

CONSULTATION ON REGULATION OF INSECT AND INSECT PRODUCTS (IMPORTS AND LOCALLY FARMED/PROCESSED)

Aim

1. The Singapore Food Agency (SFA) is seeking feedback from the food and animal feed industry, as well as interested parties, on the proposal to allow insects for human consumption and as animal feed¹, subject to specific food safety requirements and conditions. This applies to both imported, as well as locally farmed and processed insects.

Background

2. The import and sale of insects as food for human consumption is presently not allowed, while the import and sale of animal feed containing insects is currently permitted under the Feeding Stuffs Act (FSA). SFA currently permits only approved substrates² for use (mainly homogenous plant-based waste) on insects for animal feed.

3. The Singapore Food Agency (SFA) has completed a review of the regulatory position for insects and insect products. With this, SFA will permit the import and sale of insects and insect products for human consumption and animal feed, subject to the import conditions (paragraph 6) for imports, and additional pre-licensing requirements (paragraphs 7 and 8) for local farming and processing of insects and insect products.

4. These changes will allow industry more flexibility to produce insects in a safe and sustainable way, particularly in the range of substrates which can be used. Consumers would also have access to safe insect food products.

5. Presently, there are no international standards set by the Codex Alimentarius Commission or the World Organisation for Animal Health (WOAH) for insects as food or animal feed. SFA's proposed import conditions and additional pre-licensing requirements for farming and processing in Singapore are based on four identified key points to ensure safety of the insects and insect products:

- a. Species of insect is safe for human consumption
- b. Prevent the introduction of diseases and contaminants
- c. Substrate used must not impart contaminants to the insects
- d. The final product is safe for consumption

¹Animal feed refers to feed for food producing animals. This includes livestock feed (i.e., for goats, cows, poultry etc.) and aquaculture feed (i.e., for food fish and crustaceans), and excludes feed intended for pets or for non-food producing animals.

² Substrate refers to the material on which insects live on. It is usually the insect's food.

Import Conditions for Insect and Insect Products Imported into Singapore:

6. The following conditions in **Table 1** will apply to the import of insects and insect products, depending on their intended purpose (i.e., farming, human consumption, or animal feed).

- For import for human consumption: S/N 1, 2, 5, 6 will apply
- For import for animal feed: S/N 1, 2 will apply
- For import for farming (for human consumption): S/N 3, 4, 5, 7 will apply
- For import for farming (for animal feed): S/N 3, 4, 7 will apply

Table 1: Import Conditions for Insect and Insect Products

S/N	Import condition	Rationale
For all imports of insects and insect products for human consumption, or animal feed, the following conditions apply:		
1	Submission of the following documents (one-time submission) from Competent Authority of the exporting country for SFA's consideration: (i) Documentary proof that products are manufactured in premises regulated by Competent Authority; and (ii) Hazard Analysis Critical Control Point (HACCP)/ Food Safety Management System (FSMS) plan showing that products are manufactured in establishments which have in place production and post-harvest processes to identify the hazard(s) and the control measures.	To ensure that insects are processed in regulated establishments under the oversight of the relevant Competent Authority of the exporting country.
2	Submission of Health certificate for every consignment to certify that: a) Insects are not harvested from the wild;	Wild-harvested insects may potentially harbour pathogens that could cause human or animal disease. There is also no control over substrates, leading to potential contamination with environmental contaminants. These hazards are potential public health risks.

	<p>a) Manure, decomposing organic material and materials of ruminant origin are <u>not</u> used as feeding substrates. (Decomposing state is identified by putrid odours, mushy/slimy, or with visible mould or bacteria growth. Substrates which have undergone controlled fermentation are permitted); and</p>	<p>An unsafe substrate may introduce pathogens and harmful contaminants into insects. These hazards may be passed through the food chain to humans. For example, the presence of mould indicates potential aflatoxin contamination.</p> <p>SFA intends to allow flexibility for industry to utilise multiple types of substrates in combination, in a safe manner.</p> <p>SFA will allow substrates which have undergone processes to stop decomposition. This includes processes such as controlled fermentation (e.g., with lactic acid bacteria) and other processes (e.g., heat-treatment) which stops the normal decomposition process.</p> <p>The restriction of substrates to non-ruminant origin is to avoid prion transmission risks. Prions are a type of protein that can trigger neurodegenerative diseases in humans and are heat resistant. An example of a disease caused by prions is Bovine Spongiform Encephalopathy (BSE), also known as “Mad Cow Disease”.</p>
	<p>b) The products have been handled and packed in a hygienic manner and are free from contaminants</p>	<p>To address food safety and hygiene of the products.</p>
For all imports of live insects for farming (for human consumption or animal feed), the following conditions apply:		
3	<p>Submission of the following documents (one-time submission) from Competent Authority of the exporting country for SFA’s consideration:</p> <p>(iii) Documentary proof that insects are farmed in</p>	<p>To ensure that insects are farmed in regulated establishments under the oversight of the relevant Competent Authority of the exporting country.</p>

