FOOD STANDARDS
Australia New Zealand
Te Mana Kounga Kai – Ahitereiria me Aotearoa

APPLICATION A1035
FOOD DERIVED FROM INSECT-PROTECTED SOYBEAN LINE MON87701
EXPLANATORY STATEMENT

Executive Summary

Purpose

Food Standards Australia New Zealand (FSANZ) received an Application from Monsanto Australia Ltd (the Applicant) on 27 August 2009. The Applicant has requested an amendment to the *Australia New Zealand Food Standards Code* (the Code), specifically to Standard 1.5.2 – Food produced using Gene Technology, to permit the sale and use of food derived from a new genetically modified (GM) variety of soybean, MON87701. Standard 1.5.2 requires that GM foods undergo a pre-market safety assessment before they may be sold in Australia and New Zealand.

Soybean MON87701has been genetically modified to be protected against feeding damage caused by the larvae of certain insect pest species. Protection is achieved through expression in the plant of an insecticidal protein derived from *Bacillus thuringiensis*, a common soil bacterium.

Soybean line MON87701 is intended to be grown in South America. However, once commercialised, soybean products imported into Australia and New Zealand could contain ingredients derived from MON87701. Approval is therefore necessary before these products may enter the Australian and New Zealand markets.

The Application was assessed under the General Procedure.

Safety Assessment

FSANZ has completed a comprehensive safety assessment of food derived from insect-protected soybean line MON87701, as required under Standard 1.5.2. The assessment included consideration of (i) the genetic modification to the plant; (ii) the potential toxicity and allergenicity of the novel proteins; and (iii) the composition of MON87701 soybean compared with that of conventional soybean varieties.

No public health and safety issues were identified as a result of the safety assessment.

On the basis of the available evidence, including detailed studies provided by the Applicant, food derived from insect-protected soybean line MON87701 is considered as safe and wholesome as food derived from other commercial soybean varieties.

Labelling

If approved, food derived from insect-protected soybean line MON87701 will be required to be labelled as genetically modified if novel DNA and/or novel protein is present in the final food. Studies conducted by the Applicant show that the novel proteins are present in the seed.

Labelling addresses the objective set out in section 18(1)(b) of the *Food Standards Australia New Zealand Act 1991* (FSANZ Act); the provision of adequate information relating to food to enable consumers to make informed choices.

Impact of regulatory options

Two regulatory options were considered in the assessment: (1) reject the Application; or (2) approval of food derived from insect-protected soybean line MON87701 based on the conclusions of the safety assessment.

Following analysis of the potential costs and benefits of each option on affected parties (consumers, the food industry and government), approval of food derived from insect-protected soybean line MON87701 is the preferred option as the potential benefits to all sectors outweigh the costs associated with the approval.

Assessing the Application

In assessing the Application and the subsequent development of a food regulatory measure, FSANZ has had regard to the following matters as prescribed in section 29 of the FSANZ Act:

- Whether costs that would arise from an amendment to the Code approving food derived from insect-protected soybean line MON87701 outweigh the direct and indirect benefits to the community, Government or industry that would arise from this food regulatory measure.

- There are no other measures that would be more cost-effective than a variation to Standard 1.5.2 that could achieve the same end.

- There are no relevant New Zealand standards.

- There are no other relevant matters.

Decision

To approve the variation to Standard 1.5.2 – Food produced using Gene Technology, to include food derived from insect-protected soybean line MON87701 in the Table to clause 2.

Reasons for Decision

An amendment to the Code approving food derived from insect-protected soybean line MON87701 in Australia and New Zealand is proposed on the basis of the available scientific evidence, for the following reasons:

- the safety assessment did not identify any public health and safety issues associated with the genetic modification used to produce insect-protected soybean line MON87701

- food derived from insect-protected soybean line MON87701 is equivalent to food from the conventional counterpart and other commercially available soybean varieties in terms of its safety for human consumption and nutritional adequacy

- labelling of certain foods derived from insect-protected soybean line MON87701 will be required if novel DNA and/or protein is present in the final food

- a regulation impact assessment process has been undertaken that also fulfils the requirement in New Zealand for an assessment of compliance costs. The assessment concluded that the preferred option is option 2, an amendment to the Code

- there are no relevant New Zealand standards

- there are no other measures that would be more cost-effective than a variation to Standard 1.5.2 that could achieve the same end.

Consultation

Public submissions were invited on this Assessment Report between 7 April and 19 May 2010. Comments were specifically requested on the scientific aspects of this Application, in particular, information relevant to the safety assessment of food from insect-protected soybean MON87701. A total of 37 submissions were received. A summary of these is provided in **Attachment 2** to this Report.

