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

14 August 2025
354-25

Approval report – Application 1318

Steviol glycosides produced by enzymatic conversion using enzymes produced by GM Escherichia coli BL21

Food Standards Australia New Zealand (FSANZ) has assessed an application made by Sichuan Ingia Biosynthetic Co., Ltd. to amend the Australia New Zealand Food Standards Code to permit the use of 3 new enzymes sourced from a genetically modified (GM) strain of *Escherichia coli* as processing aids for the enzymatic conversion of the steviol glycoside rebaudioside A to rebaudioside M.

On 8 April 2025, FSANZ sought submissions on a draft variation and published an associated report. FSANZ received 4 submissions.

FSANZ approved the draft variation on 6 August 2025. The Food Ministers' Meeting[1] was notified of FSANZ's decision on 14 August 2025.

This report is provided pursuant to paragraph 33(1)(b) of the *Food Standards Australia New Zealand Act 1991*.

[1] Formerly referred to as the Australia and New Zealand Ministerial Forum on Food Regulation

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Supporting document

The following document which informed the assessment of this application is available on the A1318 page on the FSANZ website:

SD1 Risk and technical assessment report (at approval)

The published submissions from the call for submissions can be found on the A1318 Consultation Hub page.

Executive summary

Sichuan Ingia Biosynthetic Co., Ltd has applied to Food Standards Australia New Zealand (FSANZ) to amend the Australia New Zealand Food Standards Code (the Code) to permit the use of 3 new enzymes, expressed in a genetically modified (GM) strain of *Escherichia coli* BL21*,* for the enzymatic conversion of rebaudioside A (extracted from purified stevia leaf extract) to produce rebaudioside M, and set a new specification to permit the applicant's method of production using these enzymes.

Rebaudioside M is a steviol glycoside used as an intense sweetener. Steviol glycosides are currently permitted by the Code to be used in certain foods as food additives up to specified maximum permitted levels. Substances used as food additives must comply with any relevant specifications listed in Schedule 3 – Identity and Purity.

FSANZ's risk assessment found the 3 enzymes are technologically justified for use as processing aids in the enzymatic conversion production method of steviol glycosides. This production method is well-characterised and has permissions in international regulations, including Codex Alimentarius Commission standards. The method involves the direct addition of stevia extracts containing rebaudioside A to cultures of *E. coli* BL21 cells expressing the 3 enzymes to produce rebaudioside M. No residual protein or DNA of the microorganisms and enzymes remains in the purified rebaudioside M, and the purity is consistent with the relevant international specification for steviol glycosides.

The production organism is a strain of *E. coli* BL21, an organism with a long history of safe use as an enzyme production organism. Analysis of the GM production strain confirmed the insertion and stability of the genes involved.

No public health and safety concerns were identified in the assessment of the 3 enzymes, which have a history of safe use for steviol glycoside production. Bioinformatics searches were conducted by comparing the amino acid sequences of the 3 enzymes to those of known toxins and known allergens. No homologies of concern were identified.

FSANZ prepared a draft variation to the Code to include a new specification in Schedule 3 and a new permission in Schedule 18 for the use of the applicant's enzymes as processing aids to produce the steviol glycoside rebaudioside M using the enzymatic conversion production method. The latter permitted the use of a combination of enzymes that include:

- sucrose synthase, produced by GM *E. coli* BL21, expressing the gene for sucrose synthase from *Arabidopsis thaliana*
- uridine diphosphate (UDP)-glucosyltransferase (91D2), produced by GM *E. coli* BL21, expressing the gene for UDP-glucosyltransferase from *Stevia rebaudiana* and
- uridine diphosphate (UDP)-glucosyltransferase (76G1), produced by GM *E. coli* BL21, expressing the gene for UDP-glucosyltransferase from *Stevia rebaudiana*.

The draft variation combined both uridine diphosphate (UDP) glucosyltransferase enzymes in one entry in a manner consistent with other entries for the same enzyme in section S3—35.

Following assessment and the preparation of the draft variation to the Code, FSANZ called for submissions on 8 April 2025. Four submissions were received, with 3 raising a minor typographical error with the Enzyme Classification (EC) number for sucrose synthase. The error has been addressed in this report. Having regard to those submissions and for reasons set out in this report, FSANZ concluded that the draft variation proposed at the call for submissions did not need to be amended beyond the typographical revision.

1 Introduction

1.1 The applicant

Sichuan Ingia Biosynthetic Co., Ltd. (Sichuan Ingia) is a manufacturer of non-caloric sweeteners for the food, flavour and beverage industries.

1.2 The application

Sichuan Ingia applied to amend the Australia New Zealand Food Standards Code (the Code) to permit the use of 3 new enzymes derived from a GM strain of *Escherichia coli* as processing aids for the enzymatic conversion of stevia leaf extract to produce rebaudioside M. The applicant sought to permit the use of any combination of the following:

- sucrose synthase (EC 2.4.1.13), produced by GM *E. coli* BL21, expressing the gene for sucrose synthase from *Arabidopsis thaliana*
- uridine diphosphate (UDP)-glucosyltransferase (91D2), produced by GM *E. coli* BL21, expressing the gene for UDP-glucosyltransferase from *Stevia rebaudiana*
- uridine diphosphate (UDP)-glucosyltransferase (76G1), produced by GM *E. coli* BL21, expressing the gene for UDP-glucosyltransferase from *Stevia rebaudiana*

The application also sought the inclusion of a new specification in Schedule 3 of the Code that would permit the use of applicant's enzymes for the purpose outlined above.