	premises regulated by Competent Authority; and	
4	Submission of Health certificate for every consignment to certify that:	
	a) Insects are not harvested from the wild;	Wild-harvested insects may potentially harbour pathogens that could cause human or animal disease. There is also no control over substrates, leading to potential contamination with environmental contaminants. These hazards are potential public health risks.
	b) Manure, decomposing organic material and materials of ruminant origin are <u>not</u> used as feeding substrates. (Decomposing state is identified by putrid odours, mushy/slimy, or with visible mould or bacteria growth. Substrates which have undergone controlled fermentation are permitted); and	<p>An unsafe substrate may introduce pathogens and harmful contaminants into insects. These hazards may be passed through the food chain to humans. For example, the presence of mould indicates potential aflatoxin contamination.</p> <p>SFA intends to allow flexibility for industry to utilise multiple types of substrates in combination, in a safe manner.</p> <p>SFA will allow substrates which have undergone processes to stop decomposition. This includes processes such as controlled fermentation (e.g., with lactic acid bacteria) and other processes (e.g., heat-treatment) which stops the normal decomposition process.</p> <p>The restriction of substrates to non-ruminant origin is to avoid prion transmission risks. Prions are a type of protein that can trigger neurodegenerative diseases in humans and are heat resistant. An example of a disease caused by prions is Bovine Spongiform Encephalopathy (BSE), also known as “Mad Cow Disease”.</p>

Additional conditions applicable to insects imported for human consumption:		
5	The insect species imported may only be those listed in the List of Insect Species Approved for Human consumption (Refer to Annex). <i>[Declaration of insect species imported will be required as part of import permit approval]</i>	These are insect species with a known history of human consumption. Insect species not included in this list will be considered as novel food and companies will be required to submit a safety assessment for SFA's review.
6	For insects and insect products which are imported for <u>direct</u> human consumption (i.e., ready-to-eat products ³ , eg. Fried insect snacks, protein bars with insect powder): Submission of health certificate to certify that products have been subjected to sufficient heat treatment, or an equivalent bactericidal process, to kill pathogens prior to consumption; and are safe for consumption	To ensure that the final product is safe for consumption.
Additional condition applicable to insects imported live:		
7	Have fulfilled the National Park Board's (NParks) requirement on the import conditions for insects and other invertebrates.	To address biosecurity concerns over live insects which may escape into the environment and impact Singapore's biodiversity.

Insect Farming for Human Consumption/ Animal Feed (Additional Pre-Licensing Requirements for farms)

7. For insect farming in Singapore, in addition to the existing pre-licensing requirements applicable to the relevant farming activities (farming for human consumption⁴ or farming for animal feed⁵), the following additional pre-licensing requirements in **Table 2** will apply.

³ Ready-to-eat food means any article of food that is made available for sale for direct human consumption without the need for cooking or any other form of processing to eliminate, or reduce to a microbiological standard specified in the Eleventh Schedule, any pathogenic or other micro-organism of concern in the article of food; and includes cup noodles, fruit juice cordial, squash or syrup, powdered beverages and other concentrated food which are meant to be reconstituted or diluted with fluids before consumption (Regulation 35(2), Food Regulations).

⁴ For Insect Farming for Human Consumption: This is in addition to the [existing pre-licensing requirements and conditions related to starting a farm](#) (i.e. general good farming practices and biosecurity).

⁵ For Insect Farming for Animal Feed: This is in addition to the [existing pre-licensing requirements and conditions related to the manufacture and process of animal feed](#). Processing insects for animal feed is included under this category.

