

CODEX ALIMENTARIUS COMMISSION E



Food and Agriculture
Organization of
the United Nations



World Health
Organization

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Agenda Item 7

CX/FH 11/43/7

JOINT FAO/WHO FOOD STANDARDS PROGRAMME

CODEX COMMITTEE ON FOOD HYGIENE

Forty-third Session

Miami, United States of America, 5 - 9 December 2011

PROPOSED DRAFT ANNEX ON MELONS TO THE CODE OF HYGIENIC PRACTICE FOR FRESH FRUITS AND VEGETABLES (CAC/RCP 53-2003) (At Step 3)

Prepared by the Physical Working Group led by Canada.

Governments and interested international organizations are invited to submit comments on the attached Proposed Draft Annex at Step 3 (see Appendix II) and should do so in writing in conformity with the Uniform Procedure for the Elaboration of Codex Standards and Related Texts (see *Procedural Manual of the Codex Alimentarius Commission*) to: Ms Barbara McNiff, US Department of Agriculture, Food Safety and Inspection Service, US Codex Office, 1400 Independence Avenue, SW, Washington, D.C. 20250, USA, FAX +1-202-720 3157, or email Barbara.McNiff@fsis.usda.gov with a copy to: The Secretariat, Codex Alimentarius Commission, Joint WHO/FAO Food Standards Programme, FAO, Viale delle Terme di Caracalla, 00153 Rome, Italy, by email codex@fao.org or fax: +39-06-5705-4593 by **30 September 2011**.

Format for submitting comments: In order to facilitate the compilation of comments and prepare a more useful comments document, Members and Observers, which are not yet doing so, are requested to provide their comments in the format outlined in the Annex to this document.

BACKGROUND

The 42nd Session of the Committee on Food Hygiene agreed to start new work on an annex on melons and agreed to establish a physical working group led by Canada to develop the annex (REP 11/FH, para. 139 – 143).

The physical working group met in Ottawa, Canada from 7 – 9 June 2011. The working group was chaired by Dr J Farber (Canada) and Dr J Saltsman (USA). The full list of confirmed participants is in Appendix I of this report.

Objectives

The objective of the working group was to prepare a draft annex on melons for the Code of Hygienic Practice for Fresh Fruits and Vegetables (CAC/RCP 53-2003) for consideration by the Committee on Food Hygiene (CCFH) at its 43rd session (December 2011 in Florida, USA).

Document for consideration by the physical working group and key issues

The working group considered an initial proposed draft annex prepared with input from Canada, USA, EU, Brazil, Argentina and FAO.

The working group agreed that the annex would focus only on guidance specific to melons and to follow the format of the main Code of Hygienic Practice for Fresh Fruits and Vegetables (CAC/RCP 53-2003).

There was general agreement on the proposed draft annex as presented in Appendix II, but extensive discussion was held on some key issues, namely:

- (i) The type of water to be used (clean as opposed to potable water) and at which stage of the process (for example: the type of water to be used in dump tanks and in hydrocoolers);
- (ii) The presence of children and non-essential people in fields. The working group agreed to maintain the wording as used in the Fresh Leafy Vegetables Annex to the Code of Hygienic Practice for Fresh Fruits and Vegetables. The working group agreed that the emphasis needs to be on excluding children from fields – epidemiology indicates a higher prevalence of foodborne illness in children, who may carry pathogens and may present an increased risk of food contamination; and
- (iii) The use of hand wipes in combination with hand sanitizers in cases where clean running water is not available. The working group agreed that hand sanitizers should not replace hand washing procedures, but could be used after proper hand washing/cleaning has occurred. Specific circumstances of each operation need to be considered prior to using or implementing the alternative proposed. There was not universal agreement amongst the meeting participants regarding the addition of a statement about hand wipes. It was agreed that more discussion was needed so the reference to hand wipes was placed in brackets in the draft annex.

Recommendations

- The 43rd session of the CCFH is invited to consider the proposed draft annex on melons (Annex to the Code of Hygienic Practice for Fresh Fruits and Vegetables) which is in Appendix II of this report. Particular attention and consideration should be given to the sections identified in square brackets.

It is further recommended that:

- the entire Code and all its annexes are reviewed by CCFH to ensure consistency and remove duplication once the work on the annex on melons has been finalized; and
- in the review, consideration should be given to including a section on guidance for vulnerable groups.