The applicant's method of production is variously called 'bioconversion', 'biotransformation', 'enzymatic conversion' or 'enzyme modified', with 'enzymatic conversion' being used in this report. FSANZ has already assessed several applications using the enzymatic conversion method of manufacturing steviol glycosides – A1157, A1172, A1176, A1183 and A1268 (FSANZ 2018, FSANZ 2019a, FSANZ 2019b. FSANZ 2020 and FSANZ 2023 respectively) and the enzymes used for such manufacture are permitted in the Code. Approval of these applications resulted in amendments to Schedule 3 and Schedule 18 of the Code.

The Joint FAO/WHO Expert Committee on Food Additives (JECFA) has published a framework for the specifications of steviol glycosides within monograph 31 (2023) of JECFA specifications (FAO 2023).[2] The framework includes 4 methods of production for steviol glycosides, listed in 4 Annexes. Annex 3 – Enzyme modified steviol glycosides is the method of production applicable to this application. Annex 3 lists the enzymes, enzyme production organisms and gene sources used in the production of enzyme modified steviol glycosides. Non-toxigenic and non-pathogenic stains of *Pichia pastoris* and *E. coli* are listed as the enzyme production organisms. The gene sources listed include *Arabidopsis thaliana* and *Stevia rebaudiana.*

The JECFA framework for the specifications of steviol glycosides is included in a primary reference in subsection S3—2(1) of Schedule 3 of the Code. However, FSANZ's approach for enzyme modified steviol glycosides to date has been to include the enzymes, host (production) organism and gene (donor) source related to an applicant's specific method of producing enzyme modified steviol glycoside preparations in the Code (Schedules 3 and 18).

E. coli strain BL21 is not currently included in the Code as a permitted production organism for the 3 enzymes listed above.

[2] The framework specification was first published in 2019 (monograph 23) and updated in 2021 (monograph 26) and 2023 (monograph 31).

1.3 The current standard

1.3.1 Australia and New Zealand standards

Australian and New Zealand food laws require food for sale to comply with relevant requirements in the Code. The requirements relevant to this application are summarised below.

1.3.1.1 Permitted use – food additives

The application is to permit the use of the 3 enzymes used in the production of a steviol glycoside and is not seeking a permission for the steviol glycoside itself.

Schedule 15 lists the specific food additive permissions for different categories of foods in the table to section S15—5. 'Steviol glycosides' is listed in that table as a permitted food additive for various food categories with the International Numbering System (INS) number 960.

1.3.1.2 Permitted use – processing aids

Enzymes used in food processing and manufacturing are considered processing aids as, although they may be present in the final food, they no longer provide a technological purpose in the final food.

Paragraph 1.1.1—10(6)(c) provides that a food for sale must not have, as an ingredient or a component, a substance that is used as a processing aid, unless that substance's use as a processing aid is expressly permitted by the Code.

Section 1.1.2—13 provides that a substance 'used as a processing aid' in relation to a food is a substance used during the course of processing that meets all of the following conditions:

- It is used to perform a technological purpose during the course of processing.
- It does not perform a technological purpose in the food for sale.
- It is a substance listed in Schedule 18 or identified in section S16—2 as an additive permitted at Good Manufacturing Practice (GMP).

Standard 1.3.3 provides the conditions of use for processing aids and Schedule 18 lists permitted processing aids. Enzymes of microbial origin listed in the table to subsection S18—4(5) are permitted for use as a processing aid to perform any technological purpose if the enzyme is derived from the corresponding source specified in the table. The table to subsection S18—9(3) lists those substances, including enzymes derived from particular sources, that are permitted to be used as processing aids for specific technological purposes in relation to:

- if a food is specified—that food
- if no food is specified—any food.

There are a number of enzymes listed within the table to subsection S18—9(3) permitted for the production of different steviol glycosides.

1.3.1.3 Food produced using gene technology

Paragraph 1.1.1—10(6)(g) currently requires that the presence of a food produced using gene technology as an ingredient or component in a food for sale be expressly permitted by the Code. Section 1.5.2—3 of the Code provides that permission for use as a food additive or processing aid also constitutes the permission required by paragraph 1.1.1—10(6)(g).

1.3.1.4 Identity and purity requirements

Paragraphs 1.1.1—15(1)(a) and (b) require substances used as food additives and processing aids, respectively, to comply with any relevant identity and purity specifications listed in Schedule 3.

Subsection S3—2(1) incorporates by reference primary source specifications listed in the following: JECFA Combined Compendium of Food Additive Specifications (FAO 2021), the United States Pharmacopeial Convention (FCC 2022), Food Chemicals Codex (13th edition), and the Commission Regulation (EU) No 231/2012. These include general identity and purity specifications for enzyme preparations used in food processing, and food additives.

Section S3—35 of the Code provides a specification for steviol glycosides produced by enzymatic conversion. An amendment to section S3—35 is required to permit the method of production of the steviol glycoside rebaudioside M using the enzymes listed in the application.

