Guidance on safe use of genetically modified microorganisms (GMM) in food processing establishments

20 Jul 2023

Jointly issued by: Singapore Food Agency (SFA)
National Parks Board (NParks)
Ministry of Health (MOH)
Ministry of Manpower (MOM)
Genetic Modification Advisory Committee (GMAC) Singapore

Contents

1 Aim and scope of this document

1.1 This guidance document outlines the regulatory process for companies that intend to use genetically modified microorganisms (GMMs) in food processing establishments in Singapore to produce food substances. The guidelines in this document address possible exposure to GMMs that may impact human, plant, or animal health. These considerations must be addressed prior to application for a SFA's food processing establishment licence. By consolidating the relevant information to be provided to SFA, NParks, MOH, MOM and GMAC, the workflow described in this document facilitates the regulatory compliance and approval process for companies.

1.2 Food substances made using GMMs are considered to be novel foods and are therefore required to undergo SFA's pre-market food safety evaluation before such substances can be used in food. Companies are advised to seek SFA's regulatory approval or clarification for the food substance(s) before applying for a food processing establishment licence for production of said food substance(s). Further information on the food safety assessment information requirements and regulatory process for novel foods may be found at: https://www.sfa.gov.sg/food-information/novel-food

1.3 This document is not intended for companies and researchers planning to carry out research activities, in which neither the GMM nor the fermentation product are released outside of a research facility. For research activities, researchers and companies are to follow GMAC's Biosafety Guidelines for Research on GMOs, which are implemented by the Institutional Biosafety Committee at the research institute where said activities

are carried out. Please refer to GMAC's Biosafety Guidelines for Research on GMOs for further information.

1.4 SFA understands that safety issues related to emerging technologies in food production, including production of food substances using GMM, may require further discussions as such technologies evolve. Companies may submit enquiries and requests for consultations with SFA via the online feedback form: https://csp.sfa.gov.sg/feedback

2 Import of GMM for production of food substances

2.1 Companies are to choose the product code most relevant to the GMM under the most appropriate competent agency (CA) in TradeNet, Singapore Customs. Depending on the species or nature of the microorganism, the CA that grants import permits may be MOH, NParks or SFA. Companies are required to comply with the relevant CA's requirements for the import permit. Please refer to TradeNet for further information. In applying for the import permit, the genetically modified nature of the microorganism must be declared.

3 Workflow for evaluation on exposure to GMMs in food processing establishments

3.1 Companies are to provide complete information in the Assessment Form on Exposure to GMMs Used in Food Processing Establishments (Annex A) and submit to SFA.

3.2 SFA will channel the Assessment Form to NParks, MOH, MOM and GMAC for concurrent evaluation of the information provided. SFA will inform companies of initial queries from the abovementioned agencies, if any, within two weeks of receipt of the completed Assessment Form.

3.3 Companies may wish to request, through SFA, for a discussion with the relevant agencies to clarify outstanding issues approximately one month after submission of the completed Assessment Form. The discussion will be hosted by SFA and may be held physically or virtually depending on the availability of the attendees.

3.4 SFA will inform companies on the outcome of agencies' evaluation three months after receipt of the completed Assessment Form. If all agencies have no objections to the company's intended use of GMM in food production, companies may proceed to apply for a food processing establishment licence from SFA. Companies should append the document indicating the outcome of the agencies' evaluation as part of the documentation to support the licence application. Please refer to the following link for more information on the licencing application process: https://www.sfa.gov.sg/food-manufacturers/setting-up-food-establishments.

3.5 Please be assured that confidential information and trade secrets submitted by applicants will not be disclosed outside of SFA, NParks, MOH, MOM and GMAC without the applicant's explicit consent. Please note that the abovementioned agencies do not sign non-disclosure agreements (NDA) with companies for the purposes of evaluating the information submitted

3.6 Please refer to Annex B for the flowchart of the process described in this section.

3.7 Companies are given up to three months to respond to queries from agencies. Companies may request for an extension period on a reasonable basis. If after three months or the extension period a company does not update the agencies, the Assessment Form by the company will be considered withdrawn.

4 Revision History

Version	Date	Changes made
1	20 Jul 2023	First issue

5 Annex A: Assessment Form on Exposure to GMMs Used in Food Processing Establishments

5.1 Main Assessment Form

5.1.1 Company contact information

i. Company name

ii. Unique Entity Number (UEN)

iii. Address of production facility / facilities

iv. Name of contact person

v. Contact information

5.1.2 Information on genetically modified microorganism (GMM) strain

i. Taxonomic name of microorganism

ii. Proprietary / commercial name given to the GMM

iii. Summary of genetic modification(s) made:
   a. Method of genetic manipulation, location of insertion, site of expression and regulation of genetic insert.
   b. Provide evidence to demonstrate genetic stability of the event (e.g., Southern blots, qPCR)
   c. Information on the vector construct and whether the vector will remain in the final product.

iv. Does the GMM possess any additional antibiotic resistance compared to the non-GM counterpart?

v. Has the GMM been approved / notified / registered / deemed safe for production of food substance in other countries / jurisdictions? Please attach relevant documents.

vi. Indicate if it is possible for genetic material from the GMM to be transferred to another organism? If so, please elaborate on the conditions under which this can occur.

