

(05/06) MARCH 2006

SURVEY OF SOYA INGREDIENTS IN MEAT AND OTHER PRODUCTS

This survey was conducted as part of the Agency's food authenticity programme, which aims to gather information about the description of food in the UK.

Summary

- The primary aim of the survey was to investigate whether certain food products with soya ingredients were correctly labelled as regards to the presence of any GM soya (Monsanto's Roundup Ready™).
- A total of 60 samples of different soya ingredients were collected by fourteen local authorities 'in-factory', and were analysed to quantify the amount of Roundup Ready™ soya. The samples consisted of a range of ingredients including soya flour, soya isolates and soya mince (textured soya protein).
- The samples were first screened for the presence of GM 'Roundup Ready™' soya. This was followed by an analysis of the amount of GM 'Roundup Ready™' soya present in the soya ingredient above the limit of quantitation of 0.06%.
- Out of the 60 samples, 54 (90%) were either negative in the screening test or did not contain quantifiable levels of GM soya. The remaining six samples, where GM soya was quantified, the GM soya was present around the limit of quantitation (0.06% - 0.1%), and well below the 0.9% legal limit. Therefore, there is no requirement to label the product using these soya ingredients as "containing Genetically Modified Organisms (GMOs)", as information on traceability confirmed this to be adventitious contamination.
- The survey has shown that there is little quantifiable GM contamination in the soya ingredients tested, and the companies supplying these ingredients have adequate controls in place to prevent soya ingredients from being contaminated with GM soya.

Background

Some consumers choose to avoid eating products containing GM ingredients. In order to allow consumers to make that choice, the labelling of these products needs to be accurate.

In order to ascertain whether the labelling is accurate and food manufacturers are complying with the legislation, the authenticity programme has undertaken a survey to investigate whether GM soya, in the form of Roundup Ready™ soya, is present soya ingredients used to make meat and other food products.

Legislation

All GM foods to be marketed in the European Union are controlled under Regulation (EC) No. 1829/2003⁽¹⁾ (GM Food and Feed Regulation) and Regulation (EC) No. 1831/2003⁽²⁾ (Traceability and Labelling of Genetically Modified Organisms (GMOs) Regulation). The GM Food and Feed Regulation requires labelling for all food and feed products derived from GM sources, regardless of the presence of detectable novel genetic material in the final product, or regardless of the quantity of intentionally used GM ingredient present. Any food product sold to the final consumer, which is derived from a GMO, must be clearly labelled e.g. “ this product contains genetically modified organisms” or “produced from genetically modified soya”. However, small amounts of GM ingredients (below 0.9% for approved GM varieties) that are accidentally present by adventitious contamination in a food or feed need not be labelled. Where operators are applying this threshold, they will need to demonstrate to enforcement authorities that appropriate steps have been taken to avoid the accidental presence of GM material in non-GM supplies.

The Traceability and Labelling of GMOs Regulation creates a regime for tracing and identifying GMOs and food and feed products derived from GMOs at all stages of their placing on the market. The Regulation requires business operators when using or handling GM products to transmit and retain information at each stage of the placing on the market. Information must be retained for five years.

Methodology

In 2001/2, a pilot survey was undertaken by the Agency's authenticity surveillance programme to investigate the occurrence and labelling of GM Roundup Ready™ soya in bakery products⁽³⁾. A follow-up survey was considered to look at GM soya occurrence in meat products, for example sausages and burgers where soya ingredients are added as binders. In order to ensure the findings of the survey were robust, the methodology used in the above pilot study was validated to assess its reliability and accuracy in determining GM soya quantitatively in meat products.

The conclusion reached by this investigation was that the method did not give sufficient accuracy to quantify GM soya when mixed in a meat product. It is thought that there were interfering matrix factors (e.g. active proteases), which affected the accuracy of the method. As a result, it was decided not to undertake a survey analysing meat products, but undertake a survey of soya ingredients collected "in-factory". The method to determine GM soya in soya flour and other soya products has been validated, and is tried and tested for this use, and there is a proficiency scheme (GeMMA) for GM determination. The survey was organised to take samples of the soya ingredients such as TVP (textured vegetable protein) and soya flour prior to their use in meat products. It was also decided because of the sampling approach to widen the survey to include soya ingredients used in vegetarian foods and even baked products.

Sampling

Fourteen local authorities (Annex 1) from across the United Kingdom participated in collecting samples for the survey. Samples of soya ingredients to be used in the production of meat and other products were collected in-factory, as part of the enforcement officer's inspection of the manufacturing premises. All samples were collected during the period 1 February 2005 to the 30 April 2005.

Collecting officers were provided with a written sampling protocol outlining the type of sample to be collected. The protocol provided the collection officers with detailed information on avoiding cross contamination, and other procedures required to be followed in an Agency survey. Information on the sample was recorded on a specially designed sample collection form. The information recorded included details of the manufacturer of

the soya ingredient, any labelling on the ingredient's packaging, and details of the type of product in which the ingredient was to be used.

