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MS 1265-5 (2005) (English): CODE OF GOOD IRRADIATION PRACTICE – PART 5: DRIED FISH AND DRIED SALTED FISH FOR INSECT DISINFESTATIONS (FIRST REVISION)

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MALAYSIAN STANDARD

MS 1265: PART 5:2005

CODE OF GOOD IRRADIATION PRACTICE – PART 5: DRIED FISH AND DRIED SALTED FISH FOR INSECT DISINFESTATIONS (FIRST REVISION)

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Committee representation

The Food and Agricultural Industry Standards Committee (ISC A) under whose authority this Malaysian Standard was developed, comprises representatives from the following organisations:

Department of Agriculture

Department of Standards Malaysia

Federal Agricultural Marketing Authority

Federation of Malaysian Manufacturers

Malaysian Association of Standards Users

Malaysian Agricultural Research and Development Institute

Malaysian Palm Oil Association

Ministry of Agriculture and Agro-based Industry

Ministry of Health Malaysia

Ministry of International Trade and Industry

Universiti Kebangsaan Malaysia

Universiti Putra Malaysia

The Working Group on Food Irradiation which developed this Malaysian Standard consists of representatives from the following organisations:

Department of Fisheries Malaysia

Department of Veterinary Services Malaysia

Federation of Malaysian Consumers Associations

Malaysian Agricultural Research and Development Institute

Malaysian Institute for Nuclear Technology Research

Ministry of Health Malaysia

SIRIM Berhad (Secretariat)

Universiti Putra Malaysia

FOREWORD

This Malaysian Standard was developed by the Working Group on Food Irradiation under the authority of the Food and Agricultural Industry Standards Committee.

MS 1265 consists of the following parts, under the general title *Code of good irradiation practice:*

- Part 1: *General*

- Part 2: *Bulb and tuber crops for sprout inhibition*

- Part 3: *Fresh fruits and vegetables for insect disinfestations*

- Part 4: *Cereal grains for insect disinfestations*

- Part 5: *Dried fish and dried salted fish for insect disinfestations and as quarantine treatment*

- Part 6: *Bananas, mangoes and papayas for shelf-life extension*

- Part 7: *Fish, frog legs and shrimps for the control of microflora*

- Part 8: *Prepackaged meat and poultry for the control of pathogens and/or to extend shelf-life*

- Part 9: *Spices, herbs and vegetable seasonings for the control of pathogens and microflora*

- Part 10: *Dried meat and dried salted meat of animal origin for insect disinfestation, control mould and reduction of pathogenic microoraganisms*

This Malaysian Standard is the first revision of MS 1265: Part 5, *Guidelines for irradiation of foods: Part 5: Irradiation of dried fish and dried salted fish for insect disinfestations.*

Major modifications in this revision are as follows:

a) the scope of the standard has been amended that irradiation treatment may control moulds and reduce pathogenic microorganisms;

b) new radiation source has been added; and

c) the labelling requirements have been revised.

This Malaysian Standard cancels and replaces MS 1265: Part 5:1992, *Guidelines for irradiation of foods: Part 5: Irradiation of dried fish and dried salted fish for insect disinfestations.*

Compliance with a Malaysian Standard does not of itself confer immunity from legal obligations.

CODE OF GOOD IRRADIATION PRACTICE – PART 5: DRIED FISH AND DRIED SALTED FISH FOR INSECT DISINFESTATIONS (FIRST REVISION)

0. Introduction

Dried fish and dried salted fish can be infested with insects. These insects feed on the fish tissue and cause damage from the time of primary storage through to the use of the product by the consumer. Irradiation is used to disinfest these fish of insects present. Although mould growth can cause spoilage of these foods, irradiation, as used in their treatment, does not control it. Where needed, other measures such as the addition of sorbate may be used to control mould growth.

1. Scope

1.1 This Malaysian Standard describes the code of good irradiation practice for insect disinfestations of dried fish and dried salted fish. The fish to which this standard applies are fish of either marine or fresh water origin, and which are either dried, or dried and salted.

1.2 This standard excludes other animal foods of marine and fresh water origin.

1.3 The contamination of concern in this standard is insects. However irradiation may to certain extent control moulds and reduce pathogenc microorganisms.

2. Normative references

The following normative references are indispensable for the application of this standard. For dated references, only the editions cited apply. For undated references, the latest editions of the normative references (including any amendments) apply.

The Malaysian Food Act 1983 and Malaysian Food Regulations 1985

MS 1265:Part 1, *Code of good irradiation - Part 1: General*

3. Pre-irradiation treatment of fish

3.1 Handling the catch

3.1.1 Applicable codes of practice for handling fresh, smoked, and salted fish should be followed in maintaining the initial quality of the fish before processing and during pre-irradiation handling. In brief, these measures can be stated as follows: after catch, gut and/or bleed (if required); wash with clean water; ice or refrigerate fish without delay. The storage aboard the catching vessel and on-shore handling should comply with good sanitation practices or good hygienic practices and maintained at low (melting ice) temperatures to minimise build up of bacterial contamination.

