

**RECOMMENDED INTERNATIONAL CODE OF HYGIENIC PRACTICE
FOR PROCESSED MEAT AND POULTRY PRODUCTS
CAC/RCP 13-1976, Rev. 1 (1985)**

Explanatory Preface

- A. The Code has, as far as possible, been made consistent with the lay-out and content of the General Principles of Food Hygiene.
- B. The Hazard Analysis Critical Control Point (HACCP) System has been applied to the Code.

The HACCP System consists of: (1) an assessment of hazards associated with growing, harvesting, processing/manufacturing, marketing, preparation and/or use of a given raw material or food product; (2) determination of critical points required to control any identified hazard(s); and (3) establishment of procedures to monitor critical control points.

The critical control points have been identified in the Code and explanatory notes describing the risk and giving the type and frequency of controls to be applied have been inserted in connection with the relevant paragraphs (marked as CCP-Notes).

- C. In the preparation of this Code recognition has been given to the need to avoid precluding the adoption of new technological developments provided these are consistent with the hygienic production of wholesome meat products.

When introducing new technology, care should be taken to ensure that it does not create hazards to health, e.g. new rapid methods for production of fermented sausages require special controls to prevent staphylococcal toxin formation.

- D. Properly trained inspectors and personnel and an adequate sanitary infrastructure are necessary in order to implement the Code satisfactorily.
- E. It should be noted that many small manufacturers, supplying a limited number of retail outlets only, do not package their meat products before sale. It is not possible for the Code to make special provisions for such premises and the application of the Code to such manufacturers is left to the discretion of the special agency having jurisdiction in each country.
- F. If poultry meat and/or game meat is used in the manufacture of meat products, the provisions of this Code equally apply to such type of meats.

References

- Recommended International Code of Hygienic Practice for Fresh Meat (CAC/RCP 11-1976, Rev. 1 (1993)).
- Recommended International Code for Ante-Mortem and Post-Mortem Inspection of Slaughter Animals and for Ante-Mortem and Post-Mortem Judgement of Slaughter Animals and Meat (CAC/RCP 41-1993).

- Recommended International Code of Hygienic Practice for Game (CAC/RCP 29-1983, Rev. 1 (1993)).
- Recommended International Code of Practice, General Principles of Food Hygiene (CAC/RCP 1-1969, Rev. 2 (1985)).
- Recommended International Code of Hygienic Practice for Low-Acid and Acidified Low-Acid Canned Foods (CAC/RCP 23-1979, Rev. 1 (1989)).
- Recommended International Code of Hygienic Practice for Poultry Processing (CAC/RCP 14-1976).

Section I - SCOPE

This Code of Hygienic Practice, including the Annexes, applies to processed meat and poultry products. It contains the minimum requirements of hygiene in the production, handling, packaging, storing and transportation of processed meat products to assure a healthful and wholesome supply of such products.

Section II - DEFINITIONS

For the purpose of this Code:

- 2.1** *Abattoir* means premises approved and registered by the controlling authority used for the slaughter of animals for human consumption.
- 2.2** *Brand* means any mark or stamp approved by the controlling authority and also includes any tag or label bearing such mark or stamp.
- 2.3** *Cleaning* means the removal of soil, food residues, dirt, grease or other objectionable matter.
- 2.4** *Contamination* means the direct or indirect transmission of objectionable matter.
- 2.5** *Controlling authority* in relation to an establishment means the official authority charged by the government with the control of hygiene including inspection of meat and meat products.
- 2.6** *Detain* means held under the control and security of the controlling authority pending final judgement¹.
- 2.7** *Disinfection* means the reduction, without adversely affecting the food, by means of hygienically satisfactory chemical agents and/or physical methods, of the number of microorganisms to a level that will not lead to harmful contamination of meat and meat products.
- 2.8** *Edible* means fit for human consumption.
- 2.9** *Establishment* means any premises approved and registered by the controlling authority in which meat products are prepared, processed, handled packaged or stored.
- 2.10** *Game meat* means any edible part including offals, derived from a game carcass processed in a game packaging house, and passed by an inspector as fit for human consumption².
- 2.11** *Hermetically sealed containers* mean containers which are designed and intended to protect the

¹ When a product is detained there are in principle several options as to the action to be taken, depending on the findings and the circumstances. Such options include sorting, reprocessing (e.g. by heating), and destruction, and may need to be specified. In deciding on the option the major consideration should be to keep to a minimum the risk that unacceptable food reaches the consumer. However, food must not be needlessly destroyed nor declared unfit for human consumption.

² Wherever in the Code the word "meat" appears it shall be taken to include poultry and/or game meat.

content against the entry of microorganisms during and after heat processing.

2.12 *Ingredient* means any substance including food additives used in the manufacture or preparation of a meat product.

2.13 *Inspector* means a properly trained officer appointed by the controlling authority of a country for the purpose of inspection of meat and meat products and supervision of meat hygiene.

2.14 *Lot* means a definite quantity of a commodity produced under essentially the same conditions.

2.15 *Manager* in relation to an establishment includes any person for the time being responsible for the management of the establishment.

2.16 *Meat* means the edible part of any mammal slaughtered in an abattoir ³.

2.17 *Meat product* means a product intended for human consumption containing meat from mammals and/or poultry and/or game meat.

2.18 *Packaging material* means containers such as cans, bottles, cartons, boxes, cases and sacks, or wrapping and covering material such as foil, film, metal, paper, wax-paper and cloth.

2.19 *Potable water* means water that is pure and wholesome in accordance with WHO requirements contained in the "International Guidelines for Drinking Water Quality".

2.20 *Poultry meat* means the edible part of slaughtered domesticated birds including chickens, turkeys, ducks, geese, guinea-fowls or pigeons ¹.

2.21 *Processed* includes all methods of manufacture and preservation but does not include prepackaged fresh, chilled or frozen meat.

2.22 *Protective clothing* means special garments intended to prevent the contamination of meat and/or meat products and used as outer-wear by persons in an establishment and includes head coverings, footwear and gloves.

2.23 *Unfit for human consumption*, in relation to meat and meat products, means an article that would normally be edible but is inedible because of disease, decomposition or any other reason.

Section III - ESTABLISHMENT: REGISTRATION, DESIGN AND FACILITIES

3.1 Registration

Establishments should be approved and registered by the controlling authority.

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Wherever in the Code the word "meat" appears it shall be taken to include poultry and/or game meat.

3.2 Location

Establishments should be located in areas not subject to regular and frequent flooding and free from objectionable odours, smoke, dust and other contaminants.

3.3 Roadways and Areas Used by Wheeled Traffic

3.3.1 Such roadways and areas serving the establishment which are within its boundaries or in its immediate vicinity should have a hard paved surface suitable for wheeled traffic. There should be adequate drainage and provision should be made to allow for cleaning.

