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APPLICATION A1006

FOOD DERIVED FROM HERBICIDE-TOLERANT

SOYBEAN LINE DP-356043-5

APPROVAL REPORT

Executive Summary

Purpose

Food Standards Australia New Zealand (FSANZ) received an Application from Pioneer Hi-Bred International, Inc. (Pioneer), a DuPont Company, on 18 March 2008. The Applicant requested an amendment to Standard 1.5.2 – Food produced using Gene Technology, in the *Australia New Zealand Food Standards Code* (the Code), to permit the sale and use of food derived from a new genetically modified (GM) variety of soybean, dual herbicide-tolerant soybean line DP-356043-5.

Soybean line DP-356043-5 is tolerant to the broad-spectrum herbicide glyphosate and to acetolactate synthase (ALS)-inhibiting herbicides. Tolerance is conferred by expression in the plant of two novel proteins: GAT4601 and GM-HRA. The GAT4601 protein confers tolerance to glyphosate-containing herbicides by the acetylation of glyphosate, thereby rendering it non-phytotoxic. The GM-HRA protein is a modified soybean ALS enzyme that is able to function in the presence of the ALS-inhibiting class of herbicides, thereby conferring tolerance to those herbicides.

This Application was assessed as a Major Procedure. Following two rounds of public consultation, the Application has reached the Approval stage.

Safety Assessment

FSANZ completed a comprehensive safety assessment of food derived from soybean line DP-356043-5, which was released in the 1st Assessment Report. This assessment included consideration of (i) the genetic modification to the plant; (ii) the potential toxicity and allergenicity of the novel proteins; (iii) the composition of soybean DP-356043-5 compared with that of conventional soybean varieties; and (iv) the nutritional adequacy of soybean DP-356043-5 when incorporated into the diet.

No public health and safety concerns were identified in the pre-market safety assessment. On the basis of the available evidence, including detailed studies provided by the Applicant, food derived from dual-herbicide tolerant soybean line DP-356043-5 is considered as safe and wholesome as food derived from other commercial soybean varieties.

Novel herbicide residues

Two novel herbicide residues are generated from the use of glyphosate on soybean DP-356043-5. Following a comprehensive toxicological assessment, no public health and safety concerns were identified with regard to *N*-acetyl glyphosate (NAG) and *N*-acetyl aminomethylphosphonic acid (*N*-acetyl AMPA), which are less toxic than glyphosate itself.

As stated in previous reports, the US EPA has included NAG in tolerance limits, to reflect use of glyphosate on soybean line DP-356043-5. While noting this decision, FSANZ considers that a change to the residue definition for glyphosate as applies in Australia and New Zealand is not necessary. There would be no food safety benefit in amending the existing residue definition, and such an amendment would result in costs that are not justified given the proportion of soybean line DP-356043-5 that is likely to be present in foods imported into either country. The existing residue definition and Maximum Residue Limit (MRL) for glyphosate on soybean in the Code will therefore continue to apply, and these are appropriate for soybean line DP-356043-5. In reaching this conclusion, FSANZ consulted the Australian Pesticides and Veterinary Medicines Authority, the New Zealand Food Safety Authority, and the Applicant.

Labelling

If approved, food derived from soybean line DP-356043-5 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 novel proteins are present in the raw seed.

Soybean DP-356043-5 has elevated levels of two minor fatty acids, heptadecanoic acid (C17:0) and heptadecanoic acid (C17:1), and of the acetylated amino acids *N*-acetyl glutamate (NAGlu) and *N*-acetyl aspartate (NAAsp). Standard 1.5.2 of the Code states that additional labelling could be required for GM food where *the genetic modification has resulted in one or more significant composition or nutritional parameters* falling outside the normal range of values for the non-GM counterpart. FSANZ has examined this issue and does not recommend any additional labelling requirements for foods derived from soybean DP-356043-5, as the elevated components are not considered *significant composition or nutritional parameters*. This decision is based on their demonstrated safety, low abundance, lack of nutritional impact, and presence in other commonly consumed foods.

Labelling addresses the objective set out in paragraph 18(1)(b) of the *Food Standards Australia New Zealand Act 1991* (FSANZ Act); that is, the provision of adequate information relating to food to enable consumers to make informed choices. The general GM labelling requirements will provide consumers with relevant information about the GM status of this food.

Impact of regulatory options

Following satisfactory completion of the safety assessment, two regulatory options were considered: (1) no approval; or (2) approval of food derived from soybean DP-356043-5.

Following analysis of the potential costs and benefits of each option on affected parties (consumers, the food industry and government), option 2, approval of this Application, is the preferred option. Under option 2, the potential benefits to all sectors outweigh any costs associated with the approval.