As this Application was assessed under the General Procedure, there was one round of public comment. Responses to the Assessment Report were used to develop this Approval Report for the Application. The main issues raised in public comments are discussed in the Approval Report.

CONTENTS

SUPPORTING DOCUMENT

The following material, which was used in the preparation of this Assessment Report, is available on the FSANZ website at
http://www.foodstandards.gov.au/foodstandards/applications/applicationa1035food4537.cfm

SD1: Updated Safety Assessment Report

INTRODUCTION

An Application was received from Monsanto Australia Ltd on 27 August 2009 seeking an amendment to Standard 1.5.2 – Food produced using Gene Technology, in the *Australia New Zealand Food Standards Code* (the Code), to approve food derived from insect-protected soybean line MON87701.

The genetic modification involved the transfer of one novel gene (*cry1Ac*) into soybean. This gene is from a common soil bacterium called *Bacillus thuringiensis* and encodes an insecticidal protein (Cry1Ac) which protects the plant against feeding damage caused by certain insect pest larvae. No antibiotic resistance marker genes are present in MON87701 soybean.

This Assessment includes a full scientific evaluation of food derived from MON87701 soybean according to FSANZ guidelines[1], to assess its safety for human consumption.

1. The Issue / Problem

The Applicant has developed soybean line MON87701 that is protected from feeding damage caused by certain lepidopteran insect pest larvae. Before food derived from insect-protected soybean line MON87701 can enter the Australian and New Zealand food supply, it must first be assessed for safety and an amendment to the Code must be approved by the FSANZ Board, and subsequently be notified to the Australia and New Zealand Food Regulation Ministerial Council (Ministerial Council). An amendment to the Code may only be gazetted once the Ministerial Council process has been finalised.

Monsanto Australia Ltd has therefore applied to have Standard 1.5.2 amended to include food derived from soybean line MON87701. The Application is at the Assessment stage.

2. Current Standard

2.1 Background

Standard 1.5.2 requires that genetically modified foods undergo a pre-market safety assessment before they may be sold in Australia and New Zealand. Foods that have been assessed under the Standard, if approved, are listed in the Table to clause 2 of the Standard.

2.2 Overseas approvals

Insect-protected soybean line MON87701 is intended for commercialisation in South America. The applicant has submitted a food and feed safety and nutritional assessment summary to the US Food and Drug Administration and a request for a determination of nonregulated status from the US Department of Agriculture. Food, feed and environmental submissions were made to the Canadian Food Inspection Authority, Health Canada and a cultivation submission was made to the Brazilian National Biosafety Technical Commission. The Applicant also applied to the European Food Safety Authority for food and feed use of imported MON87701.

[1] FSANZ (2007). Safety Assessment of Genetically Modified Foods – Guidance Document. http://www.foodstandards.gov.au/_srcfiles/GM%20FINAL%20Sept%2007L%20_2_.pdf

Regulatory submissions have been or will be made to significant importers of soybean or processed soybean fractions. These include the Ministry of Agriculture in China, the Ministry of Health, Labor and Welfare and the Ministry of Agriculture, Forestry and Fisheries in Japan, as well as the Food and Drug Administration and the Rural Development Administration in the Republic of Korea.

3. Objectives

In developing or varying a food standard, FSANZ is required by its legislation to meet three primary objectives which are set out in section 18 of the FSANZ Act. These are:

- the protection of public health and safety; and
- the provision of adequate information relating to food to enable consumers to make informed choices; and
- the prevention of misleading or deceptive conduct.

In developing and varying standards, FSANZ must also have regard to:

- the need for standards to be based on risk analysis using the best available scientific evidence
- the promotion of consistency between domestic and international food standards
- the desirability of an efficient and internationally competitive food industry
- the promotion of fair trading in food; and
- any written policy guidelines formulated by the Ministerial Council.

4. Questions to be answered

Based on information provided by the Applicant on the nature of the genetic modification, the molecular characterisation, the characterisation of the novel proteins, the compositional analysis and any nutritional issues, is food derived from soybean line MON87701 comparable to food derived from conventional varieties of soybean in terms of its safety for human consumption?

Is there other information available, including from the scientific literature, general technical information, independent scientists, other regulatory agencies and international bodies, and the general community, that needs to be considered?

Are there any other considerations that would influence the outcome of this assessment?

RISK ASSESSMENT

Food from insect-protected soybean line MON87701 has been evaluated according to the safety assessment guidelines prepared by FSANZ. The summary and conclusions from the full safety assessment report (Supporting Document 1) are presented below. In addition to information supplied by the Applicant, other available resource material including published scientific literature and general technical information was used for the assessment.

