NATIONAL SURVEILLANCE PROGRAM FOR GENETICALLY MODIFIED FOODS

Contents

Executive summary

Government agencies in Australia and New Zealand monitor the food supply to ensure that it is safe, and that foods comply with Standards in the Australia New Zealand Food Standards Code. This surveillance activity is conducted by members of the Implementation Sub-Committee for Food Regulation (ISFR), which includes representation from all jurisdictions in Australia and New Zealand.

This survey was undertaken as an element of the agreed ISFR compliance strategy for genetically modified (GM) food. The compliance strategy covers a number of different potential compliance activities, and this survey is one component.

This survey was undertaken to provide information about how manufacturers are complying with the labelling provisions of Standard 1.5.2 – Food produced using Gene Technology, of the *Australia New Zealand Food Standards Code*. It will also assist jurisdictions determine the focus of future monitoring and surveillance of GM food in the Australian food supply. This survey

asked businesses about the systems they had in place to demonstrate compliance

gathered more information on systems after analytical testing.

It focused on categories of foods containing corn and soy since corn and soy represent the predominant GM crops grown worldwide. Forty food businesses that manufacture or supply soy and/or corn products responded to a questionnaire. In addition, 183 food samples from 115 manufacturers were qualitatively screened for the presence of GM material.

Of the 40 businesses responding to the industry questionnaire, only one business did not know the GM status of the ingredient used. The information businesses use to determine the GM status included supplier declarations, product/purchase order specifications, use of highly refined ingredients only or/and use of Australian grown non-GM crops.

Businesses were also asked whether they verified the information provided by their supplier and 69% acknowledged they did so by requesting a certificate of analysis from supplier, reviewing the supplier's identity preservation systems or/and undertaking analysis of ingredients.

Thirty-nine per cent of products across both corn and soy categories tested positive for the presence of GM material.

The presence of GM material does not infer non-compliance with the labelling provisions of Standard 1.5.2, as there is an allowable threshold of 1% for unintentional presence. This means labelling is not required when a manufacturer genuinely uses non-GM ingredients but finds that up to 1% of an approved GM ingredient is accidently present in the non-GM ingredient.

The businesses producing or importing the products that tested positive were asked to provide information about the systems they had in place that demonstrated how they were complying with the labelling provisions of Standard 1.5.2. As with the industry questionnaire, the main methods identified were supplier declaration, non-GM policy, use of the Australian Food and Grocery Council's Product Information Form and use of Australian grown corn and soy. Some businesses also undertook a voluntary follow-up investigation (e.g. further analytical testing, audit of identity preservation systems) of a product that tested positive in the survey.

Overall most businesses had systems in place to demonstrate compliance with the labelling provisions of Standard 1.5.2, with most including some form of verification.

Compared to a survey conducted in 2003, there is an increase in the number of products with a positive GM detection. This is not unexpected. The unintentional entry of GM material can occur at all steps in the growing and food chain and as cultivation of GM crops increases globally, the unintentional presence of GM products may also increase.

The document review along with product screening was a useful tool to determine whether businesses have systems in place to demonstrate compliance with the labelling provisions of Standard 1.5.2. Further product screening including quantitative analysis can be undertaken by regulators where businesses do not have adequate systems in place to demonstrate compliance with the labelling provisions of Standard 1.5.2.

Introduction and background

In Australia and New Zealand, the labelling provisions for genetically modified (GM) food are specified in Standard 1.5.2 – Food produced using Gene Technology, of the *Australia New Zealand Food Standards Code*. Products using GM ingredients are required to be labelled except where ingredients or processing aids unintentionally contain GM material in a quantity less than 10g/kg (1%) per ingredient. There are also exemptions for:

- highly refined foods where the process removes novel DNA and/or novel protein (other than that with altered characteristics)
- processing aids or food additives (except where novel DNA or novel protein from the processing aid or food additive remains present in the food to which it has been added)
- flavours present in the food in a concentration no more than 1g/kg.

Labelling provisions for a number of other countries are provided in Appendix 1.

All GM foods must undergo a pre-market safety assessment by Food Standards Australia New Zealand (FSANZ). Only assessed and approved GM foods can enter the food supply. A safety assessment is carried out on a case-by-case basis, with each new genetic modification assessed individually for potential impact on the safety of the food (FSANZ, 2013).The GM food is compared to a similar commonly eaten conventional food from a molecular, toxicological, nutritional and compositional view. Any new or altered hazards then become the focus of further assessment. Further information about the safety and assessment of GM foods can be found at the FSANZ website.

Standard 1.5.2 came into force in May 1999 and the first GM food approvals were gazetted in late 2000. The Code currently lists 57 approvals. These approvals are for 76 lines covering canola (10 lines), corn (21 lines), cotton (15 lines), lucerne (2 lines), potato (11 lines), rice (1 line), soybean (14 lines) and sugarbeet (2 lines)[1]. All of the approvals in New Zealand and most of the approvals in Australia cover imported food since commercial growing has not been licensed in New Zealand for any of the crops and has only been licensed for a few in Australia (through the Office of the Gene Technology Regulator (OGTR)). Currently, the only licences issued by the Gene Technology Regulator for commercial growing are for several GM lines of canola and cotton. Internationally, the main GM food crops to be commercialised are soybean, corn (maize), cotton and canola (Brookes & Barfoot, 2012).