1.3.1.5 Labelling requirements

Paragraph 1.1.1—10(8) of the Code provides that food for sale must comply with all relevant labelling requirements in the Code.

Standard 1.2.1 sets out the labelling requirements for food for sale.

Standard 1.2.4 generally requires packaged food to be labelled with a statement of ingredients. Subsection 1.2.4—7(1) requires food additives to be declared in the statement of ingredients in one of the following ways:

- If the food additive can be classified into a class of additives listed in Schedule 7—by referring to the relevant class name, followed in brackets by the name or code number of the food additive indicated in Schedule 8.
- Otherwise—by referring to the name of the food additive as indicated in Schedule 8.

Schedule 7 lists the food additive class names that can be used in the statement of ingredients. Schedule 8 lists the names and code numbers of food additives that are to be used for labelling purposes.

Paragraphs 1.2.4—3(2)(d) and (e) exempt processing aids from the requirement to be declared in the statement of ingredients, unless other requirements apply.

Section 1.5.2—4 of the Code requires a food for sale that consists of a *genetically modified food*[3] (GM food) or has a GM food as an ingredient to be labelled as 'genetically modified', unless an exemption applies. The statement 'genetically modified' must be made in conjunction with the name of the GM food. If the GM food is used as a processing aid, this statement may be included in the statement of ingredients. In these circumstances, the requirements imposed by section 1.5.2—4 apply to foods for retail sale and to foods sold to a caterer in accordance with Standard 1.2.1.

For the reasons set out in section 2.3.1.1.2 food for sale containing the enzymes as an ingredient are not required to be labelled as 'genetically modified.

1.3.1.6 Proposal P1055

In Proposal P1055 – Definitions for gene technology and new breeding techniques, FSANZ

[3] Section 1.5.2—4(5) defines ***genetically modified food*** to mean a '*food produced using gene technology that
a) contains novel DNA or novel protein; or
b) is listed in subsections S26—3(2), (2A) and (3) (i.e. regardless of the presence of novel DNA or novel protein in the foods). The foods listed in these subsections are considered to have an altered characteristic, such as an altered composition or nutritional profile, when compared to the existing counterpart food that is not produced using gene technology.

approved a draft variation to the Code that introduces a new definition for GM food. Under that new definition substances used as a processing aid will no longer be GM food for Code purposes. This amendment, if endorsed by Food Ministers, will mean the above labelling requirements will no longer apply to enzyme processing aids derived from GM sources.

1.3.2 International standards

In developing food regulatory measures, Food Standards Australia New Zealand (FSANZ) must have regard to the promotion of consistency between domestic and international food standards. In terms of food safety, the relevant international standard setting body is the Codex Alimentarius Commission (Codex).

Codex has a General Standard for Food Additives (GSFA, CXS 192-1995) that contains provisions for food additives in various food categories (Codex 2024), including steviol glycosides (as steviol equivalents). Codex also has a guideline, CXG 36-1989, *Class Names and the International Numbering System (INS) for Food Additives* (Codex 2023), which lists the Codex names and numbering (INS) of food additives, including steviol glycosides.

There is no Codex 'general standard' for enzymes, however as noted above, there are internationally recognised specifications for enzyme preparations established by JECFA and Food Chemicals Codex.

In addition, there is a Codex guideline, *Guidelines on Substances used as Processing Aids* (CAC/GL 75-2010), which sets out general principles for the safe use of substances used as processing aids, including that substances used as processing aids shall be used under conditions of GMP.

1.4 Reasons for accepting application

The application was accepted for assessment because:

- it complied with the procedural requirements under subsection 22(2) of the *Food Standards Australia New Zealand Act 1991* (FSANZ Act)
- it related to a matter that warranted the variation of a food regulatory measure.

1.5 Procedure for assessment

The application was assessed under the General Procedure.

1.6 Decision

The draft variation as proposed following assessment was approved with a minor amendment (see Table 2). The variation takes effect on gazettal.

The approved draft variation, as amended after consideration of submissions, is at Attachment A.

The related explanatory statement is at Attachment B. An explanatory statement is required to accompany an instrument if it is lodged on the Federal Register of Legislation.

The draft variation on which submissions were sought is at Attachment C.

2. Summary of the findings

2.1 Submissions received

FSANZ called for submissions on the draft variation to the Code from 8 April to 20 May 2025.

Four submissions were received, one from a government agency and 3 from industry (Table 1). The submissions are publicly available on the FSANZ Consultation Hub. All submitters supported the approval of the draft variation as provided in the Call for Submissions.

Submitters provided support for FSANZ's risk assessment and draft variation on the basis of consistency of the approach with the JEFCA framework, evidence of safety and use as processing aids and support for steviol glycosides as an important ingredient for alternative, low sugar products. Submitters also noted the proposed amendments to S3—35(2) and the establishment of an ADI 'not specified' in the absence of an identified hazard.

