNLUSTRE STORY

A-One Feeds were one of the first companies in the UK to recognise the full potential of a raw material, which whilst representing 50% of the world oil seed crop and being probably the most widely used protein source in monogastric animals, could be improved when combined with the latest technology.

Wet extrusion has been proven to increase the nutritive value of feedstuffs in several important ways:

- a) The controlled use of steam significantly reduces the levels of anti-nutritional factors (ANF), which are known to hamper protein digestion.
- b) Maximising nutrient availability, by breaking down plant cell material and so making them more accessible for digestion.
- c) Better amino acid availability, because of the use of wet rather than dry heat.

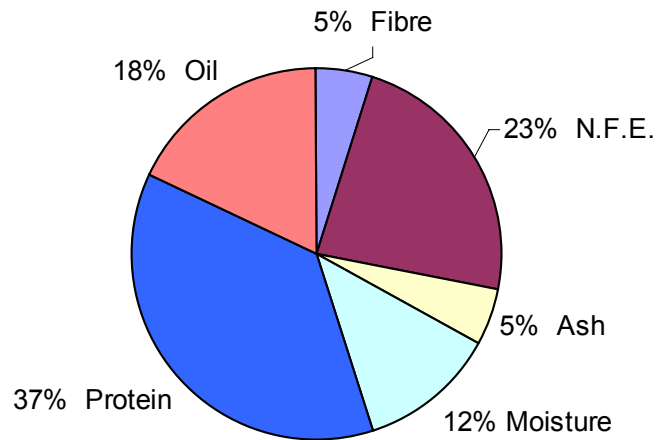
Knowing this we installed our first extruder in the late 70's and have gone forward ever since.

Although Sunlustre is a totally natural product, in that nothing is added or taken away, considerable research has gone into establishing the technology needed to produce Sunlustre as a specialist raw material. The conversion of raw soya beans into high energy, highly digestible feed requires a carefully controlled process that involves the correct level of steam, temperature and dwell time with physical shear to produce a product of the quality of Sunlustre.

Sunlustre is manufactured from only high grade U.S No 2 soya beans. In the first stage steam is employed in the destruction of the ANF, whilst at the same time protecting the protein from the damage associated with dry heating (it is generally accepted that excessive heat damage will lower protein quality). This is followed by the extrusion stage, which maximises oil availability.

The stringent control parameters employed in the manufacture of Sunlustre have been developed over a number of years, in conjunction with various institutes to enable us to maximise the potential of raw soya beans and make Sunlustre the standard inclusion in today's high performance diets.

Analyses



Lysine 2.5%

Ave Lysine 2.3%

Methione 0.58%

Meth & Cyst

Threonine 1.4%

Calcium 0.24%

Phosphorus 0.67%

Ave Phos 0.32%

Palmitic 2.0%

Stearic 0.7%

Oleic 4.5%

Linoleic 10%

Linolenic 1.1%

ME MJ/kg (cattle) 15.7

ME MJ/kg (poultry) 15.5

ME MJ/kg (pigs) 18.6

ENERGY EVALUATION

There is often much debate as to the Metabolisable energy value to be assigned to the products of various full fat soya production methods. This energy level is related to the amount of free oil, which in turn is dictated by the degree of cellular rupture, but processing must be a fine balance between maximising the oil availability (and thus ME), adequate anti-nutritional factor destruction, and minimum protein damage.

To help determine the optimal balance for Sunlustre a series of trials were commissioned at Nottingham University, to evaluate the ME of samples of Sunlustre. The results below are from one of the trials:

AME (ME/kg) : 17.2 (DM)

Dry Matter : 8%

Tiu Destruction : 90%

Sunlustre was further evaluated at the Roslin Poultry Research centre in Edingburgh. Here cockerels were used to establish the TME.