3.3.2 Where appropriate, establishments should be so designed that access can be controlled.

3.4 Buildings and Facilities

3.4.1 Establishments should provide adequate working space for the satisfactory performance of all operations.

3.4.2 The construction should be sound and ensure adequate ventilation, good natural or artificial lighting and easy cleaning. All construction materials should be such that they do not transmit any undesirable substances to the meat or meat products.

3.4.3 The establishment should be laid out and equipped so as to facilitate proper supervision of meat hygiene including performance of inspection and control.

3.4.4 The establishment should be of such construction as to protect against the entrance and harbouring of insects, birds, rodents or other vermin, as well as the entry of environmental contaminants such as smoke, dust, etc.

3.4.5 Buildings and facilities should be designed to provide separation, by partition, location or other effective means, between those operations which may cause cross-contamination.

3.4.6 Establishments should be laid out and equipped so as to ensure, that meat and meat products do not come into contact with floors, walls or other fixed structure, except those which are specifically designed for contact with meat.

3.4.7 The construction and layout of any chilling room, freezing room, freezer store or freezer should satisfy the requirements of this Code.

3.4.8 In rooms where work on meat and meat products is undertaken:

- **Floors** should be of water-proof, non-absorbent, washable and non-slip materials, without crevices, and should be easy to clean and disinfect. Where appropriate, floors should slope sufficiently for liquids to drain to trapped outlets including grates.
- **Walls** should be of water-proof, non-absorbent and washable materials and should be light coloured. Up to a height appropriate for the operation they should be smooth and without crevices, and should be easy to clean and disinfect. Where appropriate, angles between walls

and floors should be sealed and coved, and angles between walls and walls, and ceilings and walls, should be sealed to facilitate cleaning.

- **Ceilings** should be so designed, constructed and finished as to prevent the accumulation of dirt and minimize condensation, mould development and flaking, and should be easy to clean.
- **Windows** and other openings should be so constructed as to avoid accumulation of dirt and those which open should be fitted with insect-proof screens. Screens should be easily movable for cleaning and kept in good repair. Internal window sills, if present, should be sloped to prevent use as shelves.
- **Doors** should have smooth, non-absorbent surfaces and, where appropriate, be self-closing and close fitting.
- **Stairs, lift cages and auxiliary structures** such as platforms, ladders and chutes, should be so situated and constructed as not to cause contamination to meat. They should be capable of being effectively cleaned. Chutes should be constructed with inspection and cleaning hatches.

3.4.9 The use of construction materials which cannot be adequately cleaned and disinfected, such as wood, should be avoided unless its use would clearly not be a source of contamination.

3.4.10 Office accommodation should be provided for the use of the inspection service.

3.5 Sanitary Facilities

3.5.1 Water Supply

3.5.1.1 An ample supply of potable water under adequate pressure should be available with adequate facilities for its storage, where necessary, and distribution, and with adequate protection against contamination.

CCP-Note: Water should comply with the requirements contained in the WHO "International Guidelines for Drinking Water Quality", and in particular those concerned with microorganisms of enteric origin. Samples should be taken regularly, but the frequency should depend upon the origin and the usage of the water, e.g. usually more frequent from private supplies than from public supplies, and more frequent from water used for cooling of canned meats than from water used for cleaning purposes. If chlorination has been employed checks should be made daily by chemical tests for available chlorine. The point of sampling should preferably be at the point of usage, but occasionally it would be useful to sample at the point of entry of the water in the establishment.

3.5.1.2 An adequate supply of hot potable water should be available at all times during working hours.

CCP-Note: This provision is intended to cover water for both cleaning purposes and the destruction of microorganisms (especially those pathogenic to man), on knives, utensils, etc., coming into direct contact with meat and meat products. For cleaning purposes a temperature of 65°C of the water is suitable (for details, see Appendix I of the General Principles of Food Hygiene). For disinfection purposes hot water at e.g. 80°C for no less than two minutes could be used and dispensed in

such a way (e.g. in specially designed boxes near the working area) that blades of knives etc. can be submerged in the water for an adequate contact time (no less than two minutes).

Often this water supply is separate from other hot water supplies used for cleaning, hand-washing etc. But if there is only one hot water supply the term "adequate" should mean that even at times where large amounts of hot water is used (e.g. during cleaning operations) the water supply from any tap in the establishment should not be decreased.

3.5.1.3 **Ice** should be made from potable water and should be manufactured, handled and stored so as to protect it from contamination.

3.5.1.4 **Steam** used in contact directly with meat and meat products should be produced from potable water and contain no substances which may be hazardous to health or may contaminate the food.

3.5.1.5 **Non-Potable Water** used for steam production, cooling of refrigeration equipment, fire control and other similar purposes not connected with meat and meat products should be carried in completely separate lines, identifiable preferably by colour and with no cross-connection with or back siphonage into the system carrying potable water.

3.5.2 **Effluent and Waste Disposal**

Establishments should have an efficient effluent and waste disposal system. All effluent lines (including sewer systems) should be large enough to carry peak loads and should be constructed in such a manner as to avoid contamination of potable water supplies.

3.5.3 **Facilities for Storage of Waste and Inedible Material**

Facilities should be provided for the storage of waste and inedible material prior to removal from the establishment. These facilities should be designed to prevent access to waste or inedible material by pests and to avoid contamination of food, potable water, equipment or buildings on the premises.

3.5.4 **Changing Facilities and Toilets**

Adequate, suitable, and conveniently located changing facilities and toilets should be provided in all establishments. Toilets should be so designed as to ensure hygienic removal of waste matter. These areas should be well lit, ventilated and where appropriate heated and should not open directly on to food handling areas. Hand washing facilities with warm or hot and cold water, a suitable hand-cleaning preparation, and with suitable hygienic means of drying hands, should be provided adjacent to toilets and in such a position that the employee must pass them when returning to the processing area. Where hot and cold water are available mixing taps should be provided. Where paper towels are used, a sufficient number of dispensers with paper towels and receptacles for used towels should be provided adjacent to each washing facility. Taps of a non-hand operable type are preferable. Notices should be posted directing personnel to wash their hands after using the toilet.

3.5.5 **Hand Washing Facilities in Processing Areas**

Adequate and conveniently located facilities for hand washing and drying should be provided

wherever the process demands. Where appropriate, facilities for hand disinfection should also be provided. Hand washing facilities should be equipped as under 3.5.4. The facilities should be furnished with properly trapped waste pipes leading to drains.

3.5.6 **Cleaning and Disinfection Facilities**

3.5.6.1 All rooms used for de-boning, preparing, packaging or other handling of meat and meat products should be equipped with adequate facilities for cleaning and disinfecting implements, conveniently located for the use of personnel during operations. These facilities are for use exclusively in the cleaning and disinfection of knives, steels, cleavers, saws and other implements.