Previous Australian Survey

A pilot survey of corn and soy food products for GM food labelling compliance was undertaken by the TAG (Technical Advisory Group) Working Group on GM Food Labelling (Anon, 2003). This survey aimed to ascertain how businesses were adapting to the need to comply with the labelling provisions of Standard 1.5.2, and evaluate the usefulness of document surveys for determining compliance. A range of soybean and corn derived food products were analysed for the presence of 35S and *nos*[2]. Manufacturers, importers and retailers of the selected

[1] A single approval can sometimes incorporate a number of lines. For example, the approval for application A372 was for food derived from 7 herbicide-tolerant canola lines.

[2] The genes in all GM crops contain elements that define the start and finish of each gene. The two most common elements used in the genetic modification of soy and corn are the Cauliflower mosaic virus 35S (35S) promoter and

products were also asked to provide documentary evidence of the GM status of their products. Fifty-one products covering 36 businesses were included in the pilot survey. Laboratory analyses indicated all products complied with the labelling requirements of Standard 1.5.2, with 10 products having GM material present below the 1% limit. Of the 36 businesses, 39% (mostly larger businesses) had implemented a management system to demonstrate the GM status of ingredients in their products. However, despite the lack of document management systems in the remaining businesses, compliance with Standard 1.5.2 had not been compromised. The pilot survey found that a document survey is a useful tool for regulatory authorities to monitor compliance in instances where a business has implemented a management system.

Australian National Compliance and Monitoring Strategy for Genetically Modified Foods

In November 2009, the Implementation Sub-Committee (ISC) of the Food Regulation Standing Committee [now the Implementation Committee for Food Regulation (ISFR)] endorsed the National Compliance and Monitoring Strategy for Genetically Modified (GM) Foods (http://www.foodauthority.nsw.gov.au/science/market-analysis/gm-foods). The overall aim of the strategy is to enhance confidence in compliance with Standard 1.5.2.The individual elements of the strategy include:

education – provide the food industry with information to assist with complying with Standard 1.5.2

surveillance – monitor and verify compliance to Standard 1.5.2

complaint and incident response – respond to reports where it is suspected a food does not comply with Standard 1.5.2

communication – have information available on the level of compliance and government activities in respect to compliance with Standard 1.5.2

evaluation – assessment and refining the national monitoring and compliance strategy for GM foods

Following the development of industry compliance guide for GM foods in August 2010 (Anon, 2012), the Food Surveillance Network (a technical forum, chaired by FSANZ, which oversees the Coordinated Food Survey Plan developed by ISFR) was tasked with developing a proposal for the surveillance activity in the strategy. A survey proposal was developed and presented to ISC in August 2011 as part of the Coordinated Food Survey Plan for 2011-2014. The Coordinated Food Survey Plan, along with the National Surveillance Program for GM Foods, was endorsed by ISC in September 2011.

National Surveillance Program for GM Foods

This survey has been undertaken to address the surveillance program element in the strategy. It aims to provide information about how business are complying with the labelling provisions of Standard 1.5.2 and help focus future monitoring and surveillance activities across the jurisdictions.

A previous pilot survey of GM foods found that a document review was a useful way for regulatory authorities to assess compliance. For this reason this survey also uses the document review approach by

---

the *nopaline synthase (nos)* terminator. It is the presence of these elements which is tested for during initial screening for GM status of ingredients and products.

- surveying businesses about their systems to demonstrate compliance
- gathering information on systems following analytical testing.

A questionnaire was developed to gather information on the systems food businesses use to determine compliance with the labelling provisions of Standard 1.5.2. Analytical testing involved screening food samples for the presence of GM material (35S and *nos*). Where GM material was detected, businesses were asked for further information on how they sought to comply with the labelling provisions of Standard 1.5.2.

As required by the strategy, the survey used a priority matrix to determine what samples to include. The matrix is presented in Table 1 and was developed based on current approval, international data on GM crops, commercialisation of GM crops, and expected end use of the crop. In the last two decades, GM crop cultivation has grown rapidly. In 2012, 170 million ha of GM crops were planted in 28 countries, with 81% of total area of soybean and 35% of corn being accounted for by GM plantings (Nature, 2013), with United States, Brazil and Argentina are the world's largest producers of GM crops (James, 2011). Since foods containing corn and soy represent a significant proportion of the market it was decided, as with the pilot survey conducted in 2003, to focus the current survey only on corn and soy products.

Table 1: Product Priority Matrix

Crop	Ingredient/product	Ranking
Canola	Canola oil	4
Corn	Corn grits, polenta and similar products	1
	Corn syrups	4
	Corn starch and corn flour	4
	Corn-based snack foods	1
	Corn-based breads	1
	Corn-based breakfast cereals	1
	Products with corn as a minor ingredient	3
Cotton	Cotton seed linters and products containing cotton seeds	4
	Cotton seed oil	4
Soybean	Soybean and associated ingredients	1
	Soybean proteins	1
	Soybean oil	4
	Soybean milk and milk products	1
	Tofu and tofu products	1
	Miso and miso products	1
	Meat replacement products	1
	Meat products containing soybean products	2
	Soy sauce and soy sauce products	2
	Meal replacement products	2
	Protein supplement products	2
	Soy-based infant formula	2
	Other food containing soy products	3
Lucerne, Potato, Rice, Sugarbeet		4

Note:
1 – food or ingredient is predominately or totally derived from crop and if GM crop used, GM material will be present
2 – food contains the crop as a major ingredient, and if GM crop used, GM material will be present
3 – food contains the crop as a minor ingredient, and if GM crop used, GM material may be present
4 – food or product is highly refined and GM material not likely to be present or able to be detected or GM crop has not been commercialised

Method

Industry questionnaire

A questionnaire (see Appendix 2) was completed by 40[3] Australian food businesses which manufacture or supply soy and/or corn products to determine what systems are used to demonstrate compliance with Standard 1.5.2. Questionnaires were either completed directly by businesses online using SurveyMonkey™ or administered by researchers during an interview.