Table 1: Summary of submitters

Submitter	Abbreviation	Submitter Type	Support/Does not Support
Australian Beverage Council	ABCL	Industry	Support
Australian Food and Grocery Council	AFGC	Industry	Support
New Zealand Food and Grocery Council	NZFGC	Industry	Support
New Zealand Food Safety	NZFS	Government	Support

Table 2. Summary of issues and FSANZ response

Issue	Raised by	FSANZ response (including any amendments to drafting)
Submitter(s) noted a minor typographical error in the draft variation (Attachment A) where under Schedule 3 of the draft variation in subparagraph S3—35(2)(f)(ii) the current EC number reads (EC 2.4.13) and should be amended to (EC 2.4.1.13)	ABCL, AFGC, NZFGC	FSANZ agrees with the amendment and has updated the EC number in Attachment A to this report. The EC number in the approved draft variation now reads EC 2.4.1.13 (see Attachment A).

2.2 Risk assessment

This application sought approval for the use of GM *E. coli* BL21 to manufacture 3 enzymes used in the production of the steviol glycoside, rebaudioside M.

The 3 enzymes were technologically justified for their use to produce steviol glycosides by the enzymatic conversion method of production, consistent with the JECFA framework for steviol glycosides specification, and were appropriately considered processing aids for the purposes of the Code. The processing and purification steps undertaken ensure residual protein and DNA of the production organism and enzymes are removed and not in the final purified rebaudioside M.

No public health and safety concerns were identified in the assessment of any of the enzymes. The enzymes have a history of safe use in the production of steviol glycosides and show no relevant homology to known toxins or allergens. The production organism is a strain of *E. coli* BL21, an organism with a long history of safe use as an enzyme production organism. Analysis of the GM production strain confirmed the insertion and stability of the

genes involved in production of the 3 enzymes used to produce rebaudioside M.

Based on the reviewed data it was concluded that in the absence of any identifiable hazard, an ADI 'not specified' was appropriate for all 3 enzymes.

2.3 Risk management

The risk management options available to FSANZ following the call for submissions are to:

(a) approve the draft variation proposed in the call for submissions, or
(b) approve that draft variation subject to such amendments as FSANZ considers necessary, or
(c) reject that draft variation.

The enzymatic conversion production method for steviol glycosides is comparable to methods already considered and permitted by FSANZ (see A1157, A1172, A1176, A1183 and A1268).

No public health and safety concerns were identified during the assessment of the 3 enzymes. The enzymes were found to be technologically justified for their use to produce rebaudioside M and are appropriately considered to be processing aids. Their use is also consistent with the JECFA framework for steviol glycoside specifications, as non-toxigenic and non-pathogenic strains of *E. coli* are listed as a source.

Therefore, for reasons set out in this report, FSANZ considered it is appropriate to maintain its approach in the draft variation at Call for Submissions subject to one minor amendment to correct a reference. The approved draft variation includes a new specification in Schedule 3 and lists the enzymes as permitted processing aids within Schedule 18 for use in the production of the specific steviol glycoside, rebaudioside M.

2.3.1 Labelling

2.3.1.1 Ingredient labelling

In terms of the 3 enzymes used as processing aids as part of this steviol glycoside application, the generic exemption from listing processing aids in the statement of ingredients will apply (see section 1.3.1.5 above).

2.3.1.2 Labelling as 'genetically modified

Section 1.5.2—4 of the Code generally requires a food for sale that consists of a GM food or has a GM food as an ingredient to be labelled as 'genetically modified', unless one of the exemptions listed in that section apply. Paragraph 1.5.2—4(1)(b) of the Code states that GM foods are exempt from being labelled as 'genetically modified' if they are an ingredient used as a processing aid and no novel DNA or novel protein remains present in the food.

As noted in section 2.2 of this report, no residual protein or DNA from the microorganism will remain present in the final purified rebaudioside M and thus will not be present in the food for sale. Therefore, under the conditions assessed, labelling as 'genetically modified' will not be required.

2.3.1.3 Enzyme nomenclature

FSANZ notes that the International Union of Biochemistry and Molecular Biology (IUBMB) lists the accepted name 'sucrose synthase' for the enzyme EC 2.4.1.13 and 'glucosyltransferase' for the enzymes referred to in this report as uridine diphosphate (UDP)-glucosyltransferase 91D2 and 76G1 (see section 2.1 of the SD). Under the Code, the

enzyme UDP-glucosyltransferase is listed as such (instead of as glucosyltransferase), therefore for consistency, the approved draft variation follows this format. It combines both uridine diphosphate (UDP)-glucosyltransferase 91D2 and 76G1 under one entry – being uridine diphosphate (UDP)-glucosyltransferase, in a manner that is consistent with other entries for the same enzyme in section S3—35. i.e. the identifiers 91D2 and 76G1 are not included in the approved draft variation.

2.4 Risk communication

2.4.1 Consultation

Consultation is a key part of FSANZ's standards development process. FSANZ developed and applied a standard communication strategy to this application. All calls for submissions were notified via the Food Standards Notification Circular, media release, FSANZ's digital channels and Food Standards News.

The process by which FSANZ considers standards development matters is open, accountable, consultative and transparent. Public submissions were called to assist consideration of the draft variation to the Code. FSANZ acknowledges the time taken by individuals and organisations to make submissions on this application.

The draft variation was considered for approval by the FSANZ Board having regard to all submissions made during the call for submissions period.