TME_n (ME/kg): 15.0 (AR)

TME_n / GE : 70%

ANTI-NUTRITIONAL FACTORS OF SOYA BEANS

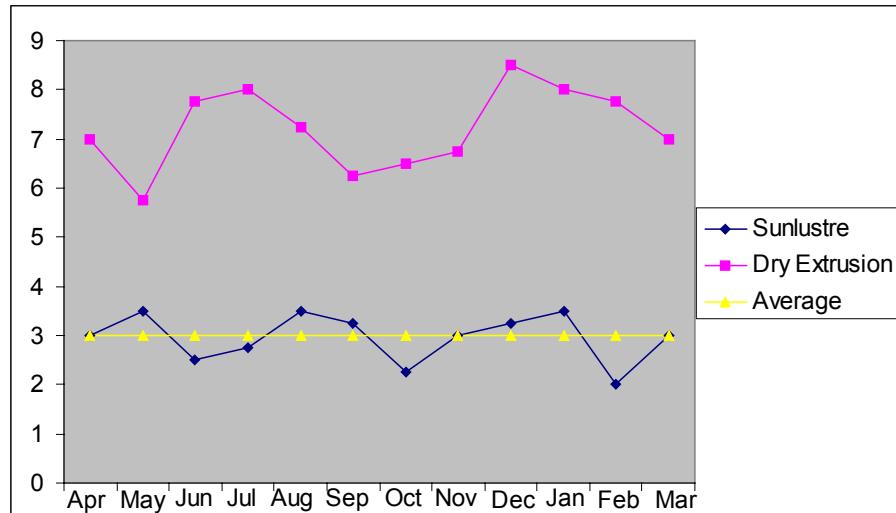
It is widely known that the legume seeds contain a variety of anti-nutritional factors. In soya beans the major factors are protease inhibitors and lectins, luckily both these are heat liable, but there is a fine balance between excessive heat treatment, which lowers protein quality, and inadequate heat treatment, leading to inferior protein digestion.

Therefore it is only by the judicious control of the processing parameters that it is possible to dictate the extent of the ANF elimination and thus subsequent animal performance.

Protease inhibitor

These components are capable of forming protein - protein complexes with the protease enzymes resulting in the competitive inhibition of their catalytic function. The most common protease inhibitors are those of Trypsin.

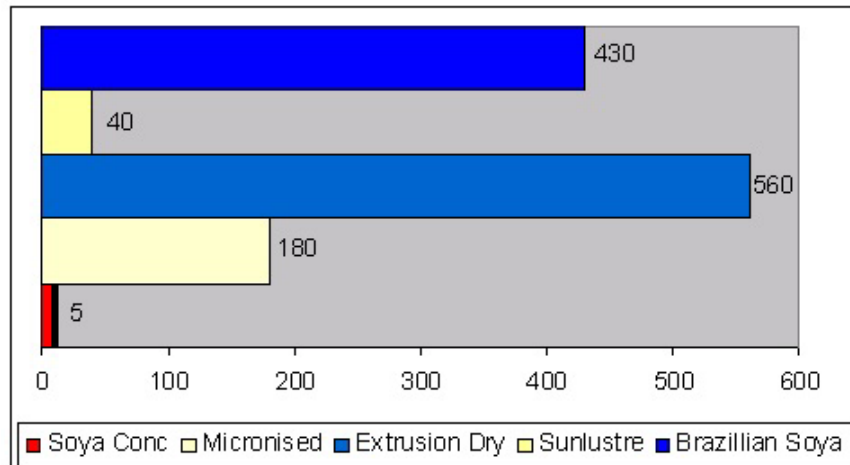
**April 1990 - April 1991
Trypsin Inhibitor Levels of Sunlustre
and a Dry extrusion Product**



Lectins

As well as trypsin inhibitors, soya beans also contain significant levels of lectins.

Lectin Concentration in a variety of soya products



Lectins pose the ability to bind to the intestinal mucosal surface, giving rise to degeneration of the intestinal membrane, alteration of intestinal permeability and impairment in nutrient absorption.