3.5.6.2 All facilities for cleaning and disinfecting implements should be of such nature and size as to permit proper cleaning and disinfection of implements. These facilities should be constructed of corrosion-resistant materials and should be capable of being easily cleaned.

3.5.6.3 All facilities for cleaning and disinfecting of implements should be fitted with suitable means of supplying hot water in sufficient quantity at all times while meat or meat products are being handled in that part of the establishment.

3.5.7 **Lighting**

Adequate natural or artificial lighting should be provided throughout the establishment. Where appropriate, the lighting should not alter colours and the intensity should not be less than:

540 lux (50 foot candles) at all inspection points.

220 lux (20 foot candles) in work rooms.

110 lux (10 foot candles) in other areas.

Light bulbs and fixtures suspended over meat in any stage of production should be of a safety type and protected to prevent contamination of meat and meat products in case of breakage.

3.5.8 **Ventilation**

Adequate ventilation should be provided to prevent excessive heat, steam condensation and dust and to remove contaminated air. The direction of the air flow should never be from a dirty area to a clean area. Ventilation openings should be provided with an insect screen or other protective enclosure of non-corrodible material. Screens should be easily removable for cleaning.

3.6 **Equipment and Utensils**

3.6.1 **Materials**

All equipment and utensils used in meat handling areas and which may contact exposed meat and meat products should be made of material which does not transmit toxic substances, odour or taste, is non-absorbent, is resistant to corrosion and is capable of withstanding repeated cleaning and disinfection. Surfaces should be smooth and free from pits and crevices. The use of wood and other materials which cannot be adequately cleaned and disinfected should be avoided except when their use would clearly not be a source of contamination. The use of different materials in such a way that contact corrosion can occur should be avoided.

3.6.2 Sanitary Design, Construction and Installation

3.6.2.1 **All equipment and utensils** should be so designed and constructed as to prevent hygienic hazards and permit easy and thorough cleaning and disinfection and, where practicable, be visible for inspection. Stationary equipment should be installed in such a manner as to permit easy access and thorough cleaning.

3.6.2.2 **Containers for inedible material and waste** should be leak-proof, constructed of non-corrosive metal or other suitable impervious material which should be easy to clean or disposable and, where appropriate, able to be closed securely.

3.6.2.3 **All refrigerated spaces** should be equipped with temperature measurement or recording devices.

3.6.3 Equipment Identification

Equipment and utensils used for inedible materials or waste should be so identified and should not be used for edible products.

Section IV - ESTABLISHMENT: HYGIENE REQUIREMENTS

4.1 Maintenance

The buildings, rooms, equipment and all other physical facilities of the establishment, including drains, should be maintained in good repair and in orderly condition. Except for rooms where heat processing or cleaning operations are performed they should be free from steam, vapour and surplus water.

4.2 Cleaning and Disinfection

4.2.1 Cleaning and disinfection should meet the requirement of this Code. For further information on cleaning and disinfection procedures, see Appendix I of the General Principles of Food Hygiene. Working rooms should be kept clean.

4.2.2 Amenities provided for the use of employees and the inspection service including changing facilities, toilets and the inspection office space should be kept clean at all times.

4.2.3 If rooms intended and most of the time used for the handling, preparation, processing, packaging or storage of meat and meat products are used for any other food preparation purposes, then cleaning and disinfection are necessary immediately before and after such use.

***CCP-Note:** Handling other foods in a room intended for handling of meat or meat products may adversely affect the microbiology of meat and meat products, and the handling of meat and meat products in a room that subsequently is used for a different food may adversely affect that food. Therefore it is advisable to separate these operations by cleaning and disinfection. The inspector in charge should satisfy himself that the cleaning and disinfection procedures are carried out every time there is such a change of use.*

4.2.4 The temperature in rooms for boning-out and trimming should be controlled and held suitably low, unless cleaning practices of equipment and utensils are carried out at least every four hours.

CCP-Note: Experience has shown that when unwrapped meat is handled on cleaned and disinfected surfaces, as will be the case at start of operation, the meat will contaminate the surfaces. If the temperature of the room is relatively high (above 10°C), microorganisms on the surface of the equipment will start to multiply and after some period of time (1-4 hours) the number of microorganisms on the surface will be contaminating the meat. To interrupt that cycle the surfaces should be cleaned at intervals of 4-5 hours, unless room temperature is held below 10°C. Disinfection could be employed as well, provided residues of disinfectant are removed promptly. Inspection should ensure that the cleaning, the possible application of disinfectant, and the removal of such disinfectant is performed at the appropriate intervals. The temperature in temperature controlled rooms should be checked regularly.

4.2.5 To prevent contamination of meat and meat products, all equipment, implements, tables, utensils including knives, cleavers, knives pouches, saws, mechanical instruments and containers should be cleaned at frequent intervals during the day and immediately cleaned and disinfected whenever they come into contact with diseased material, infective material or otherwise become contaminated. They shall also be cleaned and disinfected at the conclusion of each working day.

CCP-Note: Equipment, utensils, etc. in constant contact with meat will be contaminated with microorganisms and proliferation of microorganisms on these will soon take place. This may adversely affect meat or meat products handled subsequently. Therefore cleaning is necessary at frequent intervals during the day, at least after every break. A particular situation exists if e.g. a knife comes into contact with diseased material. Here a risk of infecting subsequent pieces of meat with pathogenic organisms is evident, and cleaning and disinfection should immediately be carried out. The purpose of cleaning and disinfection at the conclusion of each working day is i.a. to hinder the building-up of an undesirable, possibly pathogenic flora in the establishment. Monitoring should be done by regular inspection, preferably aided by microbiological testing.

4.2.6 If any skip or trolley or any container used in a department where edible material is handled enters an area where inedible material is handled it should be cleaned and disinfected immediately before re-entering the edible department.

CCP-Note: Such practice should be restricted, but if it happens the inspector should check that cleaning and disinfection is carried out.

4.2.7 Immediately after the cessation of work for the day or at such other times as may be required, the floors and walls should be cleaned to remove contamination. Floor drains should be kept in good condition and repair with strainers in place.

4.2.8 Roadways and yards in the immediate vicinity of and serving the establishment should be kept clean.

4.2.9 Adequate precautions should be taken to prevent meat and meat products from being contaminated during cleaning or disinfecting of rooms, equipment or utensils by water and detergents or by disinfectants and their solutions. Detergents and disinfectants should be suitable for the purpose intended and should be acceptable to the official agency having jurisdiction. Any residues of these agents on a surface which may come in contact with food should be removed by rinsing with potable water before the area or equipment is again used for handling meat and meat products.

4.3 Hygiene Control Programme

It is desirable that each establishment in its own interest designates a single individual, whose duties are divorced from production, to be held responsible for the cleanliness of the establishment. His staff should be a permanent part of the organization or employed by the organization and should be well trained in the use of special cleaning tools, methods of dismantling equipment for cleaning and in the significance of contamination and the hazards involved. A permanent cleaning and disinfection schedule should be drawn up to ensure that all parts of the establishments are cleaned appropriately and that critical areas, equipment and material are designated for cleaning and/or disinfection daily or more frequently if required.