2.4.2 World Trade Organization (WTO)

As members of the World Trade Organization (WTO), Australia and New Zealand are obliged to notify WTO members where proposed mandatory regulatory measures are not substantially the same as existing international standards and the proposed measure may have a significant effect on trade.

As noted in section 1.3.2 above, the method of production used in this application is well known and included in both the relevant JECFA specification for steviol glycosides and in the Codex GSFA. While there is no Codex 'general standard' for enzymes, the enzymes in this application are comparable to already permitted forms in existing international general specifications and perform the same function. FSANZ thus considered the proposed measures are not substantially different. FSANZ also considered that amending the Code to permit steviol glycosides produced by enzymatic conversion using enzymes produced by GM *E. coli* BL21 would facilitate trade in steviol glycosides and food containing steviol glycosides rather than restrict it, thus not having an inhibiting effect on trade.

Therefore, a notification to the WTO under Australia's and New Zealand's obligations under the WTO Technical Barriers to Trade or Application of Sanitary and Phytosanitary Measures Agreement was not considered necessary.

2.5 FSANZ Act assessment requirements

When assessing this application and the subsequent development of a food regulatory measure, FSANZ had regard to the following matters in section 29 of the FSANZ Act.

2.5.1 Section 29

2.5.1.1 Consideration of costs and benefits

Changes have been made to Impact Analysis requirements by the Office of Impact Analysis

(OIA)[4]. Impact Analysis is no longer required to be finalised with the OIA. Prior to these changes, the OIA advised FSANZ that a Regulation Impact Statement (RIS) was not required for applications relating to processing aids (OIA Reference: OIA23-06225). This is because applications relating to permitting the use of processing aids that have been determined to be safe are considered to be minor and deregulatory in nature, as their use will be voluntary if the draft variation concerned is approved. Under the new approach, FSANZ's assessment is that a RIS is not required for this application.

FSANZ, however, gave consideration to the costs and benefits that may arise from the proposed measure for the purposes of meeting FSANZ Act considerations. The FSANZ Act requires FSANZ to have regard to whether costs that would arise from the proposed measure outweigh the direct and indirect benefits to the community, government or industry that would arise from the proposed measure (paragraph 29(2)(a)).

The purpose of this consideration is to determine if the community, government and industry as a whole is likely to benefit, on balance, from a move from the status quo (where the status quo is rejecting the application). This analysis considers the costs and benefits of permitting the proposed enzymes as processing aids in the manufacture of rebaudioside M.

After completing the call for submissions, FSANZ remains of the view that no other realistic food regulatory measures exist.

The consideration of the costs and benefits in this section is not intended to be an exhaustive, quantitative economic analysis of the proposed measures and, in fact, most of the effects that are considered cannot easily be assigned a dollar value. Rather, the assessment seeks to highlight the potential positives and negatives of moving away from the status quo by permitting the proposed enzymes as processing aids in the manufacture of rebaudioside M.

Costs and benefits of permitting the proposed three enzymes in the manufacture of rebaudioside M

Industry

The proposed new enzymes would be used as processing aids to produce the food additive rebaudioside M, which is an intense sweetener for use in a range of foods and beverages. There are other methods of producing rebaudioside M. Industry may use rebaudioside M produced in this manner if businesses perceive a net benefit for them. Benefits may include lower costs and higher efficiency of producing and using rebaudioside M from these new production methods.

Consumers

Industry may pass some of any cost savings to consumers, where it is cheaper to produce rebaudioside M using the new enzymes as processing aids.

Given the already wide permissions for use of different steviol glycosides in foods (including rebaudioside M and other steviol glycosides), it is not currently clear whether the approved draft variation notably increases availability of lower energy food products for consumers. On the other hand, it enables the range of such food products to continue.

Government

Permitting the new enzymes to produce rebaudioside M may result in a small cost to government in terms of additions to the current range of enzymes that are monitored for compliance.

Conclusions from cost benefit considerations

FSANZ's assessment is that the direct and indirect benefits that would arise from permitting

[4] Regulatory Impact Analysis Guide for Ministers' Meetings and National Standard Setting Bodies | The Office of Impact Analysis (pmc.gov.au)

the proposed use of the new enzymes as processing aids to produce rebaudioside M would most likely outweigh the associated costs.

2.5.1.2 Other measures

There are no other measures (whether available to FSANZ or not) that would be more cost-effective than a food regulatory measure developed or varied as a result of the application.

2.5.1.3 Any relevant New Zealand standards

The relevant standards apply in both Australia and New Zealand. There are no relevant New Zealand-only Standards.

2.5.1.4 Any other relevant matters

Other relevant matters are considered below.

2.5.2. Subsection 18(1)

FSANZ has also considered the three objectives in subsection 18(1) of the FSANZ Act during the assessment.

2.5.2.1 Protection of public health and safety

FSANZ identified no potential public health and safety concerns associated with the proposed use of these enzymes as processing aids (see SD1 for more detail).

2.5.2.2 The provision of adequate information relating to food to enable consumers to make informed choices

The labelling requirements for the provision of information to consumers are discussed in section 1.3.1.5 and 2.3.1 above.

2.5.2.3 The prevention of misleading or deceptive conduct

No issues have been identified with this application relevant to this objective.