5. Risk Assessment Summary

5.1 Safety Assessment Process

In conducting a safety assessment of food derived from insect-protected MON87701 soybean, a number of criteria have been addressed including: a characterisation of the transferred genes, their origin, function and stability in the soybean genome; the changes at the level of DNA, protein and in the whole food; compositional analyses; evaluation of intended and unintended changes; and the potential for the newly expressed proteins to be either allergenic or toxic in humans.

The safety assessment applied to food from soybean line MON87701 addresses only food safety and nutritional issues. It therefore does not address: environmental risks related to the environmental release of genetically modified (GM) plants used in food production; the safety of animal feed or animals fed with feed derived from GM plants; or the safety of food derived from the non-GM (conventional) plant.

5.2 Outcomes of the Safety Assessment

Detailed molecular analyses indicate that one copy of the *cry1Ac* gene has been inserted at a single site in the plant genome and the gene is stably inherited from one generation to the next. No antibiotic resistance marker genes are present in MON87701 soybean.

MON87701 expresses one novel protein, Cry1Ac. The Cry1Ac protein is expressed at low levels in the soybean seed, with a mean concentration of 4.2 µg/g fresh weight.

The Cry1Ac protein is >99% identical to the native Cry1Ac protein from *B. thuringiensis* subsp *kurstaki*, differing by seven amino acids. However, the Cry1Ac sequence from MON87701 is 100% identical to that in cotton lines, MON 1849 and 15895, which have previously been approved by FSANZ for food use. However, the sequence in MON87701 contains a four amino acid addition at the N-terminus of the protein that serves to target it to the chloroplast. This N-terminal tag is cleaved from the protein during prototoxin activation.

A large number of studies have been done with Cry1Ac expressed in MON87701 to confirm its identity and physicochemical and functional properties as well as to determine its potential toxicity and allergenicity. These studies have demonstrated that the protein conforms in size and amino acid sequence to that expected, does not exhibit any post-translational modification including glycosylation, and demonstrates the predicted insecticidal activity.

In relation to potential toxicity and allergenicity, *B. thuringiensis* has been extensively studied and has a long history of safe use as the active ingredient in a number of insecticide products for use in agriculture as well as home gardens.

Bioinformatic studies with the Cry1Ac protein have confirmed the absence of any biologically significant amino acid sequence similarity to known protein toxins or allergens and digestibility studies have demonstrated that the protein would be rapidly degraded following ingestion, similar to other dietary proteins. Acute oral toxicity studies in mice with the Cry1Ac protein have also confirmed the absence of toxicity. Taken together, the evidence indicates that both proteins are unlikely to be toxic or allergenic in humans.

Compositional analyses were done to establish the nutritional adequacy of MON87701 soybean, and to compare it to conventional soybean under typical cultivation conditions. No

differences of biological significance were observed between MON87701 soybean and its conventional counterpart.

Food from insect-protected MON87701 soybean is therefore considered to be compositionally equivalent to food from conventional soybean varieties and its introduction into the food supply would therefore be expected to have little nutritional impact.

As soybean is one of the major allergenic foods, the allergenicity of MON87701 was compared to that of several commercial soybean varieties by assessing IgE binding responses using sera from known soybean allergic patients. Sera from these patients bound to MON87701 in a very similar manner to that of conventional soybean, suggesting that MON87701 does not have any greater potential to be allergenic than conventional soybean varieties.

5.3 Conclusions

No potential public health and safety issues have been identified in the assessment of insect-protected MON87701 soybean. On the basis of the data provided in the present application, and other available information, food derived from insect-protected MON87701 soybean is considered as safe and wholesome as food derived from conventional soybean varieties.

RISK MANAGEMENT

6. Issues raised

6.1 Risk Management Strategy

In accordance with general labelling provisions, food derived from soybean line MON87701, if approved, would be required to be labelled as genetically modified if novel DNA or novel protein is present in the final food.

7. Options

There are no non-regulatory options for this Application. The two regulatory options available for this Application are:

7.1 Option 1 – Reject the Application

Maintain the *status quo* by rejecting the Application to approve food derived from insect-protected soybean line MON87701.

7.2 Option 2 – Prepare a draft variation for food from soybean line MON87701

Prepare draft variations to amend Standard 1.5.2 to permit the sale and use of food derived from insect-protected soybean line MON87701, with or without specified conditions in the Table to clause 2 of the Standard.

8. Impact Analysis

In the course of developing food regulatory measures suitable for adoption in Australia and New Zealand, FSANZ is required to consider the impact of all options on all sectors of the community, including consumers, the food industry and governments in both countries. The regulatory impact assessment identifies and evaluates, though is not limited to, the costs and benefits of the regulation, and its health, economic and social impacts.