Assessing the Application

In assessing the Application, FSANZ has had regard to the following matters as prescribed in section 29 of the FSANZ Act:

- The costs that would arise from an amendment to the Code approving food derived from dual herbicide-tolerant soybean line DP-356043-5 do not outweigh the direct and indirect benefits to the community, Government and 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.
- Any relevant New Zealand standards including for residue limits.
- Any other relevant matters.

Decision

Approve a variation to Standard 1.5.2 – Food produced using Gene Technology, to include food derived from herbicide-tolerant soybean line DP-356043-5 in the Table to clause 2.

Reasons for Decision

A variation to Standard 1.5.2 to permit the sale and use of food derived from herbicide-tolerant soybean line DP-356043-5 in Australia and New Zealand is approved on the basis of the available scientific evidence, for the following reasons:

- the safety assessment did not identify any public health and safety concerns associated with the genetic modification used to produce soybean line DP-356043-5
- food derived from herbicide tolerant soybean line DP-356043-5 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
- the novel herbicide residues generated on soybean DP-356043-5 plants following glyphosate application are less toxic than glyphosate and pose no food safety concerns
- labelling of certain food products derived from herbicide-tolerant soybean line DP-356043-5 will be required if novel DNA and/or protein is present in the final food
- a regulation impact assessment process has been undertaken that fulfils the requirement in Australia and 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 other measures that would be more cost-effective than a variation to Standard 1.5.2 that could achieve the same end.

Consultation

As this Application was assessed as a Major Procedure, there were two rounds of public comment. Consultation on the 1st Assessment was conducted over a period of six weeks; nine submissions were received. Consultation on the 2nd Assessment was conducted over a period of four weeks; six submissions were received. A summary of these is provided in this report at **Attachment 2**.

FSANZ has taken all submitters' comments into consideration in completing the assessment of this Application, and has addressed issues, particularly those relevant to the safety of food derived from soybean DP-356043-5. Additional information was incorporated into the Safety Assessment where necessary. Responses to the 2nd Assessment Report were used to complete this Approval Report.

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INTRODUCTION

On 18 March 2008, Pioneer Hi-Bred International, Inc. (Pioneer), a DuPont Company, submitted an Application seeking approval for food derived from dual herbicide-tolerant soybean line DP-356043-5 (also referred to as soybean 356043) under Standard 1.5.2 – Food produced using Gene Technology, in the *Australia New Zealand Food Standards Code* (the Code).

Soybean 356043 has been genetically modified for tolerance to the broad-spectrum herbicide glyphosate and to acetolactate synthase (ALS)-inhibiting herbicides. Protection is conferred by expression in the plant of two novel proteins: GAT4601 (glyphosate acetyltransferase) and GM-HRA (modified version of a soybean ALS). The GAT4601 protein, encoded by the *gat4601* gene, confers tolerance to glyphosate-containing herbicides by acetylating glyphosate and thereby rendering it non-phytotoxic. The GM-HRA protein, encoded by the *gm-hra* gene, is able to function in the presence of the ALS-inhibiting class of herbicides, thereby conferring tolerance to those herbicides.

The dual herbicide tolerance traits of soybean DP-356043-5 are intended to enable growers to choose an optimal combination of the herbicides to manage weed populations. An existing glyphosate-tolerant soybean, 40-3-2, currently accounts for 60% of the global soybean area and is the most cultivated GM plant product to date. Extending tolerance to ALS-inhibiting herbicides is intended to provide growers with an additional management tool for weeds that are difficult to control with glyphosate alone.

The 1st Assessment Report was released in March 2009 and included a full scientific evaluation of food derived from soybean DP-356043-5 according to FSANZ guidelines¹ to assess its safety for human consumption. Following a six-week public consultation period, the issues raised in submissions were considered and addressed in the 2nd Assessment Report. Additional information was included in the safety assessment (Attachment 2 to the 2nd Assessment Report). Public comments were received on the 2nd Assessment Report and proposed recommendations, prior to completion of this Approval Report. All submissions relating to the 2nd Assessment Report have been summarised in **Attachment 2** to this Report.

1. The Issue / Problem

The Applicant has developed GM soybean line DP-356043-5 that is tolerant to the broad-spectrum herbicide glyphosate and to ALS-inhibiting herbicides. Pre-market approval is necessary before this product may enter the Australian and New Zealand food supply. An amendment to the Code granting approval to food derived from soybean 356043 must be approved by the FSANZ Board, and subsequently 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.

Soybean line DP-356043-5 is intended to be grown in North America. Before release onto commercial agricultural markets, the Applicant is seeking regulatory approval for soybean DP-356043-5 in key trading markets for soybean, including Australia and New Zealand. This is necessary because once it is cultivated on a commercial-scale, soybean products imported into Australia and New Zealand could contain ingredients derived from soybean 356043 as a result of comingling practices at harvest or later processing stages.