Screening analysis

A total of 183 food samples (88 corn and 95 soy products), from 115 manufacturers were purchased from retail outlets in ACT, NSW, Queensland, South Australia and Western Australia and were qualitatively screened for 35S and *nos* using polymerase chain reaction (PCR). All the products tested were not labelled as containing GM food or ingredients and came from the following categories:

- Corn
    - Corn grits, polenta and similar products
    - Corn-based snack foods (including corn chips and taco shells)
    - Corn-based breads (including tortillas)
    - Corn based breakfast cereals
    - Popcorn
- Soybean
    - Soybean and associated ingredients
    - Soybean proteins
    - Soybean milk and milk products
    - Tofu and tofu products
    - Miso and miso products
    - Soy sauce and soy sauce products
    - Meat products containing soybean
    - Meal replacement products containing soybean
    - Protein supplements containing soybean
    - Soy-based infant formula

These categories are broad and it is acknowledged that some products (see e.g. Case Study 2) may contain both soy and corn ingredients. For these mixed products, the assigned category was based on the predominant ingredient present. While the intention was to target different products in the sampling, the limited number of different products available meant that in 11 cases there were duplicate samples of a single product, although different batches were tested.

Samples were sent for analysis to either the Forensic Analytical and Science Services (FASS) Molecular Microbiology Laboratory at Lidcombe, New South Wales or the Forensic and Scientific Services Laboratory (QHFSS), Coopers Plains, Queensland. Both laboratories are accredited by the National Association of Testing Authorities for GMO analysis in foods.

[3] A total of 52 responses were received. However, a number were incomplete and a number contained duplicate data. This figure indicates usable responses.

The PCR assays employed by these laboratories to detect 35S and *nos* are based on currently validated methods published by the European Union Reference Laboratory[4] (JRC).

Processed food products can be tested with these PCR methods, as long as DNA can be extracted from the sample. Careful sample preparation is required to extract DNA free from assay inhibitors that may be present in many of the processed food products. Another problem with processed and/or highly refined food products is that extracted DNA may be substantially degraded or may be present in only small amounts. To minimise the risk of cross–contamination, individual steps were performed in separate work areas and strict quality assurance measures were incorporated.

[4] *Compendium of Reference Methods for GMO analysis 2010 European Union Reference Laboratory for GM Food and Feed- European Commission Joint Research Centre*

Results

Industry questionnaire

Forty food businesses that manufacture or sell products containing soy or corn completed the questionnaire. Details about the size of the food businesses were not collected. However by examining company names of respondents (where given), there appears to be a mix of large multinational, medium sized and small food businesses.

Background data of respondents

- twenty-eight food businesses sold or manufactured products that contain both soy and corn covering a wide range of products (most of these businesses appear to be large or medium sized).
- three food businesses sold or manufactured products containing corn only.
- nine food businesses sold or manufactured products containing soy only.

Use of GM ingredients

The majority of food businesses (29) claimed they used all non-GM ingredients (Figure 1). Of the remainder:

- five food businesses knew the GM status of one ingredient used but not the other
- five used some non-GM ingredients and some GM ingredients
- the remaining food business only used one ingredient examined in this program and did not know the GM status