4.4 Storage and Disposal of Waste

Waste material should be handled in such a manner as to exclude contamination of food or potable water. Precautions should be taken to prevent access to waste by pests. Waste should be removed from the meat and meat products handling and other working areas at intervals and at least daily. Immediately after disposal of the waste, receptacles used for storage and any equipment which has come into contact with the waste should be cleaned and disinfected. At least daily the waste storage area should also be cleaned and disinfected.

4.5 Exclusion of Domestic Animals

Animals that are uncontrolled or that could be a hazard to health should be excluded from establishments.

4.6 Pest Control

4.6.1 There should be an effective and continuous programme for the control of insects, birds, rodents or other vermin. Establishments and surrounding areas should be regularly examined for evidence of infestation.

4.6.2 Should pests gain entrance to the establishment or surrounding areas, eradication measures should be instituted. Control measures involving treatment with chemical, physical or biological agents should only be undertaken by or under direct supervision of personnel who have a thorough understanding of the potential hazards to health resulting from the use of these agents, including those which may arise from residues retained in the product. Such measures should only be carried out in accordance with the recommendations of the official agency having jurisdiction and with the full knowledge of the inspector.

4.6.3 Pesticides should only be employed if other precautionary methods cannot be used effectively. Only pesticides approved for use in an establishment by the competent authority should be used and the greatest care should be exercised to prevent any contamination of the meat or meat products, equipment or utensils. Before pesticides are applied all meat and meat products should be removed from the room and all equipment and utensils should be thoroughly washed prior to being used again.

4.7 Handling and Storage of Hazardous Substances

Pesticides or other substances which may represent a hazard to health should be labelled with a warning about their toxicity and use. Except as required for purposes of hygiene such substances which may contaminate meat and meat products, packaging materials and ingredients should be handled and stored in a part of the establishment which is not used for the preparation, processing, handling, packaging or storage of meat and meat products. They should be handled and dispensed only by authorized and properly trained

personnel or by persons under strict supervision of trained personnel. Extreme care should be taken to avoid contamination of meat and meat products. However, materials employed in the construction and maintenance of an establishment may be used at any time with the approval of an inspector.

CCP-Note: Many substances used for the purposes of pest control, disinfection, painting, etc. may contain substances harmful to man, and if they contaminate meat products they may present a public health hazard. The inspector should learn the potential danger of such substances to man, the storage of them and their use. He should discourage the use of such substances during operation, and satisfy himself that they - when used - do not leave any residues on meat and meat products or on surfaces or utensils that meat and meat products may contact.

4.8 Personal Effects and Clothing

Personal effects and clothing should not be deposited in food handling areas.

4.9 Maintenance Tools

Cleaning and maintenance tools and products should not be stored in a food handling area.

Section V - PERSONNEL HYGIENE AND HEALTH REQUIREMENTS

5.1 Hygiene Training

Managers of establishments should arrange for adequate and continuing training of every handler of meat and meat products in hygienic handling of meat and meat products and in personal hygiene so that they understand the necessary precautions to prevent contamination. Instructions should include relevant parts of this Code. For this purpose material elaborated by the controlling authority or the establishment in cooperation with the inspector should be used.

5.2 Medical Examination

5.2.1 Persons who come into contact with meat and meat products in the course of their work should have a medical examination prior to their employment if the official agency having jurisdiction, acting on medical advice, considers that this is necessary, whether because of epidemiological considerations, the nature of the meat product prepared in a particular establishment or the medical history of the prospective meat or meat product handler. Medical examination of a meat or a meat product handler should be carried out at other times when clinically or epidemiologically indicated.

5.2.2 The manager of any establishment should, if required to do so by an inspector, produce for perusal by the inspector any medical certificate produced to the manager by an employee of the establishment.

5.3 Communicable Diseases

The management should take care to insure that no person, while known or suspected to be suffering from, or to be a carrier of a disease likely to be transmitted through meat and meat products or while afflicted with infected wounds, skin infections, sores or with diarrhoea, is permitted to work in any area in any capacity in which there is any likelihood of such a person directly or indirectly contaminating meat or meat products with pathogenic microorganisms. Any person so affected should immediately report to the

management that he is ill.

CCP-Note: Persons with infected wounds or skin infections may contaminate meat and meat products - even such in cans immediately after retorting - with staphylococci. Persons with diarrhoea and even symptomless carriers of microorganisms causing gastroenteritis may contaminate meat and meat products with salmonellae or other gastrointestinal pathogens. Such persons should not be allowed to handle meat and meat products even in closed containers, until the responsible medical authority has declared that they do not create a hazard to health.

5.4 Injuries

Any person who has a cut or a wound should discontinue working with meat and meat products and until he is suitably bandaged should not engage in the preparation, handling, packaging or transportation of meat and meat products. No person working in any establishment should wear exposed bandage unless the bandage is completely protected by a waterproof covering which is conspicuous in colour and is of such a nature that it cannot become accidentally detached. Adequate first-aid facilities should be provided for this purpose.

CCP-Note: If unprotected, wounds become easily infected with pathogenic microorganisms like staphylococci. These may then subsequently contaminate meat and meat products. To prevent infection and contamination wounds should immediately be dressed with e.g. detectable bandage. Workers should be encouraged to report such accidents to the management.

5.5 Washing of Hands

Every person engaged in a meat and meat products handling area should wash his hands frequently and thoroughly with a suitable hand cleaning preparation under running warm potable water while on duty. Hands should always be washed before commencing work, immediately after using the toilet, after handling contaminated material, and whenever else necessary. After handling diseased or suspect materials hands should be washed and disinfected immediately. Notices requiring hand-washing should be displayed.

CCP-Note: It should be the responsibility of management to arrange for easy access to hand-washing facilities - outside toilets, near the working area, etc. Also management should motivate and instruct the employees in proper hand-washing. There should be adequate supervision to ensure compliance with this requirement.

5.6 Personal Cleanliness

5.6.1 Every person engaged in an area in an establishment where meat and meat products are handled should maintain a high degree of personal cleanliness while on duty, and should at all times while so engaged wear suitable protective clothing including head covering and footwear, all of which should be washable unless designed to be disposed of and which should be maintained in a clean condition consistent with the nature of the work in which the person is engaged.

CCP-Note: In the establishment clothing may easily become contaminated with meat scraps, fat and blood. Besides being unaesthetic such contamination may give rise to microbial proliferation, which may affect adversely meat and meat products. At the end of a shift all protective clothing should be thoroughly washed and dried.

5.6.2 Aprons and similar items should not be washed on the floor.

5.6.3 Such items should not be left on equipment in the working area.

CCP-Note: Such items should preferably be deposited in locked safes, protected against vermin. Under no circumstances should they be left on implements in the working area.