¹ FSANZ (2007). Safety Assessment of Genetically Modified Foods – Guidance Document. [http://www.foodstandards.gov.au/srcfiles/GM%20FINAL%20Sept%2007L%202 .pdf](http://www.foodstandards.gov.au/srcfiles/GM%20FINAL%20Sept%2007L%202.pdf)

The Applicant has therefore sought the necessary amendments to Standard 1.5.2 to include food derived from soybean line DP-356043-5 prior to any decision to commercialise this line. The Application is being assessed as a Major Procedure.

2. Current Standard

2.1 Background

Approval of genetically modified foods under Standard 1.5.2 is contingent upon completion of a comprehensive pre-market safety assessment. 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

Soybean line DP-356043-5 is intended for commercialisation in the United States and Canada. Soybean 356043 has been approved for food and feed use and environmental release in the United States (US Food and Drug Administration and the USDA – Animal and Plant Health Inspection Service) and Japan (Ministry of Agriculture, Forestry & Fisheries, Ministry of the Environment, and Ministry for Health, Labour & Welfare). Approval for food/feed use has been obtained in Mexico (Secretary of Health) and Taiwan (Department of Health). Submissions have been made to the appropriate agencies for food, feed and environmental approvals in Canada (Health Canada and the Canadian Food Inspection Agency). Regulatory submissions for food import approvals have also been made in the European Union. The Applicant has advised that further submissions for import approvals in key international markets will also be made.

In March 2009, the US Environmental Protection Agency (US EPA) amended the tolerance (i.e. maximum residue limits) for herbicide residues on soybean 356043 treated with glyphosate to include the novel metabolite *N*-acetyl glyphosate.

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.

RISK ASSESSMENT

Food derived from herbicide tolerant soybean line DP-356043-5 has been evaluated according to the safety assessment guidelines prepared by FSANZ². The complete safety assessment and the hazard assessment of glyphosate residues are available at **Attachments 2 and 3** respectively in the **2nd Assessment Report**³. In addition to information supplied by the Applicant, other available resource material including published scientific literature and general technical information were used in these assessments. The report summaries are presented below.

4. Risk Assessment Summary

4.1 Safety Assessment Process

In conducting a safety assessment of food derived from soybean line DP-356043-5, a number of criteria were 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; detailed 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 evaluation of soybean 356043 also included a separate assessment of two novel herbicide residues, namely *N*-acetyl glyphosate (NAG) and *N*-acetyl aminomethylphosphonic acid (*N*-acetyl AMPA), generated on the plants following glyphosate application.

The safety assessment applied to food from soybean line DP-356043-5 addresses only food safety and nutritional issues. It does not address any risks related to the release into the environment of 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 conventional (non-GM) plant.

4.2 Outcomes of the Safety Assessment

Soybean 356043 contains two novel genes, *gat4601* and *gm-hra*. Detailed molecular analyses indicate that one copy of each novel gene has been inserted at a single site in the plant genome and the genes are stably inherited from one generation to the next. No antibiotic resistance marker genes are present in soybean 356043.

Soybean 356043 expresses two novel proteins: GAT4601 and GM-HRA. The GAT4601 sequence is based on the GAT enzyme sequences from three strains of *B. licheniformis* that were optimised for enhanced glyphosate acetylation activity. The GAT4601 protein is 84% homologous to each of the three native GAT enzymes from which it was derived, compared with 94% amino acid homology between each of the native enzymes. GAT4601 is 146 amino acids in length and has an approximate molecular weight of 17 kDa. The GAT4601 protein is expressed at low levels in soybean 356043 seed, with a mean concentration of 0.24 µg/g of tissue (dry weight).

The GM-HRA protein is a modified version of the native ALS (acetolactate synthase) from soybean. The GM-HRA protein is characterised by two specific amino acid changes in the mature ALS protein that are known to confer tolerance to sulfonylurea herbicides. The protein is 656 amino acids in length with a predicted molecular weight of 71 kDa.

² FSANZ (2007) Safety Assessment of Genetically Modified Foods – Guidance Document. http://www.foodstandards.gov.au/srcfiles/GM%20FINAL%20Sept%2007L%20_2_.pdf

³ Available on the FSANZ website at <http://www.foodstandards.gov.au/standardsdevelopment/applications/applicationa1006food3900.cfm>

Following transport into the chloroplast and cleavage of the transit peptide, the mature protein is 604 amino acids with a predicted molecular weight of 65 kDa. The GM-HRA protein is expressed at low levels in soybean 356043 seed, with a mean concentration of 0.91 µg/g of tissue (dry weight). Both proteins conform in size and amino acid sequence to that expected, do not exhibit any post-translational modification including glycosylation, and also, for GM-HRA, demonstrate the predicted enzymatic activity.