8.1 Affected Parties

The affected parties may include the following:

- Consumers of food products containing soybean, particularly those concerned about biotechnology.

- Industry sectors:

  - food importers and distributors of wholesale ingredients
  - processors and manufacturers of food products containing soybean
  - food retailers.

- Government:

  - enforcement agencies
  - national government, in terms of trade and World Trade Organization (WTO) obligations.

The cultivation of soybean line MON87701 in Australia or New Zealand could have an impact on the environment, which would need to be assessed by the Office of the Gene Technology Regulator (OGTR) in Australia, and by various New Zealand Government agencies including the Environmental Risk Management Authority (ERMA) and the Ministry of Agriculture and Forestry (MAF) before growing in either country could be permitted. MON87701 soybean has been developed primarily for agricultural production overseas and, at this stage, the Applicant has no plans for cultivation in either Australia or New Zealand.

8.2 Benefit Cost Analysis

8.2.1 Option 1 – prohibit food from soybean line MON87701

Consumers: Possible restriction in the availability of soybean products if MON87701 soybean is present in imported foods.

No impact on consumers wishing to avoid GM foods, as food from MON87701 soybean is not currently permitted in the food supply.

Government: Potential impact if considered inconsistent with WTO obligations but impact would be in terms of trade policy rather than in government revenue.

Industry: Possible restriction on soybean imports once MON87701 soybean is commercialised overseas.

Potential longer-term impact - any successful WTO challenge has the potential to impact adversely on food industry.

8.2.2 Option 2 – approve food from soybean line MON87701

Consumers: Broader availability of imported soybean products as there would be no restriction on imported soybean products derived from MON87701 soybean.

Potentially a wider range of imported soybean products at lower prices.

Appropriate labelling would allow consumers wishing to avoid GM soybean to do so.

Government: Benefit that if MON87701 soybean were detected in soybean imports, approval would ensure compliance of those products with the Code. This would ensure no potential for trade disruption on regulatory grounds.

Approval of MON87701 soybean would ensure no conflict with WTO responsibilities.

This option could impact on monitoring resources, as certain foods derived from MON87701 soybean will be required to be labelled as genetically modified.

Industry: Food manufacturers gain broader market access and increased choice in raw materials.

Importers of processed foods containing soybean as an ingredient would benefit as foods derived from MON87701 soybean would be compliant with the Code.

Retailers may be able to offer a broader range of soybean products.

Possible cost to food industry as some food ingredients derived from MON87701 soybean would be required to be labelled as genetically modified.

8.3 Comparison of Options

As food from insect-protected soybean line MON87701 has been found to be as safe as food from conventional varieties of soybean, Option 1 is likely to be inconsistent with Australia's and New Zealand's WTO obligations. Option 1 would also offer little benefit to consumers wishing to avoid GM foods, as approval of MON87701 soybean by other countries could limit supplementation of the Australian and New Zealand market with imported soybean products.

As MON87701 soybean has been found to be safe for human consumption and the potential benefits outweigh the potential costs, Option 2, preparing draft legislation to approve insect-protected soybean line MON87701, is therefore the preferred option.

COMMUNICATION AND CONSULTATION STRATEGY

9. Communication

FSANZ applied a basic communication strategy to this Application that involved advertising the availability of assessment reports for public comment in the national press and placing the reports on the FSANZ website. As normally applies to all GM food assessments, this Approval Report will be available to the public on the FSANZ website and distributed to major stakeholders.

The Applicant and individuals and organisations that made submissions on this Application were notified at each stage of the assessment. The FSANZ Board's decision to approve the variation to Standard 1.5.2 has been notified to the Ministerial Council. If the approval of food derived from MON87460 corn is not subject to review, the Applicant and stakeholders, including the public, would be notified of the gazettal of the variation to the Code in the national press and on the website.

10. Consultation

10.1 Public Consultation

The Assessment Report was advertised for public comment between 7 April and 19 May 2010. Comments were specifically requested on scientific aspects of this Application, in particular, information relevant to the safety assessment of food derived from soybean line MON87701.

As this Application was assessed under the General Procedure, there was one round of public comment.

A total of 37 submissions were received. A summary of these is provided in **Attachment 2** to this report. FSANZ has taken the submitters' comments relevant to food safety into account in preparing the Approval Report for this application. The OGTR in Australia and MAF in New Zealand are the agencies responsible for any issues of public concern regarding the growing of GM crops and the environment (for example colony collapse disorder in bees).