5.7 Personal Behaviour

Any behaviour which can potentially contaminate the meat and meat products, such as eating, use of tobacco, chewing, spitting, should be prohibited in any part of an establishment used for the preparation, handling, packaging, storing or transportation of meat and meat products.

5.8 Gloves

Gloves if used in the handling of meat and meat products should be maintained in a sound and clean condition. The wearing of gloves does not exempt the operator from having thoroughly washed hands. Gloves should be made of an impermeable material except where their usage would be inappropriate or incompatible with the work involved.

CCP-Note: Disposable gloves are to be preferred - to be changed as often as the work involved requires or at least after every break. Special care should be given to metal gloves. Such gloves should be cleaned and disinfected at least once a day and also whenever they become contaminated. Metal gloves with worn or missing links should be promptly repaired or replaced.

5.9 Visitors

Every person who visits an area in an establishment where meat and meat products are handled should wear clean protective clothing. Visitors should observe the provisions recommended in paragraphs 4.8, 5.3, 5.4 and 5.7 should wear clean protective clothing. Visitors should observe the provisions recommended in paragraphs 4.8, 5.3, 5.4 and 5.7.

5.10 Supervision

Responsibility for ensuring compliance by all personnel with all requirements of paragraphs 5.1 - 5.9 inclusive should be specifically allocated to competent supervisory personnel.

Section VI - ESTABLISHMENT: HYGIENIC PROCESSING REQUIREMENTS

6.1 Raw Material Requirements

6.1.1 All meat used in the manufacture of meat products should have been produced in compliance with the provisions of the Code of Hygienic Practice for Fresh Meat and should have been subjected to the inspection processes prescribed therein and in the Code for Ante-Mortem and Post-Mortem Inspection of Slaughter Animals and for Ante-Mortem and Post-Mortem Judgement of Slaughter Animals and Meat. It should have been passed by an inspector as fit for human consumption.

6.1.2 Poultry meat should have been produced in compliance with the Code of Hygienic Practice for Poultry Processing and should have been passed by an inspector as fit for human consumption.

6.1.3 Game meat should have been produced in compliance with the Code of Hygienic Practice for Game, and should have been passed by an inspector as fit for human consumption.

6.1.4 All other raw materials and ingredients - whether of animal, vegetable or other origin - should be fit for human consumption, and - if applicable - should have been produced in compliance with the provisions of a relevant Code of Hygienic Practice.

CCP-Note: The provisions in 6.1.1 - 6.1.3 should ensure that a competent authority has inspected the origin and production of the meat, poultry meat or game meat to be used for the production of meat products. If he has found that the raw material is fit for human consumption, he will mark it accordingly and may issue a certificate that should follow the consignment of the meat, poultry meat or game meat. The inspector or the manager in the establishment producing meat products should convince himself of the acceptability of the raw material by inspecting the marking, the accompanying certificate, if any, and the raw material itself. For other raw material, as referred to under 6.1.4 no previous inspection or certification may have taken place. In this case the inspector or the manager may accept the ingredient, if it is acceptable for human consumption or if it is found hygienically acceptable after testing as recommended under 6.1.5.

6.1.5 No meat, poultry meat, game meat or other ingredient which has undergone deterioration or any other process of decomposition or which has been contaminated with foreign matter, making it unfit for human consumption should be used for the processing and manufacture of meat products. Where necessary, laboratory tests should be made of the ingredients prior to their being moved into the production area of the establishment.

CCP-Note: Although passed for human consumption by an inspector, the meat may have undergone such changes, e.g. during transportation, that in the establishment producing meat products it is found no longer fit for human consumption. Such meat may be used for other purposes than human consumption or be destroyed. In cases where only superficial contamination has taken place, trimming of the contaminated part may suffice. The decision whether or not the meat is still fit for human consumption may be guided by microbiological, chemical or physical analysis relative to the changes observed or suspected.

6.1.6 Raw materials and ingredients stored on the premises of the establishment should be maintained under conditions that will prevent spoilage, protect against contamination and minimize damage. Stocks of raw materials and ingredients should be properly rotated.

6.2 Prevention of Cross-Contamination

6.2.1 Effective measures should be taken to prevent contamination of meat or meat products by direct or indirect contact with material at an earlier stage of the process. Every department in which meat products are prepared, processed or stored should be used at that time only for that purpose or for the preparation and storage of other edible products subject to the same conditions of hygiene. If the departments are used for processing of non-meat products, the arrangements should be such that it can be ensured that there is no resultant contamination of the meat product.

6.2.2 Any persons handling raw materials or semi-processed meat products capable of contaminating the end product should not come into contact with any finished products unless and until they have cleaned and disinfected all utensils used by them and have changed all protective clothing worn by them during the handling of raw materials and semi-processed products which have come into contact with or have been soiled by the raw materials or semi-processed products. Hands and arms should always be washed thoroughly and disinfected after handling raw materials and semi-processed products prior to handling finished products.

CCP-Note: In most cases finished products have been subjected to a process that will reduce its microbial count, but e.g. after heat processing there could be a possibility for microorganisms contaminating the meat products. In this case microorganisms contaminating the meat product after heat processing will lack the competition from the meat's "natural" flora and may proliferate quickly. Such contamination may be derived from utensils and from hands, arms or clothing of personnel that have been working with raw materials or semi-processed meat products. For that reason it is important that they take any precautions for preventing the contamination of the finished, especially un-packaged product. In certain cases, e.g. after handling of a finished product as sausages with mould growth, workers should preferably not handle raw materials or semi-processed meats.

6.2.3 Equipment such as trays, vats, tables, etc. should not be used interchangeably for raw products and processed products unless it is completely cleaned and disinfected before moving to the area designated for processed meat products. Exposed ready-to-eat or cooked products should not be stored in the same room with raw meat.

CCP-Note: The same situation as described in the note to 6.2.2 applies here.

6.2.4 The operation of de-boning and trimming should always be carried out as rapidly as possible and meat should not be allowed to accumulate in rooms used for de-boning and trimming.

CCP-Note: De-boning and trimming involve exposure of meat surfaces to contamination - from other meat and from equipment and utensils. Such contamination could be kept to a minimum by prompt removal of de-boned or trimmed meat - either to a cold store or to further processing.

6.2.5 Any cooking or smoking of meat products should be done in separate areas equipped for this purpose.

6.3 Use of Water

6.3.1 Without prejudice to 6.3.2 and 6.3.3 only potable water should be used in meat processing.

6.3.2 Non-potable water may be used with the acceptance of the official agency having jurisdiction for steam production, refrigeration, fire control and other similar purposes not connected with food. However, non-potable water may, with specific acceptance by the official agency having jurisdiction be used in certain food handling areas provided this does not constitute a hazard to health.