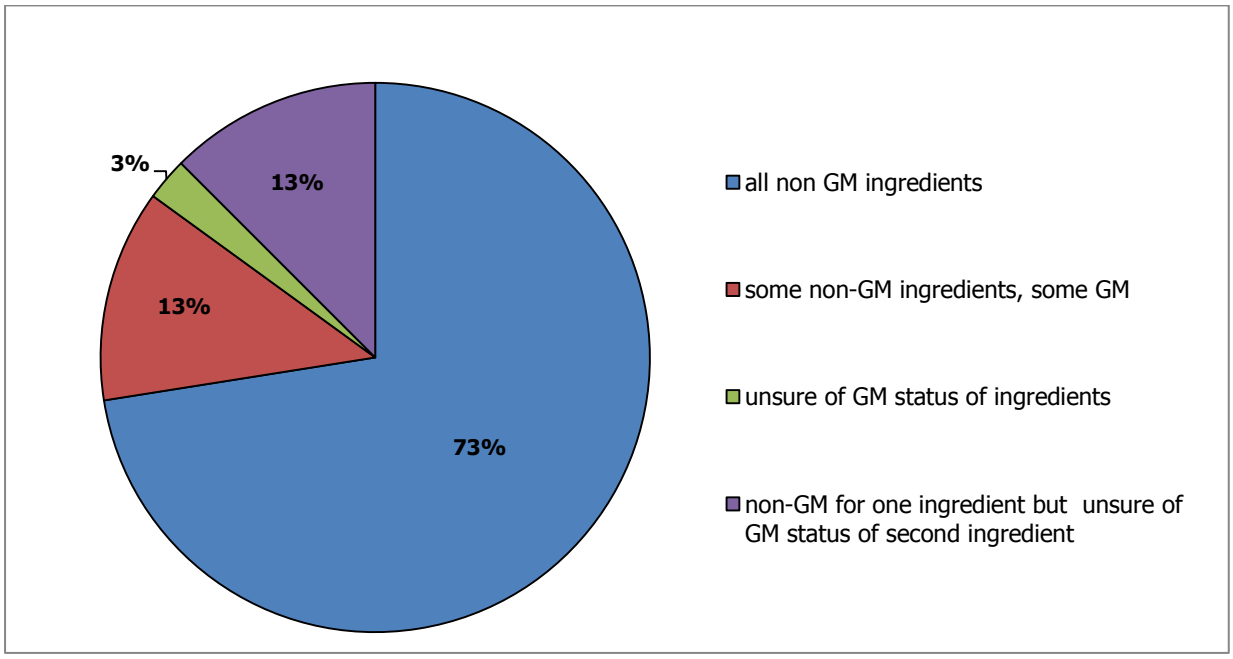

Figure 1: Use of GM ingredients

Document review

Food businesses that indicated they used non-GM ingredients were asked why they believed their ingredients were non-GM and how they sought to achieve compliance with Standard 1.5.2. All companies that indicated they used all or some non-GM ingredients (98% of food businesses surveyed) responded that they relied on documentation or verbal assurances from suppliers about the GM status of their ingredients and compliance with Standard 1.5.2.

Documentary evidence included supplier assurance that the corn/soy was Australian-grown; since there are currently no licences to grow GM corn or soy commercially in Australia this should indicate that all Australian-grown corn and soy are non-GM. A similar rationale applies to products that are stated to be 'organic' since this classification, by definition, excludes any GM material. A knowledge that the process of refining would be likely to remove DNA and protein was also used to assume compliance in the case of highly refined products such as oil.

The majority of food businesses sourcing non-GM ingredients used more than one method to determine compliance with Standard 1.5.2, with supplier declaration and product specification being the most common (Figure 2).

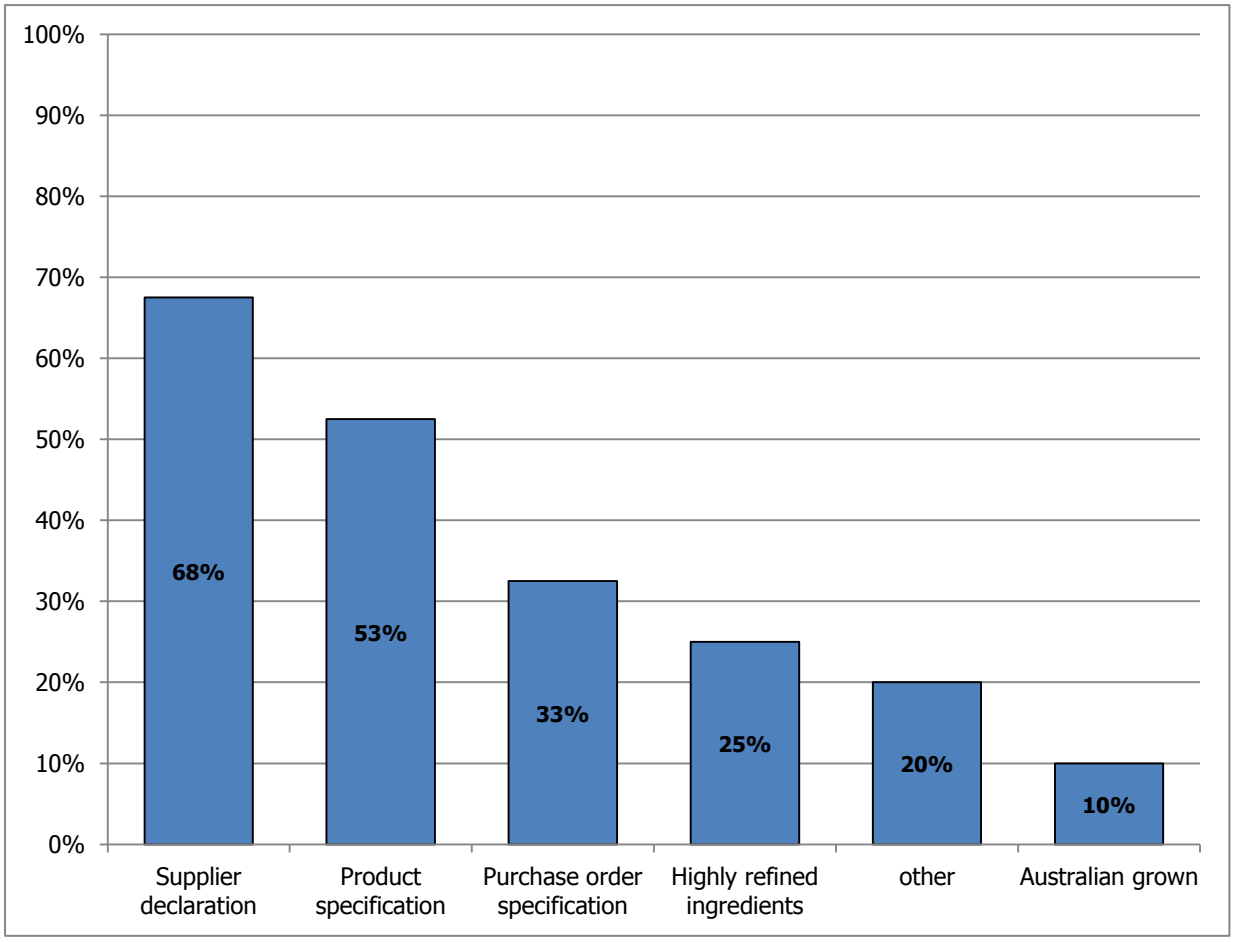

Figure 2: Documentary evidence used to comply with Standard 1.5.2

Methods included in the 'other' category of documentary evidence included using organic ingredients, approved supplier programs and verbal guarantees of non-GM status. No information was collected on types of approved supplier programs used.