APPENDIX I

**Confirmed Attendees of the Physical Working Group on the Development of an Annex on Melons for
the Code of Hygienic Practice for Fresh Fruits and Vegetables
June 7th-9th 2011, Ottawa, Ontario, Canada**

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APPENDIX II

PROPOSED DRAFT ANNEX TO CODE OF HYGIENIC PRACTICE FOR FRESH FRUITS AND VEGETABLES

ANNEX IV: ANNEX FOR MELONS

INTRODUCTION

Melons, such as cantaloupe, watermelon, and honeydew, are often consumed alone, mixed with other foods in salads and other dishes and as garnishes. They are popular in meals and as snacks and in some countries melons are a regular part of the diet. The popularity of melons has remained high as they are readily available in many countries all year round. In recent years there has been a focus on marketing not only whole melons, but pre-cut products, convenience products in packages, or in salad bars to appeal to consumers. Adding to consumer appeal for melons is the availability of new varieties that are seedless and the introduction of sweeter hybrid varieties.

Like other fresh fruits and vegetables that are eaten raw, the safety of melon products depends on maintaining good hygienic practices along the food chain during primary production, packing, processing, retail, and at the point of consumption. International outbreak data and reported illnesses raise concerns regarding the safety of melon products. There have been a number of outbreaks associated with melon consumption with a large number being caused by *Salmonella* spp¹. The major risk factors that have been identified as contributing to melon outbreaks include: poor temperature control (including extended holding at ambient temperature and poor cold storage), infected food handlers and poor personal hygiene. As fresh and pre-cut melon products move through the food chain, there is also the potential for the introduction, growth and survival of foodborne pathogens. Moreover, morphological characteristics of certain types of melons, for instance netted rind, will be prone to attachments by microbial pathogens. Fresh melons are consumed without further processing treatment that would eliminate or inactivate pathogens, if present.

SECTION 1- OBJECTIVES

Hygienic recommendations for the primary production of fresh fruits are covered in general under the *Code of Hygienic Practice for Fresh Fruits and Vegetables* (CAC/RCP 53-2003). The primary purpose of this Annex is to provide specific guidance on how to minimize microbiological hazards during primary production through packing and transport of fresh melons, including fresh melons processed for the pre-cut market and consumer use.

SECTION 2 - SCOPE, USE AND DEFINITION

2.1 Scope

This Annex covers specific guidance related to the production, harvesting, packing, processing (e.g., trimmed, sliced and/or diced), storage, distribution, marketing, and consumer use of fresh melons that are intended to be consumed without further microbiocidal steps.

2.2 Use

This Annex follows the format of the *Codex Recommended International Code of Practice - General Principles of Food Hygiene* (CAC/RCP 1-1969) (Referred to in this document as *General Principles of Food Hygiene*) and should be used in conjunction with it and other applicable codes such as the *Code of Hygienic Practice for Fresh Fruits and Vegetables* (CAC/RCP 53-2003) and Annex I, the *Annex for Ready-to-Eat Fresh Pre-cut Fruits and Vegetables*, and the *Recommended International Code of Practice for Packaging and Transport of Fresh Fruits and Vegetables* (CAC/RCP 44-1995).

2.3 Definitions

Refer to definitions in the *General Principles of Food Hygiene* and the *Code of Hygienic Practice for Fresh Fruits and Vegetables*. In addition, the following expressions have the meaning stated:

Cull means to remove any product that shows signs of physical damage (such as skin breaks or decay).

Ground spot means the point of direct contact where melons sit directly on the soil or on top of thin plastic mulch.

¹ Report of the FAO to the Codex Committee on Food Hygiene Working Group on the development of an Annex on melons for the Code of Hygienic Practice for Fresh Fruits and Vegetables (CAC/RCP 53-2003)

Melons in this document refers to whole and or pre-cut cantaloupe (also known as muskmelons and rockmelons), honeydew, watermelon and varieties of melons.

SECTION 3 - PRIMARY PRODUCTION

Fresh melons are grown in production sites indoors (e.g., greenhouses) and outdoors, harvested, and either field-packed or transported to a packing establishment.

3.1. Environmental hygiene

Potential sources of environmental contamination should be identified prior to production activities. This is important because contamination that occurs during production may not be removed during subsequent steps. In addition, melons grown in warm, humid conditions may favour growth and survival of foodborne pathogens. Growers should take steps to minimize the potential for contamination from any sources identified.

Particular attention should be given to potential sources of faecal contamination in the melon production area and to vectors which may introduce faecal contamination to the production and handling areas. These vectors include, but are not limited to, humans, domestic and wild animals, or indirectly from contaminated water, insects, or fomites such as dust, tools and equipment.