Responses to general issues raised, such as the safety of GM food, GM food labelling, long-term feeding studies and the nature and source of data used to inform the safety assessment, are available from the FSANZ website (see Table 1). In relation to the data required for an assessment, it should be noted that the data submitted by an applicant and the conduct of the studies are subjected to strict requirements outlined in the *Application Handbook*. In turn, these requirements are guided by concepts and principles developed through the work of the OECD, FAO, WHO and the Codex Alimentarius Commission in relation to the assessment of GM foods.

Table 1: Sources of Information, available on the FSANZ website, regarding GM Food

Issue	General area of FSANZ website where information can be found	Specific web link
Safety of GM food	Safety Assessment of Genetically Modified Foods	http://www.foodstandards.gov.au/_srcfiles/GM%20Foods_text_pp_final.pdf
	Frequently Asked Questions on GM foods	http://www.foodstandards.gov.au/foodmatters/gmfoods/frequentlyaskedquest3862.cfm
Labelling of GM food	Appendix 3: Safety Assessment of Genetically Modified Foods	http://www.foodstandards.gov.au/_srcfiles/GM%20Foods_text_pp_final.pdf
	Frequently Asked Questions on GM foods Part III. Labelling of GM Foods	http://www.foodstandards.gov.au/foodmatters/gmfoods/frequentlyaskedquest3862.cfm
	GM Labelling Review Report	http://www.foodstandards.gov.au/newsroom/publications/gmlabellingreviewrep2460.cfm
Long term feeding studies	Section 7.6: Safety Assessment of Genetically Modified Foods	http://www.foodstandards.gov.au/_srcfiles/GM%20Foods_text_pp_final.pdf
	Role of animal feeding studies in the safety assessment of genetically modified foods	http://www.foodstandards.gov.au/consumerinformation/gmfoods/roleofanimalfeedings3717.cfm

Issue	General area of FSANZ website where information can be found	Specific web link
Data used to inform the Safety Assess.	Food Matters • GM Foods	http://www.foodstandards.gov.au/foodmatters/gmfoods/

The main issues raised in submissions are discussed below.

10.1.1 Function of DNA in the transgene insertion site

The New Zealand Food Safety Authority (NZFSA) raised a question about the function of the DNA into which the transgene was inserted.

10.1.1.1 Response

Insertion of a transgene into an important or essential gene would have resulted in either an unviable plant or impaired agronomic traits. The plants that are selected therefore generally have insertions into non-coding regions, or into regions that, if disrupted, causes no effect on the plant's viability.

The Applicant has analysed the genomic DNA surrounding the insert. They confirm that the insertion was not into a coding region. Thus the insertion will not have resulted in the truncation, silencing or otherwise of any soybean protein.

10.1.2 Open reading frame analysis

NZFSA questioned whether the number of open reading frames (ORFs) identified was nine or six, and whether a mutation had taken place in the *cry1Ac* coding region.

10.1.2.1 Response

In any given DNA it is possible for open reading frames (i.e. coding regions) to occur in any of six reading frames, (three on each strand). The Applicant identified nine putative ORFs in an analysis of the junction regions and also analysed all six possible reading frames of the Cry1Ac ORF itself in another analysis.

The paragraph referred to simply states that it is possible in *any gene* for mutations to occur. For this reason, all six of the possible reading frames (i.e. those reading frames inherent to any piece of double-stranded DNA) were investigated for the possibility of containing ORFs should a mutation occur in the future.

10.1.3 Differences between wild-type and MON87701 amino acid sequences and reason for adding the CTP

NZFSA stated that the differences between the wild-type Cry1Ac protein in *B. thuringiensis* and in MON87701 are not defined. It also stated that the reason for adding the chloroplast transit peptide (CTP) was not included.

10.1.3.1 Response

The differences between the sequences of the wild-type and MON87701 Cry1Ac proteins have now been included in the Safety Assessment. Also, although the function of the CTP

was mentioned on pages 2, 12 and 13 of the Safety Assessment, the consequence of targeting to the chloroplast was not included. This has now been included in the Safety Assessment.

10.1.4 Compositional analysis

NZFSA questions the relevance of commercial tolerance intervals, particularly with regard to isoflavones. They suggest that large tolerance intervals preclude meaningful analysis of differences between the control and GM crops.

10.1.4.1 Response

Composition and nutrient levels in plants depend on a variety of non-genetic factors including weather conditions, rainfall, soil type, soil quality, growing season, location and orientation of plots. Significant differences in composition can be found between, for example, plants harvested from two different field sites planted with an identical variety of conventional soybeans.