Four of the six food businesses that were unsure of the GM status of one of their ingredients indicated they would endeavour to find out the GM status of their products in future. The remaining two food businesses indicated they would not find out the GM status, with one business stating that "the amount [ingredient] used would be too small". The other business stated that they reviewed the product label which did not mention GM product and the ingredients were sourced from approved suppliers.

One business stated that GM material is used in one product and the product is labelled according to the specification in Standard 1.5.2. This was a pre-packaged meat product that was sold on as bought. This business indicated some other products had been verified as not containing GM ingredients through product testing, although for most of the products there was a reliance on supplier declaration and product specification. No additional information was given about type of testing and reason for testing individual products. This business was a large multinational.

Product verification

Food businesses that knew the GM-status of one or both ingredients were asked how they verified compliance with Standard 1.5.2 (in this case 98% of businesses surveyed).

Verification refers to any additional examination of documentation either supplied by ingredient supplier or other third party or any testing conducted on ingredients. The majority (69%) of these food businesses indicated they undertook at least one form of verification of the GM status of one or both ingredients used (Figure 3).

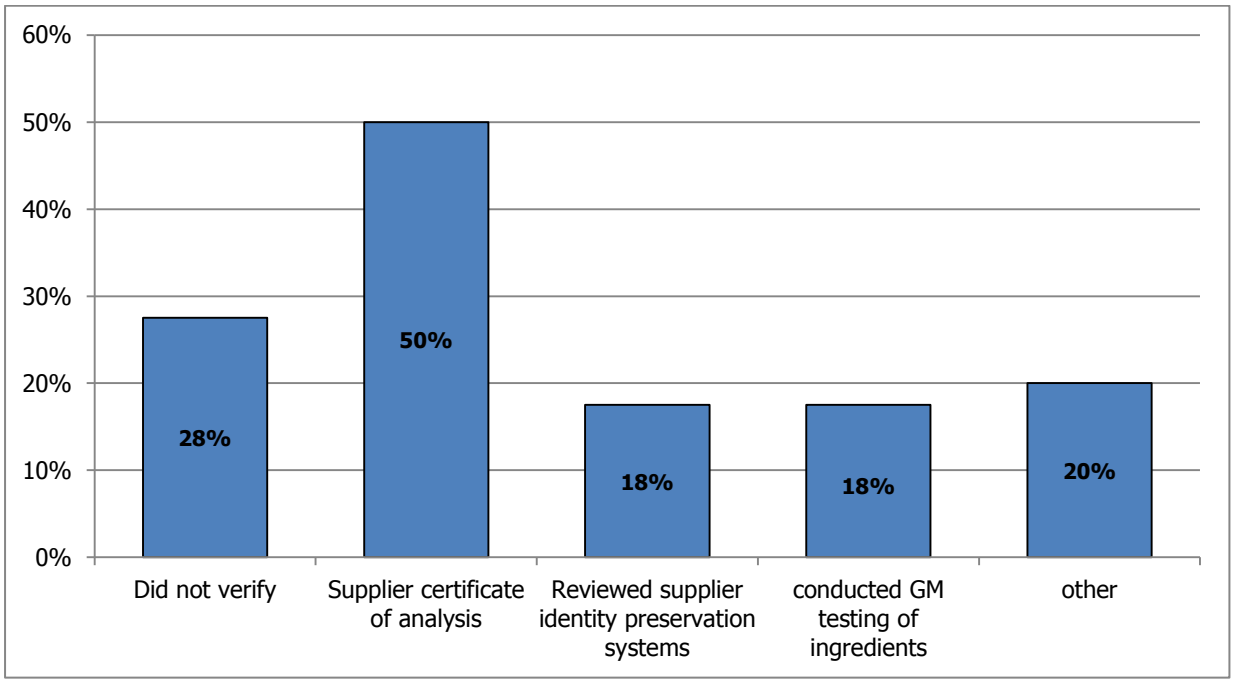

Figure 3: Verification of compliance to Standard 1.5.2

Other verification methods given included: relying on supplier declaration, product specification and supplier audits although it must be noted that given the verification definition above supplier declaration and product specification may not qualify as verification of GM status. No information was collected on frequency of testing although one business noted that not all ingredients were tested. Robustness of any verification undertaken was also not discussed in this survey.

Screening analysis

Initial screening[5] indicated that 39% of products contained one or both of the elements 35S-promoter and *nos* terminator. The presence of GM material using qualitative screening cannot be used to infer whether a product is non-compliant with Standard 1.5.2. Only quantitative analysis can do this. As this survey sought to determine what processes food businesses had in place to ensure compliance with the labelling provisions of Standard 1.5.2 no quantification analysis was done.

Further, there is a labelling exemption in Standard 1.5.2 for a food, ingredient or processing aid in which approved GM material is unintentionally present in a quantity of no more than 10g/1kg (or 1%) per ingredient. This only applies where the manufacturer has actively sought to avoid GM food or ingredients, and there is an inadvertent presence of GM material. As such the results from the screening analysis may also indicate the unintentional presence of GM material.

The presence of GM material was found in both corn and soy products, from 49 different companies. Seventy percent of the detections were from products not making any voluntary negative label claims.

Results of the screening analysis were sent to each food business where GM positive products had been detected, together with a request for information on any systems in place for demonstrating an attempt to comply with Standard 1.5.2.