3.1.1 Location of the production site

Consideration of production site location should include an evaluation of the slope and the potential for runoff from nearby fields, the flood risk as well as hydrological features of nearby sites in relation to the production site.

The proximity of high risk production sites, such as animal production facilities, hazardous waste sites and waste treatment facilities, should be evaluated for the potential to contaminate melon production fields with microbial or other environmental hazards via, for example, run-off, faecal material, aerosols or organic waste.

When the environmental assessment identifies a potential food safety risk, measures should be implemented to minimize contamination of melons at the production site. Consideration should be given to changing the landscape surrounding melon production fields, such as the construction of a shallow ditch to prevent runoff from entering the fields, to reduce the potential for pathogen contamination of melons in the production site. The effects of some environmental events, such as heavy rains, cannot be controlled. For example, heavy rains may increase melons' exposure to pathogens if soil contaminated with pathogens splashes onto melon surfaces. Consideration should be given to harvesting earlier if the weather forecast for heavy rain or delaying harvest and performing extra washing when heavy rains have recently occurred.

3.1.2 Wild and domestic animals and human activity

Many animal species (e.g., insects, birds, amphibians, chickens, feral pigs, and domestic or wild dogs) including humans that may be present in the production environment are known to be potential carriers of foodborne pathogens. Animals are a common source of contamination of surface water that may be used for irrigation. The following should be considered:

- Domestic and wild animals should be excluded from production and handling areas, to the extent possible, using appropriate biological, cultural, physical and chemical pest control methods. Methods selected should comply with local, regional, and national environmental and animal protection regulations.
- Melon production and handling areas should be properly maintained to reduce the likelihood of vector attraction. Activities to consider include efforts to minimize standing water in fields, restrict access by animals to water sources, and keep production sites and handling areas free of waste and clutter.
- Melon production sites and handling areas should be evaluated for evidence of the presence of wildlife or domestic animal activity (e.g., presence of animal faeces, large areas of animal tracks, or burrowing). Where such evidence exists, growers should evaluate the risks and whether the affected sections of the melon production sites should be harvested.

3.2 Hygienic primary production of melons

Special consideration should be given to production practices specific to melon production because of the unique characteristics of the melons and the rind of some melons and because melons frequently contact soil directly during growth and development. Melons may have smooth or netted rind surfaces. Netted rind surfaces, in contrast to smooth rind surfaces, provide an environment where microbial pathogens may more easily adhere to, survive on, and become more difficult to eliminate during post-harvest practices. It is recommended that growers use production practices that prevent or minimize contact of melons, particularly those with netted rinds, with soil, soil amendments (including natural fertilizers) or irrigation water.

Some growers place melons on cups (i.e., small plastic pads) or plastic-covered beds to minimize direct melon-to-soil contact and thereby reduce ground spot development. Melons also may be hand-turned multiple times by agricultural workers during the growing season to prevent sunburn or ground spot development. Melon rind ground spots have been demonstrated to have significantly greater microbial populations than non-ground spot areas and, therefore, may be more susceptible to microbial contamination. If cups are used underneath melons, the following are recommended:

- Use plastic mulch under cups to minimize cup and melon contact with the soil,
- Ensure cups are clean and sanitary before setting them under the melons,
- Ensure that employees follow good hygienic practices (especially hand washing and the use of clean gloves, prior to handling melons) when turning melons on the cups or during harvesting operations.

3.2.1.1 Water for primary production

Growers should identify the sources of water used on the farm (municipality, re-used, irrigation water, reclaimed wastewater, discharge water from aquaculture, well open canal, reservoir, rivers, lakes, farm ponds, etc.). It is recommended that growers assess and manage the risk posed by these waters as follows:

- Assess the potential for microbial contamination (e.g., from livestock, human habitation, sewage treatment, manure and composting operations) and the water's suitability for its intended use. Reassess the potential for microbial contamination if events, environmental conditions (e.g., temperature fluctuations, heavy rainfall, etc.) or other conditions indicate that water quality may have changed.
- Identify and implement corrective actions to prevent or minimize contamination. Possible corrective actions may include fencing to prevent large animal contact, proper maintenance of wells, filtering water, not stirring the sediment when drawing water, building settling or holding ponds, and water treatment facilities. Settling or holding ponds that are used for subsequent irrigation may be microbiologically safe, but may attract animals or in other ways increase the microbial risks associated with water for irrigating melons. If water treatment is needed, consult with water safety experts.
- Determine if microbial and chemical testing should be done to evaluate the suitability of water for each intended use. Analytical testing may be necessary after a change in irrigation water source, flooding or a heavy rainfall when water is at a higher risk of contamination. If testing, determine and document
 - What tests need to be performed, (e.g., which pathogens and/or sanitary indicators)
 - Which parameters should be noted (e.g., temperature of water sample, water source location, and/or weather description),
 - How often tests should be conducted,
 - What the test outcomes indicate, and
 - How tests will be used to define corrective actions.
- Frequency of testing should depend on the source of the irrigation water (less for adequately maintained deep wells, more for surface waters) and the risks of environmental contamination, including intermittent or temporary contamination (e.g., heavy rain, flooding, etc.).