3.1.2 The on shore unloading should be handled properly avoiding damage occur on the fish. The fish handlers should avoid mixing of catches made at different day. The on-shore storage should be maintained at the proper refrigeration temperature. Fish that requires gutting to be made on-shore should be handled properly so as to minimise bacterial contamination. Fish that is detected containing parasites, blood spots, skin pieces, etc. need to be removed.

3.1.3 Food additives should be used properly and in accordance with the Malaysian Food Act 1983 and Malaysian Food Regulations 1985.

3.2 Salting

Salting of the fresh or smoked fish may be prepared by either dry-salting or by soaking in saturated brine.

3.3 Smoking

Smoking of fish is a two-step process, in which the fish is dried and smoke is deposited during the drying process using an acceptable source of heat and smoke.

3.4 Drying

3.4.1 Drying may be done by sun drying method or by using artificial drying equipment. The modification of traditional practices may be beneficial, and new technologies for sun-drying are available.

3.4.2 It is necessary that good handling practices procedures are followed to avoid or minimise contamination of the product in all aspects during the sun drying process. The final moisture content of the dried fish should be less than 15 %.

3.4.3 The salt content of the dried salted fish may range from 4 % to 20 % and should be at a level appropriate to practices of the local market. The moisture content of dried salted fish should be low in order to minimise mould growth.

3.4.4 It is recommended that good sanitation practices be employed to minimise the initial insect population on the dried product and to prevent insect population build-up in the processing area.

4. Packaging

4.1 Packaging should be done in an insect-proof material and if possible, prior to irradiation. The packaging material should provide a moisture barrier to prevent moisture gain by the product. Vacuum packaging and usage of CO_2 to replace air in the package is recommended only for dried salted fish,. The use of an O_2 absorber or other likewise is only suitable for dried salted fish. Vacuum packaging and exclusion of oxygen is unsuitable for unsalted fish due to the possible risk development of botulinum toxin.

4.2 If the irradiation is carried out in a packaged product, the conventional packaging materials that are in contact with the product should not undergo any significant alteration of their functional properties nor yield toxic materials which can transfer to the fish as a result of irradiation treatment at the doses required.

4.3 Polyethylene, polypropylene or other clear flexible materials of similar qualities may be used. Polypropylene is more effective in preventing insect penetration than polyethylene. The combinations of films may be used, such as polypropylene and polyethylene or polyester and polyethylene. Polyethylene film is oxygen permeable, therefore polypropylene or laminates should be used to minimise oxidative damage.

4.4 Gunny bags with a polyethylene lining may be used in bulk packaging of species of small fish, provided that the exterior of the gunny-bag is treated with a suitable insect repellent. Species of fish with sharp edges and bones should not be bulk-packaged.

4.5 Carton boxes with a suitable liner such as adequately thick polyethylene or an equivalent material are acceptable for bulk packaging.

4.6 Rigid containers such as wooden, metallic or plastic boxes used with suitable liners or covers which prevent moisture gain by the product may be used for bulk packaging. However, containers made of wood or other cellulosic material will gradually be damaged if exposed repeatedly to the irradiation treatment, and, in time, will become unusable.

4.7 For retail packages, polyethylene, polypropylene or other clear flexible materials of similar qualities may be used. However, cellophane, for instance, is relatively impermeable to oxygen, but not to water vapour (moisture) is not suitable to be used.

4.8 The size and shape of containers which may be used for irradiation are determined in certain aspects of the irradiation facility. The critical aspects include the characteristics of product transport systems and of the irradiation source, as they relate to the dose distribution obtained within the container (see Clause 6).

4.9 The irradiation treatment will be more effective if the product packages are geometrically well-defined and uniform. It may be necessary to limit the use of certain package shapes and sizes to the requirements of certain irradiation facilities.

5. Pre-irradiation storage and transport

5.1 The normal storage and transport provided for dried fish are sufficient. Fish with moisture levels below 15 % need not require to be refrigerated.

5.2 The storage time taken after completed drying and before irradiation should be minimal as to avoid insect infestation. Appropriate measures to minimise infestation should be taken.

6. Irradiation

6.1 Facility requirements and operation; process parameters and critical operational control points; ionizing radiation sources employed

6.1.1 The requirements and guidance regarding certain irradiation process parameters and irradiation facilities and their operations should be referred to MS 1265: Part 1.