Bioinformatic studies with the GAT4601 and GM-HRA proteins confirmed the absence of any biologically significant amino acid sequence similarity to known protein toxins or allergens. Digestibility studies demonstrated that both proteins would be rapidly degraded following ingestion, similar to other dietary proteins. Acute oral toxicity studies in mice with both proteins also confirmed the absence of toxicity. Taken together, the evidence indicates that neither protein is toxic nor likely to be allergenic in humans.

Compositional analyses were done to establish the nutritional adequacy of soybean 356043, and to compare it to a non-transgenic conventional soybean under typical cultivation conditions. For the majority of components, there are no compositional differences of biological significance in forage or seed from transgenic soybean 356043, compared to the non-GM control.

Increased levels of two fatty acids, heptadecanoic acid (C17:0) and heptadecanoic acid (C17:1) were observed. C17:0 and C17:1 in soybean 356043 together constitute around 0.5% of the total fatty acid content, compared to 0.2% in the conventional counterpart. C17:0 and C17:1 are present in other vegetable oils and other commonly consumed foods. As these fatty acids are typical constituents of the human diet and readily metabolised, the increased levels raise no safety or nutritional concerns.

The enzyme GAT4601 also acetylates the amino acids glutamate and aspartate, increasing the levels of N-acetylglutamate (NAGlu) and N-acetylaspartate (NAAsp) in soybean 356043 compared with conventional soybean. NAAsp and NAGlu account for 0.1% of the total amino acid content in soybean 356043 seed. Both NAGlu and NAAsp were found to be present in a number of common foods, indicating that they are normal components of human diets. Both compounds are readily metabolised in humans and raise no safety or nutritional concerns. In addition, exposure to NAGlu and NAAsp through the diet would not be expected to change significantly as neither compound is detectable in soybean oil, which accounts for 94% of all soybean food consumption.

Soybean is one of the major allergenic foods. The potential allergenicity of soybean 356043 was compared to that of the parental soybean variety by assessing IgE binding responses using sera from known soybean allergic individuals. These studies indicated that soybean 356043 does not have any greater potential to be allergenic than conventional soybean varieties.

Based on the scientific information, the introduction of herbicide-tolerant soybean 356043 into the food supply would not be expected to have any nutritional impact. This was supported by the results of a feeding study, where no differences in health and growth performance were found in broiler chickens fed diets containing soybean 356043 meal compared with those fed conventional soybean diets. Similarly, a 90 day sub-chronic toxicity study concluded that there were no diet related adverse effects in rats fed a diet containing soybean 356043.

An assessment was undertaken to establish the safety of the two novel compounds generated on soybean 356043 plants following glyphosate application, namely NAG and N-acetyl aminomethylphosphonic acid (N-acetyl AMPA).

While NAG is the predominant residue detected on soybean 356043 plants treated with glyphosate, parent glyphosate, AMPA and *N*-acetyl AMPA are also detectable.

Using a weight-of-evidence approach, FSANZ concluded that NAG and *N*-acetyl AMPA were less toxic than glyphosate, which itself has low toxicity potential. On this basis, the establishment of a new acceptable daily intake (ADI) for glyphosate and its residues, or a separate ADI for NAG and *N*-acetyl AMPA is considered unnecessary.

4.3 Conclusions

No potential public health and safety concerns were identified in the assessment of soybean line DP-356043-5. On the basis of the data provided in the Application, and other available information, food derived from soybean line DP-356043-5 is considered as safe and wholesome as food derived from conventional soybean varieties.

The metabolite residues generated by glyphosate-treated soybean 356043 plants are considered less toxic than glyphosate, which itself is considered of very low potential toxicity in animals. Hence, there is no increase in overall toxicity arising from the presence of novel glyphosate residues on soybean 356043, and the current ADI for glyphosate is considered to be protective of public health and safety.

RISK MANAGEMENT

5. Issues raised

5.1 Impact on other Standards

As part of its pre-market safety assessment of food derived from herbicide-tolerant GM crops, FSANZ has regard to the generation of new residues or increased concentrations of known residues on the crop, following application of the herbicide. The potential toxicity of any new residues that have not previously been assessed is relevant to food safety and could also have implications for the existing MRLs⁴. The purpose of these MRLs is to ensure the legitimate and safe use of agricultural chemicals on commodities grown in, or imported into, Australia or New Zealand.

In Australia, the MRLs for agricultural and veterinary chemical residues present in food are listed in Standard 1.4.2, an Australia only Standard. The current MRL in the Code for soybean (dry) for glyphosate is 10 mg/kg; the current residue definition is the *sum of glyphosate and aminomethylphosphonic acid (AMPA) metabolite, expressed as glyphosate*. These are the same as listed in the Australian Pesticides and Veterinary Medicines Authority (APVMA) MRL Standard and are the requirements used for monitoring compliance with the use of glyphosate containing formulations in Australia. The Applicant states that the residues in soybean 356043 will not exceed the current MRL for glyphosate and therefore an amendment to the current MRL in the Code for glyphosate on soybean is not necessary.