In total, sixty samples of a range of ingredient types were collected and analysed. Of these 19 (32%) of the ingredients sampled were textured vegetable protein or soya mince, 12 samples (20%) were bread improvers and bakery mixes, 13 samples (22%) were soya isolate, 10 samples (16%) were soya flour, 3 samples (5%) soya grits, and 3 samples (5%) soya beans. From the information collected from the premises sampled, the ingredients were to be used in a range of products. These could be categorised as follows: 48% were destined for use in meat products, 25% in bakery products, 17% of samples in vegetarian meals and snacks, and the remaining 10% were ingredients not stating their use.

Analytical approach

The samples collected in the survey were analysed by Tepnel *BioSystems* Ltd, who were chosen through open competition with other UKAS accredited laboratories. The analysis used was a UKAS accredited DNA based real-time PCR (polymerase chain reaction) method, that is able to quantify the amount of Roundup Ready™ soya present as a percentage of the total soya in the sample. The method determines the number of copies of the EPSPS gene associated with genetic modification, as a proportion of the number of copies of the lectin gene found in all soya. The number of copies is related to the percentage of GM by use of a certified reference standard. The results are expressed as a percentage of GM soya weight for weight in total soya. A qualitative test based on the same primers but visualising the PCR products on an acrylamide gel was used initially to screen out samples with no detectable amounts of GM soya (less than 0.01%).

Samples were homogenised and a representative sample was taken for analysis. DNA extraction was carried out in duplicate on each sample, and then each DNA extract underwent a duplicate real-time PCR assay. Thus the final copy number was an average of the four determinations. The copy number was converted to % GM soya using a calibration curve based on a range of dilutions of an IRMM (Institute for Reference Materials and Measurements) soya standard. The lowest value on the curve was 0.06%, and this represents the limit of quantitation for the method. Any samples found to be below this level were classified as below the limit of quantitation. An uncertainty for the quantitative result was calculated for each sample using the variation in the four

determinations, and hence was different for each sample determination. The results are reported with the uncertainty in Annex 2. Uncertainty was also applied to the limit of quantitation as $0.06 \pm 0.04\%$.

Quality Assurance

Each sample was assigned a unique identifying code for the survey, and this was used to track the sample through the sampling and analysis process. The sample was sent directly to the laboratory by the collecting officer, along with a copy of the sample collection form giving the sample details. The analysis, the appropriate standards, and controls were used to ensure the quantitative results were robust. Negative control and extraction controls gave no positive results for Roundup Ready™ soya as expected, ensuring the results are not a result of contamination during the analytical procedure. The positive control for a sample with a known concentration of GM soya was correctly quantified indicating the method was performing accurately.

Results & Discussion

The full results of the survey are given in Annex 2. Of the 60 samples tested, 54 samples (90%) had either no detectable amounts of Roundup Ready™ soya in the screening test or contained Roundup Ready™ soya below the limit of quantitation ($0.06 \pm 0.04\%$).

The remaining six samples (10%) were found to have quantifiable levels of GM present, ranging from 0.1% to 0.15%. However, when the uncertainty is taken into account, all the results are below 0.1%, which is around the limit of quantitation, and well below the legal limit of 0.9% for adventitious contamination with GM soya. On following up with the manufacturers involved, whose products contained low but quantifiable levels of GM soya, all could provide evidence of traceable efforts to obtain GM free soya. Therefore, there is no legal requirement for them to label the presence of Roundup Ready™ soya in their ingredients.

Thus this survey has shown that the wide range of raw soya materials collected comply with the labelling requirements for GMOs. Because most of the samples were below the level of quantitation of GM soya, none of the products made with the soya ingredients are legally required to be labelled as containing GM soya. As such it indicates that there are

effective mechanisms in place by manufacturers of the ingredients sampled to ensure soya is not contaminated with GM soya.

References

(1) Regulation (EC) No 1829/2003, GM Food and Feed. OJ L268 18/10/2003, 1-23

(2) Regulation (EC) No 1831/2003, Traceability and labelling of genetically modified organisms and the traceability of food and feed products produced from genetically modified organisms and amending Directive 2001/18. OJ L268 18/10/2003, 24-28

(3) Working Party on Food Authenticity, Methodology Report: Assessment of the performance of real time PCR to quantitatively determine genetically modified soya in processed food products. January 2002.

Further information

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LOCAL AUTHORITIES THAT PARTICIPATED IN THE SURVEY

ANNEX 1

1. Caerphilly County Borough Council
2. Cumbria County Council
3. Hampshire County Council
4. Lancashire County Council
5. Leicester City Council
6. London Borough of Brent
7. Northamptonshire County Council
8. Northern Ireland Regional Group Consortium
9. North Yorkshire County Council
10. Powys County Council
11. Somerset County council
12. Surrey County Council
13. West Lothian Council
14. Wrexham County Borough Council