From the responses received it appears that the food businesses surveyed are using systems that may demonstrate compliance with the labelling provisions of Standard 1.5.2. The main method used by most of food businesses which may demonstrate compliance with the labelling provisions of Standard 1.5.2 was supplier declarations. Other common methods quoted by businesses were:

- food businesses have non GM policies in place
- use of the Australian Food and Grocery Council's Product Information Form (AFGC PIF)
- using only Australian grown corn and soy
- GM testing by manufacturer or provision of certificate of analysis from supplier
- using suppliers who have an Identity Preservation (IP) system in place

It was also apparent that the larger food businesses had more robust GM monitoring systems in place. Smaller businesses tended to rely solely on supplier declaration or product specification whereas the larger multinational companies used supplier certificate of analysis or conducted their own testing and audits of supplier IP systems.

Where companies undertook investigations into the screening result, the information provided to verify the GM status of their products included results from PCR testing of the seed sown to produce the crop to verify its non-GM status, audit of IP systems and analysis of retention samples and/or ingredients. Two case studies of manufacturer trace back investigations are outlined on the following page.

[5] 95 samples were screened by Forensic and Scientific Services (Queensland) and 88 samples were screened by FASS (NSW)

Case study 1

GM material was detected in a sample of bread, which contained soy flour and soybean. The manufacturer requested the supplier of each ingredient investigate. It was determined that the soy flour imported from Austria complied with European Union (EU) regulations regarding seed to product traceability, and that the product was subject to EU checks for GM material. It was also determined that the soybeans were sourced from Australia and the supplier provides a letter of guarantee stating soybeans are GM free. Therefore, the food business is utilising systems that may demonstrate the food businesses' compliance with Standard 1.5.2.

Case Study 2

GM material was detected in four samples of corn-based foods. Two additional samples of similar products from this food business were also analysed but tested negative for GM material. Because of the detections, the businesses initiated an investigation into the ingredients used in the products.

Main ingredient

The food business first investigated the corn used in the four foods. The corn is Australian grown (ie should be non-GM) and the corn supplier provided statements stating their growers use non-GM seed and that they do not import any corn product. Further trace back found that the corn seed was sourced from the USA under purity retaining conditions and imported into Australia for growing. The seed is routinely tested in the USA to ensure purity and the retention sample of seed from the relevant period tested negative for GM. The retention sample of crop grown in Australia tested positive for GM material, although the level was not high enough to be quantified (<0.01%). Therefore, while the source seed was confirmed as non-GM, GM material at very low rates was detected in the Australia grown corn suggesting that the unintentional presence at less than 0.01% from either GM canola or GM cotton was occurring during harvesting or storage. The occurrence of unintentional presence has been widely discussed (Belcher, Nolan, & Phillips, 2005; de Jong & Rong, 2013). As such, the corn complies with Standard 1.5.2.

Minor ingredients

The products that tested positive used different seasonings from different suppliers. All four suppliers had completed the AFGC product information form and indicated no GM labelling would be required. Retention samples of the seasonings were tested for GM, with negative results for three of the seasoning and positive for one, although less than 0.1%. The GM positive seasoning was made overseas by a manufacturer which processes both GM and non-GM ingredient. The overseas manufacturer has procedures to segregate GM ingredients from non-GM ingredients. Investigations by the manufacturer concluded that the presence of GM material at low levels was because of inadequate clean down of equipment prior to processing non-GM ingredients as well as inadequate segregation in the supply chain. The overseas manufacturer has implemented corrective actions to ensure the integrity of the non-GM ingredient. Therefore, the overseas manufacturer is utilising systems that may demonstrate the food businesses' compliance with Standard 1.5.2

Discussion and conclusion

This survey indicated that the majority of businesses have systems in place to demonstrate attempts to comply with the labelling provisions of Standard 1.5.2. These systems include implementation of a non-GM policy and sourcing of Australian-grown corn and soybean, used in association with supplier's declarations, the AFGC-PIF, purchase order specification or certificates of analysis. In addition, many businesses undertake their own verification activities. Screening analysis of samples found that GM elements were detected in 39% of products. Since quantitative analyses were not undertaken it is not possible to draw conclusions about whether these products were actually compliant with the labelling provisions in Standard 1.5.2, except that where business were able to provide certificates of analysis, results indicate that the products in all likelihood comply with the Standard.

Although feedback was received from the majority of companies with positive GM results, feedback was not requested from companies whose samples tested negative for GM material. In addition to quantitative analysis of positive detects, this feedback would be required to make any satisfactory conclusions regarding the robustness of the different GM monitoring systems and also the impact of having no system.

Compared to the 2003 Australian survey, there does appear to be an increase in the number of products with a positive GM detection and this is not unexpected. The unintentional entry of GM material can occur at all steps in the growing and food chain: naturally through wind, on farm, during transport and storage and during processing. As cultivation of GM crops increases globally, unintentional presence of GM products may also increase. Agricultural and food industries have developed protocols and processes to manage segregation of GM and non-GM crops if there is market demand to do so and unintended presence thresholds such as the threshold contained in Standard 1.5.2 support the operation of these protocols.

Several studies have been conducted on the unintentional presence of GM ingredients in food and indicate that this is a global observation (Table 2). The presence of GM material has been detected in as high as 78% of products in Brazil (Greiner & Konietzny, 2008) with an average of approximately 35% of products having positive detects. This figure is comparable to the results of this survey.

The 2003 Australian pilot survey of corn and soy food products for GM food labelling compliance found that business document review is a useful tool to monitor compliance (Anon, 2003). The document review along with product screening was a useful tool to determine whether businesses have systems in place to demonstrate compliance with the labelling provisions of Standard 1.5.2. Further product screening including quantitative analysis can be undertaken by regulators where businesses do not have adequate systems in place to demonstrate compliance with Standard 1.5.2.

