Producing non-GM soy protein through identity preservation

Richard Brown

Soya beans are a major source of protein and oil and are used extensively in food manufacturing. Soya, along with maize, is one of the first crops to be genetically modified and permitted for sale in the UK. However, this does not mean that all soya is GM soya. Though the claim that non-GM and GM soya are mixed at source in the USA has often been raised during the current debate, this is not necessarily true.

There is a source of non-GM soya protein which can supply all our needs in the UK if required.

As a soy protein provider Protein Technologies International (PTI) has long prided itself on its ability to deliver products which exactly meet its customers’ needs and specifications.

Two years ago, the company recognised that this ability may be compromised in the future through the gradual introduction into the US commodity soybean crop of GM soya. It reasoned that there may be a requirement for non-GM soy among food manufacturers and set about introducing a system which could guarantee delivery of non-GM soy should the demand arise.

Undoubtedly stimulated by media coverage of the GM issue, that demand swiftly materialised. With pressure mounting from consumer groups, and soya and soy derivatives included in the formulations of an estimated 60 per cent of UK processed foods, retailers and manufacturers have been seeking verifiable sources of non-GM soya. PTI believes that the “Identity Preservation” (IP) system it has introduced gives the maximum guarantee of product integrity. The IP system has been examined long and hard by UK retailers and manufacturers and accepted by them all as providing due diligence in ensuring the non-GM status of isolated soy protein as a manufacturing ingredient.

In investing in identity preservation, one of PTI’s key motivations has been to facilitate consumer choice. Whatever the scientific argument, market research suggests that UK consumers will currently actively avoid GM ingredients. Though not anti-GM, PTI provides non-GM soy protein to ensure that the benefits of soy can be delivered to consumers in a form which they find acceptable and, indeed, will not reject on the basis of its GM status.

This becomes more important as the health benefits of soy protein consumption become
more widely recognised. With the first soy protein health claim being considered for recognition by the FDA this autumn there is growing scientific evidence to suggest that regular consumption of soy protein can reduce cholesterol levels, combat osteoporosis, reduce menopausal symptoms and may even protect against certain cancers. Consumers who deliberately avoid soy, believing all soy to be GM will, of course, miss out on any of these benefits.

Any claim to non-GM status is, of course, open to challenge and must therefore be open to review. Most observers would agree that testing science does not currently match the optimum needs of ingredients producers, manufacturers, retailers or consumers.

Development of the PTI IP system is of special importance when consideration is given to the specificity, accuracy and reliability of the Polymerase Chain Reaction test used to detect presence or absence of GM DNA. The test is very prone to laboratory contamination which can lead to false positives. As generally applied by most testing laboratories, it is non-specific to the detection of RoundUp Ready DNA. RoundUp Ready is the only GM soybean commercially grown and is therefore the source of all GM material in the commodity soybean crop. In addition, the test is not quantitative. At best, it is semi-quantitative in that it can identify a general level (e.g. “about 0.01 per cent”, or “between 0.01 per cent and 0.1 per cent”), but it cannot provide a specific quantified result.

The distinction should also be made between non-GM and GM-free. Food law is generally predicated on thresholds and GM is likely to be treated in the same way. The issue of an acceptable threshold for GM content in a “non-GM” product has been under EC consideration for a number of years. A threshold of 2 per cent is under consideration at the time of writing.

PTI's IP system consistently delivers non-GM soy protein with GM levels at or below the level of detection and is guaranteed to achieve a GM content of below 1 per cent. It is PTI’s belief, however, that given the pervasive nature of GM in the soybean commodity stream, the delivery of GM-free product measured on the basis of negative by test is difficult, if not impossible to achieve.

PTI's IP system is based on the use of certified non-GM seeds. The progress of the non-GM seed through the system, and thus its maintenance of non-GM status from farm to plate, is visualised using the attached IP process flow schematic (see Figure 1).

**Inputs**

PTI requires use of a specific soybean seed known as STS\(^1\). This has been reviewed by the US Food and Drug Administration which has determined that it is not GM. Use of the STS\(^1\) soybean allows for post-emergent treatment of the soybean plant with a herbicide (Synchrony\(^1\)) that is hostile to the RoundUp Ready GM soybean. Synchrony\(^1\) will either kill or severely stunt the growth of RoundUp Ready beans, thus guaranteeing that, at the time of harvest, the crop is 100 per cent non-GM.