The large tolerance intervals for isoflavones merely reflect the natural variation that occurs between different commercial cultivars. This information is highly relevant to the interpretation on any statistically significant differences between a GM line and its conventional counterpart.

10.1.5 Benefit cost analysis

Queensland Health requested more quantitative detail to support the conclusions of the Benefit Cost Analysis in the Assessment Report.

10.1.5.1 Response

The Benefit Cost Analysis included in the Assessment Report is not intended to be an exhaustive, quantitative dollar analysis of the options and, in fact, most of the impacts that are considered cannot be assigned a dollar value. Rather, the analysis seeks to highlight the qualitative impacts of criteria that are relevant to each option. These criteria are deliberately limited to those involving broad areas such as trade, consumer information and compliance and do not, for example include any consideration of the impact of growing the crop (either to the farmer or to the environment).

10.1.6 Enforcement costs

Queensland Health had concerns about the impact on monitoring resources if the Application is approved.

10.1.6.1 Response

FSANZ believes it is important to recognise that, because GM foods are continually entering international trade, the costs of monitoring are largely unavoidable and will arise irrespective of whether or not GM foods are approved in Australia and New Zealand.

In the case of approved GM foods, monitoring is required to ensure compliance with the labelling requirements, and in the case of GM foods that have not been approved, monitoring is required to ensure they are not illegally entering the food supply. The costs of monitoring are thus expected to be comparable, whether a GM food is approved or not. Any regulatory

decision take by FSANZ is therefore unlikely to significantly affect the cost impact on jurisdictions, in terms of their responsibilities to enforce the Code.

10.1.7 Future findings that may influence an approval decision

Queensland Health was concerned about further GM approvals being made until the findings of the Review of Food Labelling Law and Policy were released, and the findings of research conducted by Dr Judy Carman became publicly available.

10.1.7.1 Response

The Labelling Review Committee met for the first time in November 2009 and a final report is due to be provided to the Ministerial Council at the end of 2010 and the Council of Australian Governments in 2011. While there has been some publicity surrounding Dr Judy Carman's latest findings concerning GM food, it is the understanding of FSANZ that these findings have not yet been published.

FSANZ has a statutory obligation to consider all applications seeking to amend the Code. Further, there is a statutory timeframe associated with this consideration and FSANZ therefore cannot hold up a consideration process on the grounds that information may become available at a future point. In the case of food derived from soybean line Mon87701, FSANZ considers that sufficient evidence has been provided to allow completion of a safety assessment.

However, FSANZ remains open to receive or review any new information pertinent to the GM applications that have been approved, or are in the process of being considered. If necessary, FSANZ would not hesitate to withdraw an approval or not approve a GM food where the decision could be supported by robust scientific evidence.

10.1.8 Soybean is an allergenic food, and this should have been taken into account when addressing the allergenicity of bt toxin

Gene Ethics suggested that FSANZ should have looked more closely at the potential allergenicity of bt toxin, given that soybean was an allergenic food.

10.1.8.1 Response

An allergic reaction to a food is a highly specific response. Simply being allergic to soybean will not mean a person will form an allergic reaction to any other protein, unless the two proteins share significant homology. As there is no homology between the Cry toxin and any soybean proteins, there is no risk of allergy towards bt in soy-allergic people.

10.1.9 There is a difference between sprayed application of bt and plant-expressed Cry proteins

Gene Ethics suggested the different modes of application of bt (via spraying) and Cry protein expression in the plant leads to different risks.

10.1.9.1 Response

The amount of Cry protein present in the soybean is extremely low. It is entirely insignificant when compared with the total protein content of the seed. However, even if the amount of protein expressed in the plant were large, this would be of no consequence. Whether the Cry toxin is ingested as part of a bacterium, or as part of a soybean meal, the protein, as shown in the digestibility studies, is broken down within seconds to the peptide level.

10.1.10 The soybean should be tested as a whole food. Nutritional data (e.g. on anti-nutrients) is lacking

Gene Ethics submitted that the nutritional value of the soybean had not been established and suggested that the whole food had not been tested for anti-nutrients or nutrition.

10.1.10.1 Response

The compositional studies examined in the safety assessment (SD1) include a detailed study on a whole range of nutritional components. Each of these components was analysed in seed as well as forage. In addition to the key nutrients, compositional analyses were also done of the key anti-nutrients, which in soybean include trypsin inhibitor, phytic acid and lectin.

There were no biologically relevant differences in anti-nutrients between the comparator and MON87701. Given the absence of any biologically significant differences in nutrient and anti-nutrient composition between MON87701 and non-GM soybean it can be reasonably concluded that food from MON87701 will have the same nutritional value as food from other soybean varieties.