In New Zealand, MRLs are established by the Agricultural Compounds and Veterinary Medicines Group (ACVMG) within the NZ Food Safety Authority (NZFSA). There is no MRL for glyphosate on soybean currently listed in the NZ MRL Standard⁵, however, there is a provision for residues of up to 0.1 mg/kg for agricultural compound/food combinations not specifically listed.

⁴ The MRL is the maximum concentration of a residue, resulting from the registered use of an agricultural or veterinary chemical legally permitted or recognized as acceptable in or on a food, agricultural commodity, or animal feed.

⁵ <http://www.nzfsa.govt.nz/policy-law/legislation/food-standards/nz-mrl-fs-2008-consolidation.pdf>

In addition, the NZ MRL Standard recognises Codex standards for imported food. The Codex MRL for glyphosate in soybean seed is 20 mg/kg (the Codex and New Zealand residue definition includes only parent glyphosate).

In this case, the Applicant provided information to enable a separate hazard assessment of residues of glyphosate and metabolites in soybean 356043 seed. This assessment concluded that glyphosate is the only toxicologically-significant compound of the four residues considered in the assessment, and is detectable on commodities derived from herbicide-treated soybean 356043 plants. On this basis, the current residue definition for glyphosate in Standard 1.4.2, the sum of glyphosate and AMPA expressed as glyphosate, remains appropriate from a safety perspective.

In previous assessment reports, FSANZ acknowledged the need to consider the existing MRL and residue definition for glyphosate, given that, this year, the US EPA amended the existing tolerances⁶ for glyphosate residues on soybean to include the combined residues of the herbicide glyphosate and its metabolite N-acetyl-glyphosate on soybean 356043⁷.

While noting the US EPA decision, FSANZ considers that the costs of amending the existing residue definition for glyphosate solely in relation to soybean 356043, do not outweigh the benefits of pursuing such an amendment to Standard 1.4.2. There is no approval, nor any application under consideration, to grow soybean line DP-356043-5 plants in Australia or New Zealand. Therefore, food commodities derived from soybean 356043 will only be present in foods in Australia or New Zealand if they are imported as food or food ingredients, most likely from the US. In addition, the presence of NAG and N-acetyl AMPA raises no safety concerns. On this basis and consistent with the view expressed by the Applicant, FSANZ proposes that the existing residue definition and MRL for soybean in the Code should continue to apply and should apply to soybean line DP-356043-5.

FSANZ considers this approach to be appropriate because:

- there is no food safety basis for modifying the existing MRL or residue definition for soybean in the Code to incorporate a separate residue definition or MRL for soybean line DP-356043-5
- incorporating a new residue definition with novel residues may have compliance implications in relation to the availability of analytical standards or analytical capability for the novel residues– thereby imposing costs on compliance agencies for an issue that does not have a food safety imperative
- this approach would maintain consistency between the Code and the APVMA MRL Standard in relation to MRLs and residue definitions, and thereby continue the existing requirements for industry and government agencies with no additional costs in relation to glyphosate analysis of soybean or soybean products
- unnecessarily complicating Standard 1.4.2 with a separate residue definition for soybean line DP-356043-5 is not justified when it is considered that this line of soybean is unlikely to constitute a major component of the soybean or soybean products that may be consumed in Australia or New Zealand.

⁶ The term ‘tolerances’ is used in the United States and is equivalent to the term Maximum Residue Limit in Australia.

⁷ <http://edocket.access.gpo.gov/2008/E8-28571.htm>

5.5.1 Tolerance to other herbicides

Soybean line DP-356043-5 also carries a second genetic modification conferring tolerance to ALS-inhibiting herbicides.

FSANZ has not previously assessed any GM lines that are tolerant to ALS-inhibiting herbicides. If approved, soybean line DP-356043-5 would need to comply with the existing MRLs in the Code.

5.2 Risk Management Strategy

If approved, food derived from herbicide tolerant soybean line DP-356043-5 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 novel proteins are present in the seed. Highly refined products, such as soybean oil, are exempt from this general labelling requirement if they do not contain novel protein or DNA.

Standard 1.5.2 also contains provision for additional labelling requirements in cases where 'the genetic modification has resulted in one or more significant composition or nutritional parameters having values outside the normal range of values for existing counterpart food not produced using gene technology.' In developing the GM food labelling standard, it was recognised that there may be instances where additional labelling would be appropriate, for example where a property or characteristic of the food means that it is no longer equivalent to an existing counterpart food (Proposal P97).

Soybean 356043 has elevated levels of two minor fatty acids (C17:0 and C17:1) and two acetylated amino acids (NAGlu and NAAsp). FSANZ therefore considered whether additional labelling requirements would be appropriate in this case. Following a detailed evaluation of the issues, FSANZ has concluded that additional labelling requirements for soybean 356043 are not warranted, based on the following considerations.