6.3.3 Water re-circulated for re-use within an establishment should be treated and maintained in a condition so that no health hazard can result from its use. The treatment process should be kept under

constant surveillance. Alternatively re-circulated water which has received no further treatment may be used in conditions where its use would not constitute a health hazard and will not contaminate either the raw material or the end-product. Non-potable re-circulated water should have a separate distribution system which can be readily identified. The acceptance of the official agency having jurisdiction should be required for any treatment process and for the use of re-circulated water in any food process.

6.4 Processing

6.4.1 Processing should be supervised by technically competent personnel.

6.4.2 All steps in the production process, including packaging, should be performed without unnecessary delay and under conditions which will prevent the possibility of contamination, deterioration, or the development of pathogenic and spoilage microorganisms.

CCP-Note: Ideally a production process should be so designed that all steps are performed immediately after each other - in a continuous flow. If, however, for some reason delays are necessary, semi-manufactured products should during the delay be chilled to and held at temperatures below 10°C. Processing of meat often means a change of the state of the meat product so that it will be more susceptible to microbial attack. Exceptions are e.g. controlled drying and curing, processes that will reduce the potential for microbial growth. Otherwise time and temperature, under certain circumstances water activity, oxidation-reduction potential or the microbiology of the meat product should be regularly monitored.

6.4.3 Methods of preservation and necessary controls should be such as to protect against contamination or development of a public health hazard and against deterioration within the limits of good commercial practice.

6.5 Packaging

6.5.1 No containers, equipment or utensils should be stored in any part of an establishment in which exposed meat or meat products are prepared, processed, handled, packaged or stored.

6.5.2 All packaging material should be stored in a clean and hygienic manner. The material should be appropriate for the meat product to be packaged and for the expected conditions of storage and should not transmit to the product objectionable substances beyond the limits acceptable to the official agency having jurisdiction. The packaging material should be sound and should provide appropriate protection from contamination.

6.5.3 Meat product containers should not have been used for any purpose which may lead to contamination of the product. If necessary according to their origin containers should be inspected immediately before use to ensure that they are in a satisfactory condition and are cleaned or cleaned and disinfected; when washed they should be well drained before filling. Only packaging material required for immediate use should be kept in the packaging or filling area.

CCP-Note: Packaging material such as paperboard for cartons should not be assembled in rooms where exposed meat or meat products are prepared, processed, handled, packaged or stored, unless it is part of a hygienically performed automated operation.

6.5.4 Rough treatment of the containers should be avoided to prevent the possibility of contamination of the finished meat product.

6.5.5 Meat products should be packaged in a manner which will protect them from contamination and deterioration under normal condition of handling, transportation and storage.

6.5.6 **Lot Identification**

Packaged meat products should bear a permanent marking in code or in clear to identify the producing factory and the lot.

6.5.7 **Processing and Production Records**

Permanent legible and dated records of pertinent processing and production details should be kept concerning each lot. These records should be retained for a period that exceeds the shelf life of the product, but unless a specific need exists they need not be kept for more than two years. Records should also be kept of the initial distribution by lot.

6.6 **Storage**

6.6.1 Meat and meat products should be stored under such conditions as will preclude the contamination with and/or proliferation of microorganisms and protect against deterioration of the product or damage to the container. During storage, periodic inspection of the meat and meat products should take place to ensure that only meat products which are fit for human consumption are dispatched and that end product specifications should be complied with when they exist. The product should be dispatched in the sequence of the lot numbers.

6.6.2 The following provisions should apply where meat or meat products are placed in chilling rooms:

6.6.2.1 Entry should be restricted to personnel necessary to carry out operations efficiently.

6.6.2.2 Doors should not be left open for extended periods and should be closed immediately after use.

6.6.2.3 Meat or meat products as well as containers holding meat or meat products should not be stacked directly on the floor.

***CCP-Note:** Warm products should be chilled before packaging into large containers to prevent deterioration of the central part of the product. Rapid cooling down of all parts or all packages of meat products and maintaining non-shelf-stable meat products at chill temperature are essential. They should be placed on pallets or on dunnage in such a way that there is adequate air circulation.*

6.6.2.4 No chilling room should be loaded beyond its designed capacity.

6.6.2.5 Where refrigeration equipment is not manned, automatic temperature recorders should be installed. If no automatic device is installed, temperatures should be read at regular intervals and the readings recorded in a log book.

CCP-Note: Maintenance of the desired temperature in chilling rooms is extremely important. Accidentally the cooling equipment may fail with consequent temperature rise in the room and in the products. To detect such temperature failures, records - automatic or manual - should be taken and the results reported to the manager who will, if necessary, inform the inspector for him to decide what action to be taken.

6.7 Transport of the End Product

6.7.1 Means of transport of containers should comply with the following conditions:

6.7.1.1 All internal finishes should be made of corrosion-resistant material, be smooth, impervious and easy to clean and disinfect. Joints and doors should be sealed so as to prevent the entry of pests and other sources of contamination.

6.7.1.2 The design and equipment should be such that the required temperature can be maintained throughout the whole period of transport. Where transportation is under refrigeration it is desirable to install temperature recorders. If no automatic device is installed, temperature should be read at regular intervals and the reading recorded in a log book.

6.7.1.3 Vehicles intended for the transport of meat products should be equipped in such a manner that the meat products do not come into contact with the floor.

6.7.2 Meat products should not be carried in any means of transport which is used for conveying live animals.

6.7.3 Meat products should not be carried in the same means of transport as other goods in a way which may adversely affect the meat products.

6.7.4 Meat products should not be placed in any means of transport which are not clean. If necessary it should be cleaned and disinfected before loading.

6.7.5 Every effort should be made to prevent changes in temperature of frozen meat products at any time during storage and transport but where accidental thawing takes place, the meat products should be examined and evaluated by the inspector before any further step is taken.

6.8 Sampling and Laboratory Control Procedure

6.8.1 In addition to the routine control carried out by the inspection services, it is desirable that each establishment should have access to laboratory control of the meat products processed. The amount and type of such control will vary with the type of meat product as well as the needs of management. Such control should reject all meat products that are unfit for human consumption.

6.8.2 Laboratory facilities should be available for the purpose of monitoring hygiene. This could be the establishment's own laboratory or an official laboratory or any other appropriate laboratory.

6.8.3 The inspector should have access to all information relevant to his duties and responsibilities.

6.8.4 Samples of the production should be taken to assess the safety and hygiene of the meat product.

6.8.5 Laboratory procedures used should preferably follow recognized or standard methods in order that the results may be readily interpreted.

6.8.6 Laboratories checking for pathogenic microorganisms should be well separated from meat production area.

Section VII - END PRODUCT CRITERIA

7.1 Criteria such as microbiological, chemical or physical may be required depending on the nature of the meat product. However, application of the hazard analysis critical control point concept should be more effective than intensive end product testing in ensuring that the requirements of this Code are followed and its purpose achieved. If end product testing is carried out, criteria should include sampling procedures, analytical methodology, specifications and limits for acceptance.