10.1.11 Amino acid differences between MON87701 and wild-type proteins

NZFSA noted the amino acid differences (seven in total) between the wild-type and MON87701 Cry1Ac proteins. It would like to know why the changes were introduced, and what effect they have.

10.1.11.1 Response

The amino acid differences between the Cry1Ac protein expressed in MON87701 and the wild-type Cry1Ac are the result of combining the first 1398 nucleotides of the *cry1Ab* gene with nucleotides number 1399 to 3534 of the *cry1Ac* gene. As a result of this combination, a total of seven amino acid differences compared with wild type Cry1Ac protein derived from *Bacillus thuringiensis* subsp. kurstaki HD-73 were produced. Six of these differences (located in the first 466 amino acid segment) are due to the fact that this portion of the protein is derived from the *cry1Ab* gene (the sequences for Cry1Ac and Cry1Ab are highly homologous in this 466 amino acid segment but differ in six positions). The seventh substitution at position 766 is attributed to a natural polymorphism among Cry1Ac proteins. Thus all of the amino acid differences stem from differences that naturally exist in the wild-type proteins.

10.1.12 The protein analyses used to determine equivalence, while probably appropriate in the context of protein analyses, could look highly variable

NZFSA sought a reference for the assertions that molecular weight differences of ≤ 5% (i.e. approximately 5 kDa) and densitometric variability of ±35% were acceptable.

10.1.12.1 Response

The assay acceptance criteria used for each assay of equivalence of the *E. coli* and MON 88701-produced proteins are based on the following factors: 1) public literature addressing method variability, and 2) extensive experience with the analytical procedures used to assess protein equivalence. In the case of SDS-PAGE, molecular weight precision is reported to be approximately 2-7% (Goetz et al. 2004)[2] for proteins ranging in size from 14.4 to 166 kDa. The acceptance criterion for immuno-equivalence was determined using experience with this assay and the many steps (gel electrophoresis, electro transfer to a membrane, and development of bound antibody) involved in producing this data.

10.2 World Trade Organization (WTO)

As members of the WTO, Australia and New Zealand are obligated to notify WTO member nations where proposed mandatory regulatory measures are inconsistent with any existing or imminent international standards and the proposed measure may have a significant effect on trade.

The draft variation to the Code would have a trade enabling effect as it would permit food derived from MON87701 soybean to be imported into Australia and New Zealand and sold, where currently it is prohibited. For this reason it was determined there was no need to notify this Application as an SPS measure in accordance with the WTO Agreement on the Application of SPS Measures.

CONCLUSION

11. Conclusion and Preferred Approach

Decision

To approve the variation to Standard 1.5.2 – Food produced using Gene Technology, to include food derived from insect-protected soybean line MON87701 in the Table to clause 2.

11.1 Reasons for Decision

An amendment to the Code to give approval to the sale and use of food derived from soybean line MON87701 in Australia and New Zealand is proposed on the basis of the available scientific evidence, for the following reasons:

- the safety assessment did not identify any public health and safety issues associated with the genetic modification used to produce insect-protected soybean line MON87701

- food derived from insect-protected soybean line MON87701 is equivalent to food from the conventional counterpart and other commercially available soybean varieties in terms of its safety for human consumption and nutritional adequacy

labelling of certain foods derived from insect-protected soybean line MON87701 will be required if novel DNA and/or protein is present in the final food

[2] Goetz, H., M. Kuschel, T. Wulff, C. Sauber, C. Miller, S. Fisher, and C. Woodward. 2004. Comparison of selected analytical techniques for protein sizing, quantitation and molecular weight determination. Journal of Biochemical and Biophysical Methods. 60: 281-293

- a regulation impact assessment process has been undertaken that also fulfils the requirement in New Zealand for an assessment of compliance costs. The assessment concluded that the preferred option is Option 2, an amendment to the Code

- there are no relevant New Zealand standards

- there are no other measures that would be more cost-effective than a variation to Standard 1.5.2 that could achieve the same end.

12. Implementation and Review

Following the consultation period for this document, an Approval Report will be completed and the draft variation will be considered for approval by the FSANZ Board. The FSANZ Board's decision will then be notified to the Ministerial Council. Following notification, the proposed draft variation to the Code is expected to come into effect on gazettal, subject to any request from the Ministerial Council for a review of FSANZ's decision.