5.1.3 Information on use of GMM

i. Describe the intended use(s) of the GMM (e.g., for use in food for humans / feed for animals). Please specify exactly the food substances that will be produced from the GMM, and if it is intended for use in food for humans or feed for animals.

ii. Indicate the expected maximum production volume of the GMM. Indicate an estimated volume if unable to provide exact volume. Please indicate volume in litres.

iii. Are antibiotics used in the production process? If so, indicate the antibiotics used, which part of the process antibiotics are used, and the amounts used.

iv. Describe the system for cleaning / decontamination between production cycles.

v. Describe the measures put in place to ensure that live GMM is not released outside of the food processing establishment. Channels by which live GMM may be released outside include in wastewater, on personnel working in the facility, and on goods transported in and out of the facility. Describe how the effectiveness of these measures are assessed.

vi. Describe the response plan in the event of a leak or spill of the GMM. Describe site supervision procedures and any safety procedures undertaken by staff.

vii. Where will the GMM be manufactured? What is the start date and the duration of the manufacturing process?

viii. Describe the production process, detailing growth conditions, the nature (batch or continuous) and scale of the process. E.g., single-use bioreactor, continuous flow bioreactor, shake flask. Please provide a flowchart showing the key stage of production.

ix. If it is possible for genetic material from the GMM to be transferred to another organism, describe the measures put in place to prevent such occurrences.

5.1.4 Questions on possible impact on human health if humans are exposed to GMM

i. Indicate if the GMM and/or non-GM counterpart is known or suspected to be capable of causing death, disease or other biological malfunction in humans.

ii. Indicate if the GMM and/or non-GM counterpart is known or suspected to produce substances that are capable of causing death, disease or other biological malfunction in humans.

5.1.5 Questions on possible impact on animal health if animals are exposed to GMM

i. Indicate if the GMM and/or non-GM counterpart is known or suspected to be capable of causing death, disease or other biological malfunction in animals.

ii. Indicate if the GMM and/or non-GM counterpart is known or suspected to produce substances that are capable of causing death, disease or other biological malfunction in animals.

5.1.6 Questions on possible impact on plant health if plants are exposed to GMM

i. Indicate if the GMM and/or non-GM counterpart is known or suspected to be capable of causing death, disease or other biological malfunction in plants.

ii. Indicate if the GMM and/or non-GM counterpart is known or suspected to produce substances that are capable of causing death, disease or other biological malfunction in plants.

5.1.7 Questions on possible impact on workplace safety and health

Risk assessment (RA) is required to be conducted for all work activities to be carried out in the workplace. This will include identifying Workplace Safety and Health (WSH) hazards and taking measures to eliminate or minimise the risks and develop safe work procedures to control the risks

i. Provide a brief description or workflow of the main work processes.

ii.	Indicate if work processes involve: (1) any use or generation of combustible dust; (2) any use of flammable and explosive substances; (3) any use of nanomaterials or (4) any hot work processes. If yes to any of the above, please provide additional information on the work process, substance name, quantity used, control measures and programmes to mitigate the risk.
iii.	Indicate any other high-risk work activities identified as part of RA
iv.	Please provide brief details of control measures and programmes for high-risk work identified.
v.	Indicate if workers are be exposed to any of the hazards listed in the WSH (Medical Examinations) Regulations as such workers are required to undergo pre-placement and regular medical examinations.
vi.	Indicate if steam boilers and autoclaves are approved and registered with the Ministry of Manpower

6 Annex B: Process flowchart

Step	Estimated timeline
1. Company to provide complete information in Assessment Form on Exposure to GMMs Used in Food Processing Establishments (Annex A) and submit to SFA. SFA contact: Dr Tan Yong Quan (tan_yong_quan@sfa.gov.sg) Scientist, Risk Assessment and Communication Department, National Centre for Food Science	*D* (submission date)
⇩	
2. SFA will channel the Assessment Form to NParks, MOH, MOM and GMAC for concurrent evaluation of the information provided in the complete Assessment Form. SFA will inform company of initial queries from the agencies, if any.	*D* + 2 weeks
⇩	
3. Company can request for a discussion with the relevant agencies to clarify outstanding issues.	*D* + 1 month
⇩	
4. SFA will inform company on the outcome of agencies' evaluation based on the information provided.	*D* + 3 months^
⇩	
5. Company may proceed to apply for a food processing establishment licence from SFA (provided there is no objection from agencies). Company should append the document indicating the outcome of the agencies' evaluation as part of the documentation to support the licence application.	

^ Contingent on receipt of complete information in the Assessment Form

7 Annex C: Frequently Asked Questions

Q7.1 **If all the agencies have no objections to my company's intended use of GMM in food production based on the Assessment Form, does it mean my company can proceed with setting up the production facility?**

No, a licence from SFA for food processing establishment is still required in order to operate a facility where food is processed or produced for commercial purposes. Because GMM may introduce safety risks that are not present in conventional food production, the intention of the Assessment Form is to facilitate companies in ensuring that potential exposure that may impact human health, workplace health and safety, as well as plant and animal health, are addressed prior to application for a food processing establishment licence.

Q7.2 **My company is intending to use a genome edited microorganism that does not contain foreign DNA. Would my microorganism be considered as genetically modified?**

Whether a genome edited microorganism will be subject to GMO regulations will depend on the extent and type of genomic alterations made. Please contact SFA for further discussion.

Q7.3 **Is it necessary to obtain regulatory approval for use of novel food that is derived from a GMM before applying for a food processing establishment licence?**

SFA advises companies to obtain regulatory approval for the precision fermentation product **prior** to applying for a food processing establishment licence. This is because approval for the fermentation product to be used in food is a condition for the food processing establishment licence. Further information on the process for obtaining novel food regulatory approval may be found here: https://www.sfa.gov.sg/food-information/novel-food