Table 2: International studies on GM presence in food

Year	Country	Study	Reference
2012	Jordan	15/200 food samples tested positive for 35S as well as the specific events associated with RoundupReady soy and Bt176 corn.	Herzallah, 2012
2011	Ireland	FSAI regularly conducts monitoring surveys of GM presence in food. In 2011 14/58 contained GM material. 3 of these samples contained GM material greater than 0.9%.	FSAI, 2011
2011	UAE	16/128 samples tested positive for CaMV 35S-promoter and Nos terminator gene. These samples were pizza, bread, tinned corn and soy milk. An additional 2 samples were positive for Nos but not CaMV 35- and positive for maize gene which indicated GA21 maize.	Premanandh, Maruthamuthu, Sabbagh, & Al Muhairi, 2012
2008	Hungary	79/208 food products containing soy were positive for roundup ready soy. 6% (13 samples all meat products) were above the EU threshold of 0.9%	Ujhelyi et al., 2008
2004	Wales, England	10/25 Welsh and English products containing unrefined soy tested positive for EPSPS protein using ELISA methodology	Partridge & Murphy, 2004
2000-2005	Brazil	The presence of genetically modified soy (RoundupReadyTM soy) in soy food in Brazil has increased steadily from 13% in 2000 to 78% in 2005. The number of food products containing genetically modified soy in a proportion above 1.0% on the ingredient level, the threshold for labelling according to Brazilian legislation, increased from 11% in 2000 to 36% in 2005. No clear trend was found within maize containing food products. Eight to eleven per cent were shown to consist of material derived from genetically modified maize and 4–6% was found to contain more than 1% of genetically modified maize. Although it must be noted that the majority of soy produced in Brazil is now GM.	Greiner & Konietzny, 2008

References

Anon (2003). *Australian Pilot Survey of GM Food Labelling of Corn and Soy Food Products, TAG Working Group in GM Food Labelling.* Retrieved 22 October.

Anon (2012). *Compliance Guide to Australia New Zealand Food Standards Code 1.5.2: Food Produced using Gene Technology.* Retrieved 16 October 2013

Belcher, K., Nolan, J. & Phillips, P.W.B. (2005). Genetically modified crops and agricultural landscapes: spatial patterns of contamination. *Ecological Economics, 53*(3), 387 – 401

Brookes, G.; Barfoot, P. (2012). The income and production effects of biotech crops globally 1996 – 2010. *GM Crops and Food: Biotechnology in Agriculture and the Food Chain* 3(4): 1 – 8.

de Jong, T.J. & Rong, J. (2013). Crop to wild gene flow: does more sophisticated research provide better risk assessment? *Environmental Science & Policy, 27*, 135 – 140

European Food Safety Authority (EFSA). (2013). *Regulation (EC) No 1830/2013 of the European parliament and the of the Council.* Retrieved 7 November 2013

FDA. (2013). *FDA's role in regulating safety of GE foods.* Retrieved 7 November 2013

FSAI. (2011). *Monitoring the presence of GM ingredients on the Irish Market in 2011.* Retrieved 22 August 2013.

FSANZ. (2013). *GM Foods*. Retrieved 7 November 2013

Greiner, R., & Konietzny, U. (2008). Presence of genetically modified maize and soy in food products sold commercially in Brazil from 2000 to 2005. *Food Control, 19*(5), 499-505.

Health Canada. (2012). *Frequently Asked Questions – Biotechnology and Genetically Modified Foods.* Retrieved 7 November 2013

Herzallah, S.M. (2012). Detection of genetically modified material in feed and foodstuffs containing soy and maize in Jordan*. Journal of Food Composition and Analysis* 26: 169 – 172.

James, C (2011). *Global Status of Commercialized Biotech/Crops: 2011.ISAAA Brief No. 43*. International Service for the Acquisition of Agri-biotech Applications: Ithaca, NY.

Ministry of Agriculture, Forestry and Fisheries (MAFF). (2007). *Food labelling for processed foods.* Retrieved 7 November 2013

Nature (2013). Tarnished promise. GM Crops: promise and reality, a Nature special issue. *Nature 497*: 21 – 23.

Partridge, Murphy, D.J. (2004). Detection of genetically modified soya in a range of organic and health food products. Implications for the accurate labelling of foodstuffs derived from potential GM crops. *British Food Journal* 106 (3): 166 – 180.

Premanandh, J., Maruthamuthu, M., Sabbagh, A., & Al Muhairi, S. (2012). Prevalence of genetically modified foods (GM foods) in the United Arab Emirates. *Food Control, 25*(1), 10-12.

Ujhelyi, G., Vajda, B., Béki, E., Neszlényi, K., Jakab, J., Jánosi, A., Gelencsér, É. (2008). Surveying the RR soy content of commercially available food products in Hungary. *Food Control, 19*(10), 967-973.