ATTACHMENTS

1. Draft variation to the *Australia New Zealand Food Standards Code*
2. Summary of issues raised in public submissions

Attachment 1

Draft variation to the *Australia New Zealand Food Standards Code*

Subsection 87(8) of the FSANZ Act provides that standards or variations to standards are legislative instruments, but are not subject to disallowance or sunsetting

To commence: on gazettal

[1] ***Standard 1.5.2*** *of the Australia New Zealand Food Standards Code is varied by inserting in* Column 1 *of the* Table to clause 2 –

Food derived from insect-protected soybean line MON87701	

Attachment 2

Summary of Public Submissions on Assessment Report

Submitter	Comments
Leo Adler Josephine Agiel-Knudsen Kaye Bannatyne Peter Beetz Andrew Bell Lisa Benson J. Carapiet Nadine Gray Jonathan Eisen Karen Forno Charlotte Huckson Lynley Jenness Patricia McKinnon Joe McLaughlin Christine Phippen Rod Sandle Katherine Smith Jeremy Watt Tony Wyeth (Private)	• The release of GM foods into the food chain places unreasonable costs on people seeking to avoid GE ingredients. • Safety data on GM foods is inadequate • Rejection would force industry to develop strict traceability and testing.
Anna Clements (Private)	• Is concerned about the use of foreign GM in food and does not want to eat it. • Labelling of GM foods is virtually non-existent
Dorothy Coe (Organic Growers Club)	• Does not want any GM foods in Australia. • Is concerned about cross-contamination • Has concerns about safety • Wants to keep Australia free from the growing of GM crops
Food Technology Association of Australia	• Supports the application
Frank Golik (Private)	• Animal studies should be performed over several years • There is a lack of independent testing
H. Lim (Private)	• GM foods should not be on the market until research has been done over at least 30 years
Nathan Kennerley (Private)	• There is no way to monitor health effects of GMOs once they have entered the food supply. • GM foods that are not labelled as such cannot be traced • The applicant is not trustworthy • FSANZ follows the GRAS approach of the US
Cecelia Martin (Private)	• There are harmful effects to the soil and humans ingesting GMs. • There is widespread opposition to GM foods. • GM foods are all unsafe.
Cliff Mason (Private)	• Approval of A1035 would place an increased burden on people wishing to avoid GM foods. • The GRAS approach of the FDA is under scrutiny, and FSANZ uses these approaches. • GMOs cannot be traced if they are not labelled • The threat of WTO action imposes on national sovereignty

Submitter	Comments
Barbara Morgan Nicole Page (Private)	• Does not want any GM foods in Australia. • Is concerned about cross-contamination • Has concerns about safety • Wants to keep Australia free from the growing of GM crops
New Zealand Food Safety Authority	• Does not object to the Application. • Suggests identification of the function of the DNA in the insertion site • Expresses confusion about the ORF analysis • Seeks clarification of the amino acid differences between the *wt* and MON 88701 Cry1Ac protein • Seeks a reference for acceptance standards in molecular weight and densitometric analysis. • Suggests that the tolerance intervals used, particularly for isoflavone levels, are large and this may make comparison difficult.
Bob Phelps (Gene Ethics)	• Has concerns with the concept of substantial equivalence • FSANZ does not take into account the "evidence of harm" of other GM foods • Whole GM foods should be tested for their safety • Soybean is an allergenic food – this may influence the allergenicity of the Cry protein • FSANZ does not take into account the effects of bt crops on Indian and Philippines farm workers • FSANZ does not take into account the rejection on safety grounds of the bt brinjal • FSANZ does not take into account the difference in consumption between *B. thuringiensis* sprayed on crops and the Cry protein expressed constitutively • Compositional studies are inadequate • There is insufficient nutritional data (e.g. increases in anti-nutrients) • FSANZ should take into account the ethics of the applicant • FSANZ overstates the WTO impact • There is insufficient technological justification for the product
Queensland Health (whole of Government response)	• Expresses concern that the scientific studies accompanying the Application are not independent. • Requests information as to the status of similar applications elsewhere in the world. • Seeks access to the advice provided by FSANZ to the OBPR regarding cost-benefit analysis. • Has concerns about the impact on monitoring resources if the Application is approved. • Requests the application be deferred until the outcomes of the labelling review and Dr Judy Carmen's study are known.
Vincent Rowe (Private)	• Cry proteins in transgenic pollen could cause colony collapse disorder in bees due to an immune response to the protein
Scott Baker (Private)	• Releasing GM food without labelling will remove consumer choice • New Zealand should be a GM-free country
Charmaine Waldron Franceine Waldron (Private)	• The GM product is contaminated/hazardous waste • GM research is a waste of money • There is a failure of justice in forcing NZ consumers to carry the risks of accidental consumption • There are environmental risks associated with GMOs • GM is unacceptable, unscientific and unethical
Paul White (Private)	• Approval of A1035 would be reckless experimentation