6.1.2 The ionising radiation which may be used for the irradiation of fish of marine and fresh water origin is limited to:

a) Gamma rays from the radionuclides Cobalt-60 and Caesium-137;

b) X-rays generated from machine sources operated at or below an energy level of 5 MeV (Million Electron Volts); and

c) Electrons generated from machine sources operated at or below an energy level of 10 MeV.

6.1.3 The selection of the irradiation source to be employed in the treatment should be appropriately considered, for example the use of electrons has its limitations due to their poor penetration ability.

6.1.4 It is not possible to distinguish irradiated from non-irradiated product by inspection. Therefore, it is important that, in the operation of an irradiation facility, any appropriate means, such as physical barriers, be used for keeping the irradiated and non-irradiated product separate.

6.1.5 Indicators which change colour or which otherwise undergo some easily determined and time-stable change when exposed to radiation at the doses required are commercially available. Such devices, common in the radiation-sterilisation industry which is used as a paper sticker (or equivalent) and attached to each product unit, such as a carton, could assist the operator in identifying irradiated product.

6.1.6 It is important to keep adequate records of the operation of the irradiation facility. Fish which have been irradiated should be identified by lot numbers or other suitable means. Such measures which enable verification of the irradiation treatment carried out are likely to be required by the regulatory agencies.

6.2 Amount of radiation used (absorbed dose)

6.2.1 General

6.2.1.1 The most important process parameters in the irradiation treatment of food is the amount of ionising energy absorbed by the target material. This is termed 'absorbed dose'. The unit of absorbed dose is the Gray (Gy). One Gy is equal to the absorbtion of one joule per kg. The dose employed is determined by the level of the initial contamination (number of insects), the kind of insects, and the purpose of the treatment.

6.2.1.2 The irradiation procedure is controlled to deliver a prescribed dose involves a number of considerations. Among which is important is the technology for measuring dose, given the termed 'dosimetry'. The manuals on dosimetry procedures should be consulted. Refer to bibliography for the list of references on dosimetry procedures.

6.2.2 Dried fish

The most commonly insects to infest dried fish are *Dermestes spp.*, *Necrobia spp.* and *Lasioderma spp.* Disinfestation is achieved at an absorbed dose of 0.50 kGy.

6.2.3 Dried salted fish

Dried salted fish are infested with insects such as *Dermestes maculatus, Dermestes carnivorus, Necrobia rufipes* and the flesh flies of *Sarcophagidae* family. High moisture dried salted fish may be infested by blow flies also. Disinfestation is achieved at an absorbed dose of 0.50 kGy.

6.3 Irradiation conditions

The conditions usually practiced for irradiating materials at ambient temperatures may be employed. The irradiation areas should be ventilated to minimise ozone build-up.

7. Post-irradiation handling and storage

7.1 Storage of dried fish

There is no special requirement for storage of irradiated dried fish with 15 % maximum, moisture content, packed in suitable packaging materials. Such dried fish may be stored for three months to nine months without moulding.

7.2 Storage of dried salted fish

The storage requirements for dried salted fish vary according to the moisture content. Low moisture product can be stored at ambient temperatures without moulding. Higher moisture content fish (e.g. approaching 50 %) require refrigerated storage.

7.3 Transport of dried fish and dried salted fish

There are no special requirements for the transport of dried fish and dried salted fish. The integrity of the packages should be maintained in order to prevent re-infestation with insects.

8. Labelling

8.1 Foods that have been irradiated shall be labelled and labelling shall be in accordance with the current national legislation requirements.

8.2 Labelling should not only identify the food as irradiated, but also serve to inform the purchaser as to the purpose and benefits of the treatment.

8.3 Each package containing the food treated by ionizing radiation may bear on it the international food irradiation symbol given in MS 1265: Part 1.

9. Re-irradiation

In general irradiation of the same product more than once is not recommended. Where re-irradiation is allowed to control subsequent insect infestation, the total absorbed dose should not exceed that approved. MS 1265: Part 1 may be referred which includes provisions for the re-irradiation of certain foods.

10. Quality of irradiated dried fish and dried salted fish

The quality of dried fish and dried salted fish is not changed by radiation disinfestation of insects.

11. Final product specification

11.1 In terms of this standard the associated final product specification is that both dried fish and dried salted fish be free of insects and insect damage.

11.2 Recognition should be given to the possibility of product spoilage occurring in other ways as a result of other factors, for example, moulding or sensory changes not controlled by the irradiation treatment.

Bibliography

MS ISO ASTM 51204: 2005, *Practice for dosimetry in gamma irradiation facilities for food processing*

MS ISO ASTM 51261: 2005, *Guide for selection and calibration of dosimetry systems for radiation*

MS ISO ASTM 51431: 2005, *Practice for dosimetry in electron and bremsstrahlung irradiation facilities for food processing*

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