The levels of C17:0 and C17:1 in soybean 356043 together constitute around 0.5% of the total fatty acid content, compared to 0.2% in the conventional counterpart. NAAsp levels are increased over 200-fold, and NAGlu around 7-fold, although NAAsp and NAGlu together account for only 0.14% of the total amino acid content in soybean 356043 seed. Although elevated compared to the conventional counterpart, these constituents remain minor components of soybean 356043. In addition, after specific consideration of any possible impact on food safety, no nutritional issues could be identified as a result of the increased levels in soybean 356043 as C17:0, C17:1, NAGlu and NAAsp are natural constituents of commonly eaten foods in the human diet and are readily metabolised.

In this case, these components are not considered to be *significant composition or nutritional parameters* for the purposes of labelling GM foods.

Labelling is intended to address the objective set out in subsection 18(1)(b) of the FSANZ Act; the provision of adequate information relating to food to enable consumers to make informed choices. Labelling for changes in the levels of C17:0, C17:1, NAGlu and NAAsp would be unlikely to provide consumers with useful information, particularly as the changes are of no safety or nutritional consequence and do not change the nature of the food. In this context, additional labelling is likely to be confusing and potentially misleading to consumers. The general labelling provisions of the Standard would provide consumer information on the GM status of the food.

The costs to the agricultural and food industry sectors of applying additional labelling requirements in the absence of a clear consumer benefit were also considered.

Soybean 356043 has been approved for cultivation and as food in the USA. The US FDA has not imposed a requirement for labelling of soybean 356043 and it will be treated as other GM soybean varieties.

In order to comply with any additional labelling requirements in Australia and New Zealand, soybean 356043 would need to be segregated from other soybean, including other GM soybean, varieties. This would involve considerable additional costs associated with food production, which could be passed on to consumers. It is also important to note, from an enforcement perspective, that where comingling of soybean varieties occurs, either at harvest or at a later processing stage, the amounts of soybean 356043 would be lower and the altered levels of C17:0 and C17:1 would not be detectable in soybean oil products.

Studies conducted by the Applicant clearly show that NAGlu and NAAsp are below the limit of quantitation in soybean oil, the major food fraction of soybean. Therefore, any need for additional labelling because of increased levels of acetylated amino acids would not apply to refined soybean oil. Other soybean fractions that are likely to contain NAGlu and NAAsp would already be captured under existing general labelling requirements for novel DNA and/or novel protein. This means that products such as soy flour and soy milks would require labelling in any case, notwithstanding the increase in levels of acetylated amino acids.

6. Options

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

6.1 Option 1 – Maintain the *status quo*

Reject the Application, thus maintaining the *status quo*.

6.2 Option 2 – Proceed to the development of a food regulatory measure

Amend Standard 1.5.2 to permit the sale and use of food derived from herbicide-tolerant soybean line DP-356043-5, with or without specified conditions in the Table to clause 2 of the Standard.

7. 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 analysis identifies and evaluates, though is not limited to, the costs and benefits of the regulation, and its health, economic and social impacts.

7.1 Affected Parties

The affected parties may include the following:

- Consumers of soybean-containing food products, particularly those concerned about the use of biotechnology to generate new crop varieties.
- Industry sectors:
 - food importers and distributors of wholesale ingredients
 - processors and manufacturers of soybean-containing food products
 - food retailers

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

Soybean line DP-356043-5 has been developed primarily for agricultural production overseas and, at this stage, the Applicant has no plans for cultivation of this variety in either Australia or New Zealand. The cultivation of soybean 356043 in Australia or New Zealand could have an impact on the environment, which would need to be independently 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 commercial release in either country could be permitted.

7.2 Benefit Cost Analysis

7.2.1 Option 1 – reject the Application, thus maintaining the status quo

Consumers: Possible restriction in the availability of imported soybean products to those products that do not contain soybean line DP-356043-5.

No impact on consumers wishing to avoid GM foods, as food from soybean line DP-356043-5 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 imports of soybean food products once soybean line DP-356043-5 is commercialised overseas.

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

7.2.2 Option 2 – approve food from soybean line DP-356043-5

Consumers: Broader availability of imported soybean products as there would be no restriction on imported foods containing soybean line DP-356043-5.

Potentially, no increase in the prices of imported foods manufactured using comingled soybean products.

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

Government: Benefit that if soybean line DP-356043-5 was 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 soybean line DP-356043-5 would ensure no conflict with WTO responsibilities.

Approval could impact on monitoring resources, as certain foods derived from soybean DP-356043-5 will be required to be labelled as *genetically modified*.

There may also be an impact on compliance resources associated with detection of soybean line DP-356043-5.

Industry: Importers of processed foods containing soybean derivatives would benefit as foods derived from soybean line DP-356043-5 would be compliant with the Code, allowing broader market access and increased choice in raw materials.