7.2 To the extent possible in good manufacturing practice the products shall be free of objectionable matters.

7.3 When tested by appropriate methods of sampling and examination, the products:

- (a) shall be free of pathogenic microorganisms in numbers representing a hazard to health;
- (b) shall not contain any substances originating from microorganisms in amounts which may represent a hazard to health; and
- (c) shall not contain any other poisonous or deleterious substances in amounts which may represent a hazard to health.

7.4 The products should comply with the requirements for pesticide residues and food additives laid down by the Codex Alimentarius Commission.

Annex A

PRESERVATION OF MEAT PRODUCTS IN HERMETICALLY SEALED RIGID CONTAINERS

For details concerning preservation of shelf-stable meat products in hermetically sealed metal containers, see: Recommended International Code of Hygienic Practice for Low-Acid and Acidified Low-Acid Canned Foods (CAC/RCP 23-1979).

In preserving meat products in hermetically sealed rigid containers the critical control points are:

- a) **Heat processing.** The products should be processed so that they present no public health hazard and withstand spoilage during subsequent storage, transport and sale. The temperature and duration of processing of specific formulations should be based on the recommendations of technical specialists competent in canning technology.
- b) **Supervision of processing.** Processing should be supervised by technically competent personnel and be subject to check by the inspector.
- c) **Seam control.** Control of can seams should be made regularly during production, and this, with processing records adequate to identify the processing and history of each batch of product, should be kept by the management and made available to the inspector.
- d) **Water control.** Only potable water should be used for washing of empty containers or for the cooking and cooling of any hermetically sealed container. Where re-circulated water is used for cooling heat processed containers it should be filtered and if necessary treated by the addition of chlorine. Such water, depending upon the potential degree of non-potability, should contain from two to five parts per million of residual chlorine at the discharge end of the cooler. Any other acceptable disinfectant may be used in effective concentration in place of chlorine.
- e) **Treatment of containers.** Rough treatment of containers both before and after processing should be avoided to prevent the possibility of contamination of the processed products. If it is essential to handle wet cans, personnel should do so exercising hygienic precautions. Belts, runways, and other can conveying equipment should be maintained in a clean condition and good repair.
- f) **Storage of meat products.** Canned meat products not subjected to a heat treatment that will make them shelf-stable at ambient temperature should always be stored, transported and sold under chilled conditions.

Annex B

PRESERVATION OF NON-SHELF-STABLE MEAT PRODUCTS HEAT TREATED PRIOR TO PACKAGING

- a) In establishments in which meat products are heat treated prior to packaging a chill-room should be available for holding raw unprocessed meat on its reception and for storing boned, cut or otherwise raw unprocessed meat which is not transferred directly to the sections in which it is cooked or otherwise processed.

Adequate means for rapidly chilling and storing any cooked meat product to an internal temperature of not more than 7°C at the point of slowest refrigeration should be available.

- b) After preparation the product should be kept chilled until final cooking. The temperature and duration of the cooking process for these heat treated meat products should be such that the heat treatment alone or in combination with other preserving processes is sufficient to eliminate the health risk from vegetative forms of pathogenic organisms. Processes should be supervised by technically competent personnel and checked as necessary by the official agency having jurisdiction. Processing records adequate to identify the processing and history of each batch of products should be kept by the management and made available to the official agency having jurisdiction.

CCP-Note: Experience has shown that the main risk to public health from such meat products is due to food-poisoning organisms such as salmonellae, staphylococci and Clostridium perfringens. To reduce this risk a heat treatment should ensure the inactivation of vegetative organisms. This would require proper time-temperature conditions, which should be monitored.

- c) At all stages following cooking, manual handling of exposed meat products should be kept to an absolute minimum and, if at all possible, should be replaced by mechanical methods.

CCP-Note: After heat processing the meat product is especially sensitive to microbial contamination from hands and from surfaces with which they come into contact. Particularly important will be contamination from hands with e.g. staphylococci. Use of disposable gloves by personnel handling such meat products should be encouraged.

- d) Cooked meat products should be rapidly chilled in a hygienic manner to an internal temperature of not more than 7°C. If water is used for cooling any cooked meat product it should be of potable quality and may be re-circulated if treated and returned to potable quality.

CCP-Note: Rapid cooling is essential to inhibit growth of any organisms that have survived cooking, e.g. Clostridium perfringens, or that have contaminated the meat product after cooking. The potability of the water should be checked in accordance with CCP-Note to para. 3.5.1.1. Cooling temperatures should be frequently, if not continuously, monitored.

- e) Packaging of meat products preserved by heat treatment should be carried out without undue delay in a separate room.

CCP-Note: *Particular care must be taken to prevent cross-contamination from raw, unprocessed meat. Where packaging follows slicing and cutting these operations should preferably take place in the same room under satisfactory conditions of hygiene. Packaged finished products should be inspected to ensure the detection and rejection of visibly defective packages.*

- f) Meat products heat treated prior to packaging should be stored in chilled accommodation and protected from contamination.

CCP-Note: *Only chill storage and protection from contamination of meat products packaged after heat treatment will ensure the expected shelf-life and protect against public health hazards. Temperatures in cooling rooms should be frequently, if not continuously monitored.*

- g) Adequate laboratory facilities should be available for the purpose of making regular microbiological examinations.

CCP-Note: *Such microbiological monitoring would only include the meat products itself, but also meat contact surfaces to ensure that cleaning and disinfecting procedures are satisfactory.*

Annex C

**PROCEDURES FOR INVESTIGATIONAL MICROBIOLOGICAL EXAMINATION
OF MEAT PRODUCTS IN HERMETICALLY SEALED CONTAINERS****EXPLANATORY MEMORANDUM**

1. To control the safety and stability of large consignments of meat products in hermetically sealed containers by microbiological tests would require examination of more containers than laboratory facilities and personnel are likely to be able to handle, and would lead to considerable wastage of product. Detection of botulism through microbiological testing is unlikely.
2. Better knowledge of safety and stability can be gained from data on production control and heat treatment provided by the processing establishment, and of the water supply. Reliance may also be placed on knowledge of the product of an establishment gained from experience of previous shipments from that source. If such data are adequate and satisfactory, testing may be dispensed with. The controlling authority might nevertheless decide to carry out periodic examinations of shipments presented at the port of entry in cases where factory data are satisfactory.
3. The integrity of hermetically sealed containers is critical to the safety of the product. Where shipments are examined, a careful examination should therefore be made for container integrity.
4. Where shipments are examined care should be taken not to damage the containers, as this could place safety of the consignment at risk. Damage to the containers in a sample could lead to unjustified detention of a consignment.
5. As indicated in 1., the probability of finding a microbiological hazard leading to a public health risk (e.g. botulism) by sampling is remote. For shelf-stable heat-processed meat products this document merely indicates the probabilities of obtaining defective samples in lots with different proportions of these being defective. The sampling procedures are investigational, i.e. when there is a reason to suspect improper processing or risk of post-processing contamination. Examinations could be performed on cans taken directly from the lot on arrival in a port of entry or after an adequate incubation period. For non-shelf-stable heat-processed meat products a sampling plan involving microbiological examinations and guidelines is proposed. The main reason for suspicion for these products is temperature abuse after processing, during transportation and storage, and so a sampling plan involving a smaller number of samples will suffice. However, this plan should also be used when there is a reason to suspect improper processing.