2.5.3 Subsection 18(2) considerations

FSANZ has also had regard to:

- **the need for standards to be based on risk analysis using the best available scientific evidence**

FSANZ used the best available scientific evidence to conduct the risk assessment which is provided in SD1. The applicant submitted a dossier of scientific studies as part of its application. This dossier, together with other technical and scientific information, was considered by FSANZ in assessing the application.

- **the promotion of consistency between domestic and international food standards**

A number of international jurisdictions and standards permit the use of steviol glycosides in foods. As outlined in section 1.2, JECFA has adopted a framework for developing specifications for steviol glycosides by 4 different methods of production, including enzymatic conversion. The applicant's method of production of rebaudioside M is consistent with Annex 3 of the JECFA framework.

- **the desirability of an efficient and internationally competitive food industry**

Permission to use the applicant's enzymes as processing aids to produce rebaudioside M would enable Australian and New Zealand food manufacturers to access and use a product assessed as safe that is available to some overseas competitors. This will improve their capacity to compete in overseas markets (see discussion in section 2.5.1.1 above).

- **the promotion of fair trading in food**

No issues were identified for this application relevant to this objective.

- **any written policy guidelines formulated by the Food Ministers' Meeting**

The Ministerial Policy Guideline Addition to Food of Substances other than Vitamins and Minerals[5] includes specific order policy principles for substances added to achieve a solely technological function, such as processing aids. These specific order policy principles state that permission should be granted where:

- the purpose for adding the substance can be articulated clearly by the manufacturer as achieving a solely technological function (i.e. the 'stated purpose')
- the addition of the substance to food is safe for human consumption
- the amounts added are consistent with achieving the technological function
- the substance is added in a quantity and a form which is consistent with delivering the stated purpose
- no nutrition, health or related claims are to be made in regard to the substance.

FSANZ determined that permitting the proposed use of these enzymes is consistent with these specific order policy principles for 'Technological Function'. All other relevant requirements of the policy guideline are similarly met.

3 References

Codex 2023, CXG 36-1989,Class Names and the International Numbering System for Food Additives Guidelines | CODEXALIMENTARIUS FAO-WHO Accessed 31 January 2025

Codex 2024, CXS 192-1995, General Standard for Food Additives (GSFA), Standards | CODEXALIMENTARIUS FAO-WHO Accessed 31 January 2025

EC (2012) COMMISSION REGULATION (EU) No 231/2012 of 9 March 2012 laying down specifications for food additives listed in Annexes II and III to Regulation (EC) No 1333/2008 of the European Parliament and of the Council. http://data.europa.eu/eli/reg/2012/231/2023-03-22 Accessed 21 January 2025

FAO (2023). Compendium of Food Additive Specifications. Joint FAO/WHO Expert Committee on Food Additives (JECFA), 96th Meeting 2023 FAO JECFA Monographs 31. Rome. Available online at: https://www.fao.org/food/food-safety-quality/scientific-advice/jecfa/jecfa-additives/detail/en/c/560/

FCC (2022). Steviol Glycosides. In: Food Chemicals Codex, 13th edition. Rockville (MD): United States Pharmacopeial Convention.

FSANZ (2018). Application A1157. FSANZ, Canberra. Available online at: https://www.foodstandards.gov.au/food-standards-code/applications/A1157-EnzymaticproductionofRebaudiosideM

FSANZ (2019a). Application A1172. FSANZ, Canberra. Available online at: https://www.foodstandards.gov.au/food-standards-code/applications/A1172EnzymaticproductionofRebaudiosideD

[5] Policy guideline on the addition of substances other than vitamins and minerals | Food Regulation

FSANZ (2019b). Application A1176. FSANZ, Canberra. Available online at: https://www.foodstandards.gov.au/food-standards-code/applications/A1176

FSANZ (2020). Application A1183. FSANZ, Canberra. Available online at: https://www.foodstandards.gov.au/food-standards-code/applications/A1183

FSANZ (2023). Application A1268. FSANZ, Canberra. Available online at: https://www.foodstandards.gov.au/food-standards-code/applications/A1268-Steviol-glycosides-produced-by-bioconversion-using-new-enzymes-produced-by-GM-Escherichia-coli

PureCircle Stevia Institute 2023, Map Infographic Where in the World is Stevia Approved? Accessed 21 January 2025.

Attachments

A. Approved draft variation to the *Australia New Zealand Food Standards Code*
B. Explanatory Statement
C. Draft variation to the *Australia New Zealand Food Standards Code* (call for submissions)

Attachment A – Approved draft variation to the *Australia New Zealand Food Standards Code*

Food Standards (Application A1318 – Steviol glycosides produced by enzymatic conversion using enzymes produced by GM *Escherichia coli* BL21) Variation

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The Board of Food Standards Australia New Zealand gives notice of the making of this variation under section 92 of the *Food Standards Australia New Zealand Act 1991*. The variation commences on the date specified in clause 3 of this variation.

Dated [To be completed by Delegate]

[Insert name and position of Delegate]
Delegate of the Board of Food Standards Australia New Zealand

Note:

This variation will be published in the Commonwealth of Australia Gazette No. FSC XX on XX Month 20XX. This means that this date is the gazettal date for the purposes of clause 3 of the variation.