Table 2: Additional Pre-Licensing Requirements for Farming of Insects for Human Consumption or Farming for Animal Feed

SN	Additional Pre-Licensing Requirements	Human Consumption	Animal Feed	Rationale
1	Insects' species farmed may only be those listed in the List of Insect Species Approved for Human Consumption (Refer to Annex). Insect species that are not in the approved list will be considered novel food and companies will be required to submit a safety assessment for SFA's review.	✓		A food safety assessment is required so that SFA can assess if the novel food is safe for human consumption.
2	Insects farmed are not harvested from the wild.	✓	✓	Wild-harvested insects may potentially harbour pathogens that could cause human or animal disease. There is also no control over substrates, leading to potential contamination with environmental contaminants. These hazards are potential public health risks.
3	Applicant is required to establish and submit a Hazard Analysis Critical Control Point (HACCP)/ Food Safety Management System (FSMS) plan in their production and post-harvest processes to identify the hazard and the control measures. The applicant is	✓	✓	A HACCP/FSMS plan is required for production and post-harvest to identify the hazards early and plan for control measures. Upon granting of licence, the HACCP/FSMS plans must be in line with what the applicant submitted during the business proposal for SFA to license the insect farming.

SN	Additional Pre-Licensing Requirements	Human Consumption	Animal Feed	Rationale
	required to implement the HACCP/FSMS as submitted throughout the licence term.			
4	<p><u>Substrates</u> Substrate used for feeding of insects shall not be contaminated with any substances which may cause the insects to be unsafe for human consumption.</p>	✓		This is to ensure that substrates do not have any harmful substances which may be passed down the food chain to humans.
5	<p><u>Substrates</u> Manure, decomposing organic material and materials of ruminant origin shall not be used as substrates without the prior approval of SFA.</p> <p>For food waste to be used as insect substrate, the food waste should not be in a decaying or decomposing state (Decomposing state is identified by putrid odours, mushy/slimy, or with visible mould or bacteria growth. Substrates which have undergone controlled fermentation are permitted).</p> <p>Applicants are to ensure that there is a system in place to</p>	✓	✓	<p>An unsafe substrate may introduce pathogens and harmful contaminants to the insects. These hazards may be passed through the food chain to humans. For example, the presence of mould in the substrate indicates potential aflatoxin contamination. Aflatoxins are a type of mycotoxin that are produced by some types of moulds and can be poisonous. They are chemically stable in food and cannot be easily eliminated, even at high temperatures encountered in food processing, such as roasting, baking and even frying.</p> <p>SFA intends to allow flexibility for industry to utilise multiple types of substrates in combination, in a safe manner.</p>

SN	Additional Pre-Licensing Requirements	Human Consumption	Animal Feed	Rationale
	screen inputs into the waste stream, to ensure that the substrate will not contain materials which are disallowed.			<p>SFA will allow substrates which have undergone processes to stop decomposition. This includes processes such as controlled fermentation (e.g., with lactic acid bacteria) and other processes (e.g. heat-treatment) which stops the normal decomposition process.</p> <p>The restriction of substrates to non-ruminant origin is to avoid prion transmission risks. Prions are a type of protein that can trigger neurodegenerative diseases in humans and are heat resistant. An example of a disease caused by prions is Bovine Spongiform Encephalopathy (BSE), also known as “Mad Cow Disease”.</p>
6	<u>Post-harvest</u> Good hygiene practices are to be implemented during post-harvest handling to prevent cross contamination.	✓	✓	Good post-harvest handling practices are important to ensure that contaminants are not introduced during the production processes.
7	<u>Post-harvest</u> Insects for human consumption have been subjected to sufficient heat treatment, or an	✓		Raw/uncooked insects might contain bacteria that are harmful to human health.

SN	Additional Pre-Licensing Requirements	Human Consumption	Animal Feed	Rationale
	equivalent bactericidal process, to kill pathogens prior to consumption; and are safe for consumption			
8	The licensee shall not conduct any sales of <u>live</u> insects to retailers (both brick-and-mortar or online) or members of the public without the prior approval of the Director-General.	✓	✓	Restricting sales of <u>live</u> insects to retailers or members of the public would safeguard public health and mitigate food safety risks of consuming live insects without further processing.

Processing of Insects for Human Consumption (Additional Pre-Licensing Requirements for food processing establishments)

8. For processing of insect and insect products in Singapore, for human consumption, in addition to the existing requirements and conditions for food processing establishments⁶, the following additional pre-licensing requirements in **Table 3** will apply.