USDA Foreign Agricultural Service. (2009). *Japan Food and agricultural import regulations and standards – narrative*. FAIRS country report. Retrieved 7 November 2013

USDA Foreign Agricultural Service. (2010). *Argentina Biotechnology – GE plants and animals. 2010 annual biotechnology report.* Retrieved 7 November 2013

USDA Foreign Agricultural Service. (2011). *Brazil Agricultural Biotechnology Annual 2011.* Retrieved 7 November 2013

Appendix 1: International Requirements for Labelling GM foods

Country	GM Labelling Requirement	Reference
Argentina	Voluntary labelling – no threshold	USDA FAS, 2010
Brazil	Mandatory labelling. Tolerance limit of 1% for food and food ingredients containing or being produced through biotech events.	USDA FAS, 2011
Canada	Voluntary labelling. Special labelling only required if there's health & safety issue e.g. allergens or compositional/nutritional changes e.g. high oleic acid soybean	Health Canada, 2012
Japan	Mandatory labelling. Products must be labelled if: • GM material is present in the top 3 raw ingredients and accounts for 5% or more of the total weight. • Any products in which genetically modified DNA can be detected even after processing, or those whose compositions or nutritional values differ in comparison to their conventional counterparts (eg soybean - high oleic acid gene-altered)	MAFF, 2007 & USDA FAS, 2009
The European Union	Mandatory labelling. Does not apply to food/feed which contains, consists of, or is produced from GMOs in a proportion no higher than 0.9% of the food/feed ingredients considered individually and if this presence is adventitious or technically unavoidable.	EFSA, 2013
The USA	Voluntary labelling.	FDA, 2013

Appendix 2: Industry Questionnaire

Introduction

This survey is for food businesses that sell products containing corn (maize) or soy or their products. Corn and soy are amongst the most widely commercialised genetically modified (GM) food crops. Corn and soy and their products are also ingredients widely used by the food industry. Food Standard 1.5.2 includes requirements for labelling foods containing certain genetically modified ingredients.

If your products contain any soy or corn ingredients we would like to know how you comply with the labelling clauses of Food Standard 1.5.2.

If you would like to review the Standard then copy this link into your browser: http://www.comlaw.gov.au/Series/F2008B00628

Some common soy and corn food ingredients are:

- Corn grits
- Corn meal Corn oil*
- Corn flour (maize starch)*
- Polenta
- Yellow corn / maize flour
- Soy flour
- Soy grits
- Soy lecithin
- Soy meal
- Soybean oil*
- Soy protein concentrate
- Soy protein isolate
- Textured vegetable (soy) protein

* Note: Highly refined products such as corn oil, corn flour (maize starch) and soybean oil that do not contain novel DNA or novel protein, introduced as a result of the genetic modification, might not require GM labelling.

1. Company Information

Company Name:

Contact Name:

Contac Phone Number:

Corn Products

2. Do you sell food containing corn products or corn-containing food ingredients?

- Yes
- No
- Unsure

3. What types of food do you sell that contain corn products/ingredients?

- Breakfast cereal
- Mexican foods
- Snack foods
- Bread
- Pantry supplies
- Other (please specify)

4. What is the GM status of the corn products/ingredients?

- All non-GM

- All GM
- Some GM some non-GM
- Unknown

GM corn

5. Is the GM corn product or ingredient a Permitted Food in Food Standard 1.5.2? If so the corn line would be listed in the Schedule to the Standard.

- Yes
- No

6. Do labels for the products that include GM include the required 'genetically modifies' statement?

- Yes
- No

Non-GM corn

7. Is the corn product or ingredient a Permitted Food in Food Standard 1.5.2? If so the corn line would be listed in the Schedule to the Standard.

- Yes
- No

8. Does your food label include the required 'genetically modified' statement?

- Yes
- No

9. Why do you believe the products/ingredients are non-GM?

- Product specification
- Supplier declaration
- Purchase orders specify non-GM
- Use only highly purified products without altered characteristics
- Only use Australian grown corn and corn products
- Other (please specify)

10. Have you verified or checked the non-GM status? If yes, how?

- No
- Reviewed identity preservation (IP) system
- Supplier Certificates of Analysis
- GM testing of product
- Other (please specify)

11. Will you now take steps to find out the GM status of the corn product/ingredient? If the answer is 'no', please explain why.

- Yes
- No – please explain why

12. Does your company manufacture its own corn products/ingredients? If no, please provide up to 3 suppliers' names and addresses.

- Yes
- No – suppliers' names & addresses

Soy products

13. Do you sell food containing soy products or soy-containing food ingredients?

- Yes
- No
- Unsure

14. What types of foods do you sell that contain soy products/ingredients?

- Processed meats
- Meal replacements
- Protein supplements
- Sports supplements
- Infant formula
- Soy milk
- Asian sauces
- Other (please specify)

15. What is the GM status of the soy products/ingredients?

- All GM
- All non-GM
- Some GM and some non-GM
- Unknown

GM soy

16. Are the GM soy products or ingredients Permitted Foods in Food Standard 1.5.2? If so the soy line would be listed in the Schedule to the Standard.

- Yes
- No

17. Do labels for the products that include GM soy include the required 'genetically modifies' statement?

- Yes
- No

Non-GM soy

18. Is the soy product or ingredient a Permitted Food in Food Standard 1.5.2? If so the corn line would be listed in the Schedule to the Standard.

- Yes
- No

19. Does your food label include the required 'genetically modified' statement?

- Yes
- No

20. Why do you believe the product/ingredient is non-GM?

- Product specification
- Supplier declaration
- Purchase orders specify non-GM
- Use only highly purified products without altered characteristics
- Only use Australian grown soy and soy products
- Other (please specify)

21. Have you verified or checked the non-GM status? If yes, how?

- No
- Reviewed identity preservation (IP) system
- Supplier Certificates of Analysis
- GM testing of product
- Other (please specify)

22. Will you now take steps to find out the GM status of the soy product/ingredient? If the answer is 'no', please explain why.

- Yes
- No – please explain why

23. Does your company manufacture its own soy products/ingredients? If no, please provide up to 3 suppliers' names and addresses.

- Yes
- No – suppliers' names & addresses

Do you have any questions about the survey or GM labelling?

- No
- Yes – please write your question here

Thank you for your assistance.