1 Name

This instrument is the *Food Standards (Application A1318 – Steviol glycosides produced by enzymatic conversion using enzymes produced by GM* Escherichia coli *BL21) Variation*.

2 Variation to Standards in the *Australia New Zealand Food Standards Code*

The Schedule varies Standards in the *Australia New Zealand Food Standards Code*.

3 Commencement

The variation commences on the date of gazettal.

Schedule

Schedule 3—Identity and purity

[1] Subparagraph S3—35(2)(f)(ii)

Omit the subparagraph, substitute:

(ii) sucrose synthase (EC 2.4.1.13) sourced from Escherichia coli K-12;

(g) by enzymatic conversion of purified stevia leaf extract to produce rebaudioside M using a combination of enzymes that contains:

(i) UDP-glucosyltransferases from *Stevia rebaudiana* sourced from *Escherichia coli* BL21; and

(ii) sucrose synthase (EC 2.4.1.13) from *Arabidopsis thaliana* sourced from *Escherichia coli* BL21.

Schedule 18—Processing aids

[2] Subsection S18—9(3) (table)

Insert the following entry for each enzyme in alphabetical order:

Sucrose synthase (EC 2.4.1.13) sourced from *Escherichia coli* BL21 containing the gene for sucrose synthase from *Arabidopsis thaliana*	For the conversion of purified stevia leaf extract to produce rebaudioside M	GMP
Uridine diphosphate (UDP) glucosyltransferases sourced from *Escherichia coli* BL21 containing the UDP glucosyltransferase gene from *Stevia rebaudiana*	For the conversion of purified stevia leaf extract to produce rebaudioside M	GMP

Attachment B – Explanatory Statement

EXPLANATORY STATEMENT

Food Standards Australia New Zealand Act 1991

Food Standards (Application A1318 – Steviol glycosides produced by enzymatic conversion using enzymes produced by GM Escherichia coli BL21) Variation

1. Authority

Section 13 of the *Food Standards Australia New Zealand Act 1991* (the FSANZ Act) provides that the functions of Food Standards Australia New Zealand (the Authority) include the development of standards and variations of standards for inclusion in the *Australia New Zealand Food Standards Code* (the Code).

Division 1 of Part 3 of the FSANZ Act specifies that the Authority may accept applications for the development or variation of food regulatory measures, including standards. This Division also stipulates the procedure for considering an application for the development or variation of food regulatory measures.

The Authority accepted Application A1318 which seeks to permit the use of a combination of new enzymes sourced from genetically modified *Escherichia coli BL21* as processing aids for the bioconversion of the steviol glycoside rebaudioside M, and the inclusion of a new specification that would permit the applicant's specific enzymatic conversion method. The Authority assessed the Application in accordance with Division 1 of Part 3 and prepared a draft variation - the *Food Standards (Application A1318 – Steviol glycosides produced by enzymatic conversion using enzymes produced by GM Escherichia coli BL21) Variation* (the approved draft variation)

2. Variation is a legislative instrument

The approved draft variation is a legislative instrument for the purposes of the *Legislation Act 2003* (see section 94 of the FSANZ Act) and be publicly available on the Federal Register of Legislation (www.legislation.gov.au).

This instrument is not subject to the disallowance or sunsetting provisions of the *Legislation Act 2003.* Subsections 44(1) and 54(1) of that Act provide that a legislative instrument is not disallowable or subject to sunsetting if the enabling legislation for the instrument (in this case, the FSANZ Act): (a) facilitates the establishment or operation of an intergovernmental scheme involving the Commonwealth and one or more States; and (b) authorises the instrument to be made for the purposes of the scheme. Regulation 11 of the *Legislation (Exemptions and other Matters) Regulation 2015* also exempts from sunsetting legislative instruments a primary purpose of which is to give effect to an international obligation of Australia.

The FSANZ Act gives effect to an intergovernmental agreement (the Food Regulation Agreement) and facilitates the establishment or operation of an intergovernmental scheme (national uniform food regulation). That Act also gives effect to Australia's obligations under an international agreement between Australia and New Zealand. For these purposes, the Act establishes the Authority to develop food standards for consideration and endorsement by the Food Ministers Meeting (FMM). The FMM is established under the Food Regulation Agreement and the international agreement between Australia and New Zealand, and consists of New Zealand, Commonwealth and State/Territory members. If endorsed by the

FMM, the food standards on gazettal and registration are incorporated into and become part of Commonwealth, State and Territory and New Zealand food laws. These standards or instruments are then administered, applied and enforced by these jurisdictions' regulators as part of those food laws.

3. Purpose

The purpose of the approved draft variation is to amend the Code to permit the use of a combination of new enzymes sourced from genetically modified *Escherichia coli BL21* as processing aids for bioconversion of the steviol glycoside rebaudioside M. The approved draft variation amends section S3—35 and the table to subsection S18—9(3) for this purpose.

4. Documents incorporated by reference

The approved draft variation does not incorporate any documents by reference.