Section I - SCOPE

1. These procedures are guidelines to be used in international trade for microbiological investigational purposes for lots of meat products in hermetically sealed containers, which have been heat-treated after packaging.
2. For shelf-stable products the number of samples to be taken and the method of examination are assessed by the inspecting agency. The document contains probabilities of obtaining defective samples in a lot. Detection of botulism through microbiological testing is unlikely.

3. For non-shelf-stable heat-processed meat products a sampling plan involving microbiological examinations and guidelines is proposed.
4. All these procedures are intended to be used in cases, where the controlling authority has reason to suspect that the lot is unsatisfactory, and not for routine purposes.

Section II - REFERENCES

1. Recommended International Code of Hygienic Practice for Low-Acid and Acidified Low-Acid Canned Foods (CAC/RCP 23-1979).
2. Annex A to this Code.

Section III - PROCEDURE

A. Shelf-stable meat products, heat-treated after packaging

1. The inspecting agency will assess the number of samples to be taken according to the expected hazard and the feasibility of inspecting the number of samples required. The following table is meant to guide the inspecting agency in its choice of sampling plans, but is in no way restrictive, as numbers of samples outside the range given, or between the numbers may be useful for different purposes, where investigational sampling is employed.

The probability of obtaining one or more defectives in a sample of (n) subsamples
(sample units) with proportion (p) of the lot defective

Number of sample units (e.g. cans) examined per sample	Proportion of the lot that is defective			
	0.01	0.001	0.0001	0.00001
	Probability of detecting one or more defectives			
200	0.87	0.18	0.02	0
1000	1.00	0.63	0.10	0.01
2000	1.00	0.86	0.18	0.02
3000	1.00	0.95	0.26	0.03
4000	1.00	0.98	0.33	0.04
5000	1.00	0.99	0.39	0.05

B. Non-shelf-stable meat products, heat-treated after packaging

1. For non-shelf-stable meat products five containers are inspected visually and the contents subjected to microbiological examination. Depending on the results obtained and any other relevant information on the lot it may be passed, detained⁴ or set aside for further investigation.

See definition of *detain* in the main Code.

2. Technique:

- (a) Sample 5 containers from the warmer places in the lot and examine for visual defects.
- (b) Identify the 5 sample containers mentioned under (a) in a proper manner and send them to a laboratory for microbiological examination. The transportation should take place under refrigeration, 10°C or less.
- (c) In the laboratory draw test portions from the 5 sample containers with aseptic precautions, so as to obtain one test portion from the centre of each container and one test portion from the periphery of each container.
- (d) Examine the 2 x 5 test portions for aerobic plate count. Use ISO Standard (IS 2293) - Aerobic Count at 30°C (Reference Method).
- (e) Detain if any of the 10 test portions has an aerobic plate count exceeding 10,000 per gramme. Also detain if test portions from the centre or the periphery of 3 or more of the containers show an aerobic plate count higher than 1000 per gramme.
- (f) In case of detention an investigation for specific organisms might be indicated.

Annex D**PRESERVATION OF SHELF-STABLE CURED MEAT PRODUCTS IN CONSUMER SIZE
HERMETICALLY SEALED CONTAINERS**

In preserving shelf-stable cured meat products in hermetically sealed containers the following factors are critical: salt and moisture content, ingoing nitrite content, microbial contamination of meat and non-meat ingredients, pH, the thermoprocess and the integrity of the container. Shelf stability is assured by partial thermodestruction of the bacterial spore contaminants and/or subsequent inhibition of the surviving spores. The safety of the product depends on correct combinations of the above critical factors.

By convention, the effective heat treatment of a product is expressed as F_0 . A value of $F_0 = 1$ is equivalent to 1 minute at 121.1°C at the coldest (centre) point of the container. Also, a heat treatment for 10 minutes at 111.1°C or for 100 minutes at 101.1°C is equal to $F_0 = 1$.

It is essential to read this text in conjunction with the Recommended International Code of Hygienic Practice for Low-Acid and Acidified Low-Acid Canned Foods, and with Annex A of this Code.

Critical factors dealt with in this annex are as follows:

- a) The microbial contamination of the raw meat ingredients should be verified periodically. Mean levels in excess of 100 mesophilic bacillary spores/g should be sufficient cause for a thorough examination of the production chain for potential sources of contamination or for application of a more severe heat treatment.
- b) The aerobic mesophilic spore count for spices should not exceed 1×10^4 /g.
- c) The contribution of non-meat ingredients other than spices to the contamination of the final raw product should be collectively within 50 mesophilic spores/g.
- d) Provided the requirements in paragraphs a) to c) are complied with, the following combinations of brine concentrations ($\%NaCl \times 100/(\%NaCl + \%H_2O)$) and thermoprocesses, in conjunction with 150 mg/kg added nitrite (expressed as sodium nitrite) and an unadjusted pH-range of 6.0-6.7, may serve as broad guidelines in the manufacture of safe shelf-stable luncheon meats and chopped meats, ham (and shoulder), and frankfurter type sausages in hermetically sealed containers:

Luncheon meats and chopped meats:

3.0-4.0 % brine/1.0-1.5 F_0
4.0-4.5 % brine/1.0 F_0
4.5-5.0 % brine/0.5-1.0 F_0
5.0-5.5 % brine/0.5 F_0

Ham and shoulder:

3.3 % brine/0.3-0.5 F_0

3.7 % brine/0.2-0.3F₀

4.0 % brine/0.1-0.2F₀

Sausages:

2.5 % brine/1.5F₀

Cured pasteurized side bacon: In conjunction with 100 mg/kg added nitrite (expressed as sodium nitrite), shelf-stable cured pasteurized bacon should have a minimum brine concentration of 7% and should be heated to at least 70°C in the centre.

- e) If less stringent combinations of safety factors are to be applied, these should be based on extensive plant experience, thorough microbiological studies, and on standards of hygiene to ensure minimum levels of bacterial spores.
- f) It may be desirable to use levels below 150 mg/kg added nitrite (expressed as sodium nitrite), but this may necessitate an increase in the brine concentration and/or the heat process.
- g) The brine concentration and the ingoing amount of nitrite must be carefully controlled to assure that every lot of the product contains not less than the level specified for each.