A further possibility is that the lectins are competing for binding sites with the gut bacteria, resulting in an imbalance in gut flora, i.e. colonisation by harmful bacteria rather than the beneficial lactobacilli.

The graph is the result of work by Bristol University in the development of an ELISA method for detection of lectins, it shows the differing efficiency of the various production methods in eliminating lectins.

Conclusion

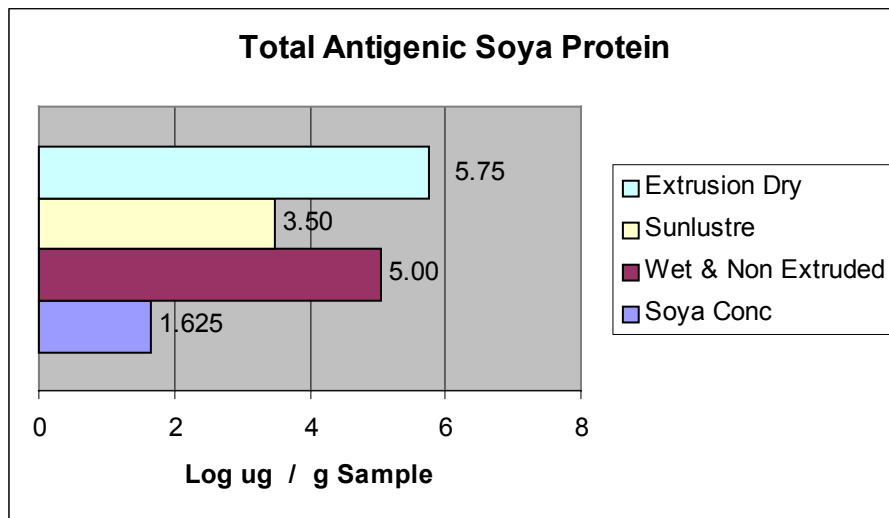
Whether the harmful effects of soya can be wholly attributed to the existence of these ANF is doubtful. However they have been shown to have a deleterious effect on animal performance. Therefore any product such as Sunlustre where these factors have been significantly reduced must be of a benefit to animal performance.

TOTAL ANTGENIC SOYA-PROTEIN

Although trypsin inhibitors and lectins are known to be harmful components of soya. The presence cannot fully explain the symptoms of poor growth, inappetance, diarrhoea and high mortality often observed when soya is fed to young livestock.

Other components must be involved and it has been established that Soya contains a group of soluble proteins that posses antigenic properties.

According to J. Sissons " A feed antigen is defined as a macromolecule of dietary origin that is recognised by the immune system of the alimentary tract as foreign, and stimulates the immune system to produce antibodies for eliminating the antigen". This however is perfectly normal and desirable physiological response.



The problem is, that these soluble proteins of soya are extremely active in stimulating an immune response which can lead to an intestinal hypersensitivity to soya in livestock, predisposing them to the above symptoms.

To quantify these levels TNO Wageningen was commissioned to evaluate a group of soya products by ELISA for total antigenic soya protein.

The above graph details the results, and as would be expected the soya protein concentrate with its alcoholic extraction steps, gave the lowest allergenic response.

The interesting point is the variation between the full fat soya samples (substantial considering that the plot is of the log of the titres).

These results therefore imply that in the manufacture of Sunlustre A-One Feeds substantially reduce the antigenic factors, when compared to other full fat soya's leading to a lower allergenic response, which will benefit the performance of diets for young livestock containing Sunlustre.

SUMMARY

The processing criteria employed in the manufacture of Sunlustre leads to a substantial reduction in the ANF and antigenic properties of soya, especially when compared to other full fat production processes.

- (i) Steam heated to destroy the ANF and antigenic factors in soya.
- (ii) Controlled use of steam protects protein quality.
- (iii) Extruded to maximise oil availability.
- (iv) Uniform quality oil source, not always the case with some fat blends.
- (v) High degree of process control.
- (vi) Handles well in bulk.