Table 3: Additional Pre-Licensing Requirement for Processing of Insects for Human Consumption

SN	Additional Pre-Licensing Requirements	Rationale
1	Insect species processed may only be those listed in the List of Insect Species Approved for Human Consumption (Refer to Annex). Insect species that are not in the approved list will be considered novel food and companies will be required to submit a safety assessment for SFA's review.	These are insect species with a known history of human consumption. Insect species not included in this list will be considered as novel food and companies will be required to submit a safety assessment for SFA's review.

⁶ For processing of insects for human consumption, [existing requirements and conditions for food processing establishments](#) will apply.

SN	Additional Pre-Licensing Requirements	Rationale
2	Insects used for processing are not harvested from the wild	Wild-harvested insects may potentially harbour pathogens that could cause human or animal disease. There is also no control over substrates, leading to potential contamination with environmental contaminants. These hazards are potential public health risks.
3	The applicant shall submit laboratory analysis test results from accredited laboratories (under SFA's Laboratory Recognition Programme [LRP]) as one of the documents for licence application. The test results are to be in compliance with the Singapore Food Regulations.	Processed insect products must comply with the microbiological and chemical standards for food as stipulated in the Singapore Food Regulations.
4	Applicant is required to submit a Hazard Analysis Critical Control Point (HACCP)/ Food Safety Management System (FSMS) plan in their processing plans to identify the hazard and the control measures. The applicant is required to implement the HACCP/FSMS as submitted throughout the licence term.	A HACCP/FSMS plan is required for processing to identify the hazards early and plan for control measures. Upon granting of licence, the HACCP/FSMS plans must be in line with what the applicant submitted for SFA to license the insect processing.
5	Insects for human consumption have been subjected to sufficient heat treatment, or an equivalent bactericidal process, to kill pathogens prior to consumption; and are safe for consumption	To ensure that the final product is safe.
6	Products are manufactured, packed, transported, and stored in a manner that prevents contamination.	To ensure that the final product is safe.

Compliance with Food Regulations

9. In addition to the import conditions and additional pre-licensing requirements in paragraphs 6 to 8, all farming, processing and sale of insect and insect products for human consumption shall comply with Singapore's Food Regulations.

Request for Comments

10. SFA invites views and comments on the import conditions and additional pre-licensing requirements detailed in paragraphs 6 to 8. All submissions should be clearly and concisely written and should provide a reasoned explanation for any proposed revisions.

11. Submissions should reach SFA no later than 6:00 p.m., 4 December 2022, through mail, or email to the following addresses:

Mail:

Risk Management & Surveillance Department
Joint Operations Division
Singapore Food Agency
52 Jurong Gateway Road #14-01
Singapore 608550
(Attention: Ms Low Yi Lin)

Emails:

LOW_YI_LIN@SFA.GOV.SG
CHIN_XIU_WEN@SFA.GOV.SG

Annex

Table A: List of Insect Species Approved for Human Consumption

S/N	Order/Family	Common name of insect	Scientific name of insect
1	Orthoptera	a) House cricket	<i>Acheta domesticus</i>
		b) Banded cricket	<i>Gryllodes sigillatus</i>
		c) Common/field cricket	<i>Teleogryllus testaceus</i> / <i>Teleogryllus mitratus</i> (<i>Gryllus testaceus</i>)
		d) Black/field cricket/ Two-spotted cricket	<i>Gryllus bimaculatus</i>
		e) African migratory locust	<i>Locusta migratoria migratorioides</i>
		f) American desert locust	<i>Schistocerca americana gregaria</i>
		g) Grasshopper	<i>Oxya japonica Thunberg</i>
2	Coleoptera	a) Superworm beetles / Giant mealworm beetle / King mealworm	<i>Zophobas atratus morio</i>
		b) Mealworm	<i>Tenebrio molitor</i> (larvae stage only)
		c) Lesser mealworm	<i>Alphitobius diaperinus</i> (larvae stage only)
3	Lepidoptera	a) Greater wax moth/ Honeycomb moth	<i>Galleria mellonella</i>
		b) Lesser wax moth	<i>Achroia grisella</i>
		c) Silk moth/ silkworm	<i>Bombyx mori</i> (Pupa (without cocoon) & caterpillar)
4	Scarabaeidae	a) Whitegrub	<i>Protaetia brevitarsis</i> (larvae stage only)
		b) Giant Rhino beetle grub	<i>Alomyrina dichotoma</i> (larvae stage only)
5	Hymenoptera	a) Western honey bee/ European honey bee	<i>Apis mellifera</i>