Retailers may be able to offer a broader range of soy products or imported foods manufactured using soybean derivatives.

Possible cost to food industry as some food ingredients derived from soybean line DP-356043-5 would be required to be labelled as genetically modified.

7.3 Comparison of Options

As food from herbicide-tolerant soybean line DP-356043-5 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, as approval of soybean line DP-356043-5 by other countries could limit the availability of imported soy products in the Australian and New Zealand markets. In addition, Option 1 would result in the requirement for segregation of any products containing soybean 356043 from those containing approved soybean varieties, which would be likely to increase the costs of imported soy foods.

As the novel herbicide residues generated on soybean 356043 plants following glyphosate application are less toxic than glyphosate itself, glyphosate is considered the only toxicologically-significant residue associated with seed derived from soybean 356043 plants. Detection and measurement of glyphosate residues on material derived from soybean 356043 plants is adequate from a safety perspective. Consultation between the APVMA, NZFSA and the Applicant has concluded that consequential amendments to Standard 1.4.2 are not necessary.

Based on the conclusions of the safety assessments, the potential benefits of Option 2 outweigh the potential costs. A variation to Standard 1.5.2 giving approval to dual herbicide-tolerant soybean line DP-356043-5 is therefore the preferred option.

COMMUNICATION AND CONSULTATION STRATEGY

8. Communication

As normally applies to all GM food assessments, FSANZ has applied a communication strategy to this Application that involves advertising the availability of assessment reports for public comment in the national press and placing the reports on the FSANZ website.

Public comment on the 2nd Assessment Report was sought prior to the preparation of this Approval Report. All Reports are available to the public on the FSANZ website and be distributed to major stakeholders. In addition, FSANZ will issue a media release drawing journalists' attention to the matter.

The Applicant and individuals and organisations that make submissions on this Application will be notified at each stage of the assessment. The decision of the FSANZ Board to approve the draft variation to Standard 1.5.2 will be notified to the Ministerial Council.

If the approval of food derived from herbicide-tolerant soybean line DP-356043-5 is not subject to review, the Applicant and stakeholders, including the public, will be notified of the gazettal of changes to the Code in the national press and on the website. FSANZ also provides an information service to the jurisdictions on changes to the Code.

9. Consultation

9.1 Public consultation

As this Application is being assessed as a major procedure, there were two rounds of public consultation. Comments on the scientific aspects of this Application were specifically sought in the first consultation period from 20 March to 1 May 2009, and nine submissions were received⁸. From these submissions, several technical issues were identified as requiring further attention. These included the need for more detailed information on the safety of increased levels of two acetylated amino acids, the ALS inhibiting herbicides and herbicide residues on soybean crops, the source organism *B. licheniformis*, feeding studies, and the molecular characterisation of soybean 356043. FSANZ undertook further research and sought additional data from the Applicant before completing the 2nd Assessment Report. Where necessary, FSANZ addressed issues through a change to the safety assessment for soybean 356043.

Public submissions were invited on the 2nd Assessment Report, including the proposed draft variation to the Code, from 2 September to 30 September 2009. Six submissions were received. A summary of these is provided in **Attachment 2** to this Approval Report. Comments received in response to the 2nd Assessment Report indicated that specific technical issues concerning the safety of soybean 356043 were satisfactorily addressed in that report and no new issues were raised.

9.1.1 General safety issues

Comments received in two submissions raised concerns about GM foods and their assessment in a general context. FSANZ has responded to the majority of these issues in previous assessments and has provided specific information on the FSANZ website.

In relation to GM foods, novel foods or substances added to foods requiring a comprehensive pre-market assessment, a scientific, evidence-based assessment is used to establish that the food or substance is safe for human consumption. For GM foods, this requires evidence to show that the proposed food is as safe as the existing counterpart food, on a case-by-case basis. FSANZ will not approve a GM food if any public health and safety concerns have been identified in the assessment.

With regard to the quality assurance of data underpinning the safety assessment of a GM food, the data requirements for GM foods are the same as for any other substance undergoing a pre-market assessment. Applications must be accompanied by a statutory declaration regarding the veracity of the information provided by the Applicant. Statements relating to the conduct of studies according to the principles of Good Laboratory Practice (GLP), as described in international standards, must also be provided. In addition, FSANZ demands the raw laboratory data for all studies submitted, which enables assessors to independently examine the data to confirm the interpretation of results.

⁸ A summary of first round public submissions is at Attachment 4 in the 2nd Assessment Report available at <http://www.foodstandards.gov.au/standardsdevelopment/applications/applicationa1006food3900.cfm>

The processes used by FSANZ for ensuring the quality of the Applicant's information are similar across other agencies carrying out risk assessments of foods.