However, existing provisions of the Code incorporate documents by reference that would prescribe identity and purity specifications for the processing aids and food additive (the steviol glycoside rebaudioside M produced by enzymatic conversion) permitted by the approved draft variation. Section 1.1.1—15 of the Code requires substances used as processing aids and food additives to comply with any relevant identity and purity specifications listed in Schedule 3 of the Code. Subsection S3—2(1) incorporates by reference primary source specifications listed in the following: Joint FAO/WHO Expert Committee on Food Additives (JECFA) Combined Compendium of Food Additive Specifications (FAO 2021), the United States Pharmacopeial Convention (FCC 2022), Food Chemicals Codex (13th edition); and the Commission Regulation (EU) No 231/2012. These include general specifications for the identity and purity parameters of food additives and enzyme preparations used as processing aids in the production of those additives.

5. Consultation

In accordance with the procedure in Division 1 of Part 3 of the FSANZ Act, the Authority's consideration of Application A1318 included one round of public consultation following an assessment and the preparation of a draft variation and an associated assessment summary. A call for submissions (including the draft variation) was open for a six-week period.

Further details of the consultation process, the issues raised during consultation and by whom, and the Authority's response to these issues are available in an approval report published on the Authority's website at www.foodstandards.gov.au.

Changes have been made to the impact analysis requirements by the Office of Impact Analysis (OIA)[6]. Impact analysis is no longer required to be finalised with the OIA. Under the new approach to impact analysis, FSANZ will assess whether an application requires a Regulatory Impact Statement (RIS).

FSANZ's assessment is that a RIS is not required for this application. Prior to the abovementioned changes, the OIA advised FSANZ that a RIS was not required for applications relating to food additives. This is because applications relating to permitting the use of food additives that have been determined to be safe are considered to be minor and/or deregulatory in nature, as their use will be voluntary if the draft variation concerned is approved.

[6] Formerly known as the Office of Best Practice Regulation (OBPR)

FSANZ's decision not to develop a RIS for application A1318 is consistent with the OIA's prior advice.

6. Statement of compatibility with human rights

This instrument is exempt from the requirements for a statement of compatibility with human rights as it is a non-disallowable instrument under section 44 of the *Legislation Act 2003*.

7. Variation

References to 'variation' in this section are references to the approved draft variation.

Clause 1 of the variation provides that the name of the variation is the *Food Standards (Application A1318 – Steviol glycosides produced by enzymatic conversion using enzymes produced by GM Escherichia coli BL21) Variation*.

Clause 2 of the variation provides that the Code is amended by the Schedule to the variation.

Clause 3 of the variation provides that the variation will commence on the date of gazettal of the instrument.

7.1 Item [1]

Item [1] of the Schedule to the variation amends Schedule 3 by repealing subparagraph S3—35(2)(f)(ii) and replacing it with:

- the current subparagraph S3—35(2)(f)(ii); and
- a new entry, as paragraph S3—35(2)(g), for the enzymatic conversion of purified stevia leaf extract to produce rebaudioside M using a combination of the following enzymes:
    - UDP-glucosyltransferase from *Stevia rebaudiana* sourced from *Escherichia coli* BL21, and
    - sucrose synthase (EC 2.4.1.13) from *Arabidopsis thaliana* sourced from *Escherichia coli* BL21.

7.2 Item [2]

Item [2] of the Schedule to the variation amends Schedule 18 by including two enzyme listings in the table to subsection S18—9(3), which lists substances permitted to be used as processing aids for specific technological purposes.

The following enzymes are listed in alphabetical order in column 1 of the table:

- Sucrose synthase (EC 2.4.1.13) sourced from *Escherichia coli* BL21 containing the gene for sucrose synthase from *Arabidopsis thaliana*
- Uridine diphosphate (UDP) glucosyltransferases sourced from *Escherichia coli* BL21 containing the UDP glucosyltransferase gene from *Stevia rebaudiana*

The specific technological purpose for each enzyme is prescribed in column 2 of the table for the corresponding enzyme i.e. 'for the conversion of purified stevia leaf extract to produce rebaudioside M'.

The maximum permitted level (MPL) at which each enzyme may be present in food is prescribed in column 3 of the table for the corresponding enzyme. That is, the MPL must be consistent with Good Manufacturing Practice (as defined by subsection 1.1.2—2(3) of the Code).

The effect of the amendments made by Items [1] and [2] above is to permit the use of an enzymatic conversion method of producing the steviol glycoside rebaudioside M which uses a combination of enzymes that contains both:

- UDP-glucosyltransferases from *Stevia rebaudiana* sourced from *Escherichia coli* BL21, and
- sucrose synthase (EC 2.4.1.13) from *Arabidopsis thaliana* sourced from *Escherichia coli* BL21.

Attachment C – Draft variation to the *Australia New Zealand Food Standards Code* (call for submissions)

Food Standards (Application A1318 – Steviol glycosides produced by enzymatic conversion using enzymes produced by GM *Escherichia coli* BL21) Variation

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Dated [To be completed by Delegate]

[Insert name and position of Delegate]
Delegate of the Board of Food Standards Australia New Zealand

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Schedule 3—Identity and purity

[1] Subparagraph S3—35(2)(f)(ii)

Omit the subparagraph, substitute:

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(iii) sucrose synthase (EC 2.4.1.13) from *Arabidopsis thaliana* sourced from *Escherichia coli* BL21.

Schedule 18—Processing aids

[2] Subsection S18—9(3) (table)

Insert the following entry for each enzyme in alphabetical order:

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