The added benefit of the use of STS\(^1\) seed with Synchrony\(^1\) herbicide is that the latter is an environmentally friendly herbicide, requiring lighter and less frequent application than that used with conventional commodity soybean crops.

**Production**

PTI has contracted with farmers in the USA to grow the STS\(^1\) seed on dedicated plots on their farms. Rigorous procedures and documentation validating their adherence to these procedures cover all phases of planting, growing, harvesting and on-farm storage. Records must demonstrate that the right seed was used, that the appropriate herbicide was applied, that all equipment and conveyances were cleaned and flushed before their use for STS\(^1\) soybeans, that the nature (GM or non-GM) of the preceding crop planted on the STS\(^1\) plot is identified, that crop segregation procedures were properly maintained, and that any on-farm storage facilities and transportation conveyances were cleaned and flushed before using for the IP STS\(^1\) crop.

**Storage and distribution of whole soybeans**

This step of the IP system covers the country storage elevators (or silos) which have been contracted by PTI to provide storage and on-demand supply of IP’d soybeans to PTI’s soybean crusher where initial processing of
beans into white flakes takes place. Procedures and documentation are similar in function to those used in the production phase of the system. They cover all phases of conveying the IP’d soybeans into the dedicated storage elevators and into conveyances and the cleaning and flushing of conveyances used to transport the IP’d soybeans to the crusher.

**Processing**

Conversion of the whole IP’d soybean into a finished soy-based ingredient begins with the Soybean processor or crusher. The whole IP’d soybean is delivered from the elevator to the crusher for processing into defatted, white soy flakes.

The crusher likewise has procedures, and documented validation of adherence to these procedures, covering all phases of the operation including clean and flush of the off-loading conveyances and storage silos for the IP’d soybeans, conveyances and equipment used to process the IP’d soybeans into defatted white flakes, conveyance of the flakes into trucks or railcars, and clean and flush of the trucks or railcars used to transport the IP’d flakes to PTI’s production plants.

PTI, the food ingredient processor in the IP chain, receives the IP’d flakes at its production plants. Again, procedures and documentation validating adherence to the IP system are required for the following functions: clean and flush of off-loading flake conveyances and storage silos for the IP’d flakes, clean and flush of the conveyances into the production process, the production process itself, and the packaging equipment.

The identity of the IP’d finished product is positively maintained through use of a unique batch coding procedure and “IP” labelling is
applied to each bag. As additional security to ensure delivery of the correct product to the correct customer, the IP product is assigned for release against a specific customer product allocation inventory.

Product distribution

Care must be exercised by both the finished consumer food processor and the distributor during their handling and further processing of the IP soy-based ingredient to prevent the introduction of GM into their finished product by residues of GM ingredients which may remain on their processing equipment as the result of insufficient cleaning or flushing.

Written procedures and documentation of formulation and sanitation of equipment are integral to sustaining the IP of the soy-based ingredient at one of the most critical points in the IP procedure, incorporation of the IP’d ingredient into the finished product.

Retailers

Again, storage, handling, warehousing and transportation of the finished product at the retail grocery or consumer point of purchase must be adequate to prevent mixing with an exterior source of GM. This may generally be accomplished through inventory segregation and good housekeeping procedures.

Consumers

Use of the PTI IP system results in providing consumers with the information which they need from the ingredient supplier, the finished product manufacturer and the retailer or grocer regarding the source of the ingredients used. In effect, they can make an informed choice on the GM or non-GM status of the product that they are purchasing with the full confidence that products made with Supro STS IP soy protein are verifiably non-GM. While PTI has long-standing relationships with manufacturers and retailers built on trust and good business practice, it does not expect this alone to provide the guarantees sought by them in the current GM environment. Therefore the whole PTI IP system is independently verified by a third party, the Swiss auditing company SGS. In addition, PTI’s IP system is open to inspection by its customers (manufacturers) and their customers (retailers) to ensure that due diligence criteria are met throughout.

In the short term, PTI’s IP system meets a clear market need for non-GM ingredients. In the longer term it will help to restore the positive association of soya consumption with healthy living and break the common perception that “all soya is GM soya”.

284