9.2 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 inclusion of food derived from soybean 356043 in the Code would have a liberalising effect on trade as it would permit any foods containing this variety of soybean to be imported into Australia and New Zealand and sold, where currently they would be prohibited. For this reason, there was no need to notify this Application under the Sanitary or Phytosanitary Measures (SPS) Agreement.

CONCLUSION

10. Conclusion and Decision

Decision

Approve the variation to Standard 1.5.2 – Food produced using Gene Technology, to include food derived from herbicide-tolerant soybean line DP-356043-5 in the Table to clause 2.

10.1 Reasons for Decision

An amendment to the Code giving approval to the sale and use of food derived from soybean line DP-356043-5 in Australia and New Zealand is approved on the basis of the available scientific evidence, for the following reasons:

- the safety assessment did not identify any public health and safety concerns associated with the genetic modification used to produce soybean line DP-356043-5
- food derived from herbicide tolerant soybean line DP-356043-5 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
- the novel herbicide residues generated on soybean line DP-356043-5 plants following glyphosate application are less toxic than glyphosate and pose no food safety concerns
- labelling of certain food products derived from herbicide-tolerant soybean line DP-356043-5 will be required if novel DNA and/or protein is present in the final food
- a regulation impact assessment process has been undertaken that fulfils the requirement in Australia and 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 other measures that would be more cost-effective than a variation to Standard 1.5.2 that could achieve the same end.

11. Implementation and Review

The FSANZ Board's decision will be notified to the Ministerial Council. Following notification, the proposed draft variation to Standard 1.5.2 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 second round public submissions

Attachment 1

Draft variations 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 sunseting

To commence: on gazettal

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

Food derived from herbicide-tolerant soybean line DP-356043-5	
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Summary of Public Submissions on 2nd Assessment Report

Submitter	Comments
NSW Food Authority	<ul style="list-style-type: none"> ▪ States that the issues and concerns raised by NSW in the first round of consultation were adequately addressed in the Second Assessment Report. Some of the issues addressed included a request for further discussion of the compositional changes arising from the acetylation of glyphosate, glutamate and aspartate, and the novel herbicide residues, as well as additional information on the safety of the source organism <i>Bacillus licheniformis</i>. A number of typographical errors were also corrected.
New Zealand Food Safety Authority	<ul style="list-style-type: none"> ▪ States that the additional information on acetylated amino acids incorporated into the Second Assessment Report adequately addressed the concerns expressed by NZFSA in the first round of consultation. As a result, NZFSA agrees that the increased levels of acetylated amino acids in soybean 356043 are not nutritionally significant and raise no food safety concerns. ▪ Agrees with the conclusion in the Second Assessment Report that there is no need to change the existing MRL and residue definition in Standard 1.4.2 for glyphosate on soybeans.
Queensland Health (whole of Queensland Government response)	<ul style="list-style-type: none"> ▪ States that a number of concerns raised by Queensland in relation to the assessment of soybean 356043 have been adequately addressed in the Second Assessment Report. As a result, the Queensland government now supports approval of this application. ▪ Considers that some concern with respect to the lack of independent, long-term work on GM issues generally remains. ▪ Notes that the monitoring and enforcing of GM food legislation will be appropriately addressed by the national enforcement strategy for GM food.
The Food Technology Association of Australia	<ul style="list-style-type: none"> ▪ Supports approval of the Application
Mark McDougall	<ul style="list-style-type: none"> ▪ States that novel proteins may be producing novel medical conditions that will not show up for years. There is a lack of independent multi-generational nutritional research on GM crops being approved for growing. ▪ Corporate 'ghost-writing' of research papers on drugs has been reported, which raises the question of whether the safety reports on soybean 356043 can be trusted. Independent scientists should be given access to GM strains to conduct research. Grants to institutions or independent researchers should be available to conduct multi-generational studies. ▪ In lieu of long term testing, the applicant should find insurance companies willing to cover the lifelong safety risks [posed by the GM food], and the products should be labelled as <i>novel GM variant not independently assessed</i>.

Submitter	Comments
<p>Don Lazarro (Ceres Natural Foods P/L t/a Pureharvest)</p>	<ul style="list-style-type: none"> ▪ Considers that there has been insufficient research on GM crops and most of the research undertaken and published has a bias because it is industry-driven and funded. Independent research is needed before the foods can be deemed safe. ▪ GM soybean oil will not be labelled or identified and so the public will not have the opportunity to make an informed decision about whether to purchase the product. Similarly, if GM soybean oil is used in commercial cooking, there will be no identifying markers to alert consumers to the fact that the food has been cooked in GM oil. ▪ Labelling food only where novel DNA or novel protein is present does not give consumers adequate information to know whether to purchase the foods. ▪ FSANZ should not approve food derived from soybean 356043 until comprehensive, independent and peer reviewed studies have been completed, and the labelling regime has changed to enforce clear labelling of all genetically engineered foods.