- If water testing is limited to non-pathogenic indicators, frequent water tests may be useful to establish the baseline water quality so that subsequent changes in the levels of contamination can be identified.
- If the water source is found to have unacceptable levels of indicator organisms or is contaminated with foodborne pathogens, corrective actions should be taken to ensure that the water is suitable for its intended use. Testing frequency should be increased until consecutive results are within the acceptable range.

3.2.1.1.1 Water for irrigation

Netted melon rind surfaces, in contrast to smooth rind surfaces, may foster greater attachment and survival of foodborne pathogens. For this reason, the quality of irrigation water and type of irrigation method used is an important consideration. Growers should consider the following:

- Avoid overhead irrigation methods, particularly with netted rind melons, because wetting the outer rind of melons increases the risk of pathogen contamination.
- Subsurface or drip irrigation presents the least risk of contaminating melon surfaces. For drip irrigation, care should be taken to avoid creating pools of water on the soil surface or in furrows that may come into contact with melon rinds.

3.2.1.1.2 Water for fertilizers, pest control and other agricultural chemicals

Clean water, should be used in the application of aqueous fertilizers, pesticides and other agricultural chemicals that are directly applied to the surface of melons, especially close to harvest. Foodborne pathogens can survive and grow in many agrichemical solutions, including pesticides.

3.2.1.1.4 Water for harvesting and other agricultural uses

Clean water should be used for other agricultural purposes, such as dust abatement, hydration, use as a lubricant, and to maintain roads, yards, and parking lots in areas where melons are grown. This would include water used to minimize dust on dirt roads within or near melon production sites.

3.2.1.2 Manure, biosolids and other natural fertilizers

Manure, biosolids and other natural fertilizers may contain human or animal waste, animal parts or products, or be composed primarily of plant materials. Because of this, foodborne pathogens may be present and may persist for weeks or even months, particularly if treatment of these materials is inadequate.

Growers should consider the following when using any of these materials:

- Use proper treatment by physical, chemical or biological methods to reduce the risk of potential human pathogen survival.
- Composting, if done properly, can be a practical and efficient method to inactivate foodborne pathogens in manure.
- When using aerobic composting methods, regularly and thoroughly turn compost heaps to ensure that all of the material will be exposed to elevated temperatures because pathogens can survive for months on the heap surface.
- When using anaerobic methods, special consideration should be given to determine the length of time needed to inactivate pathogens that may be present. In general, only fully decomposed animal waste or plant material should be applied to melon fields.
- Use of untreated and/or partially treated manure, biosolids, and other natural fertilizers should not be used after plant emergence or after a transplant is put into the soil, unless it can be demonstrated that product contamination will not occur.

3.2.3 Personnel health, hygiene and sanitary facilities

The following should be considered:

- Each business operating primary production operations should have written Standard Operating Procedures (SOPs) that relate to health, hygiene and sanitary facilities. The SOPs should address

worker training, facilities and supplies to enable agricultural workers to practice proper hygiene, and company policies relating to expectations for worker hygiene as well as illness reporting.

- All agricultural workers should properly wash their hands using soap and clean, running water before handling melons, particularly during harvesting and post-harvest handling. Agricultural workers should be trained in proper techniques for hand washing and drying.
- If gloves are used, a procedure for glove use in the field should be documented and followed. If the gloves are reusable, they should be made of materials that are easily cleaned and disinfected, and they should be cleaned regularly and stored in a clean area. If disposable gloves are used, they should be discarded when they become torn, soiled, or otherwise contaminated.
- Non-essential persons and casual visitors, particularly children, should not be allowed in the harvest area as they may present an increased risk of contamination.

3.2.3.1 Personnel hygiene and sanitary facilities

Growers should consider the following:

- Provide areas away from the field and packing lines for agricultural workers to take breaks and eat. For worker convenience, these areas should provide access to toilet and hand-washing facilities so agricultural workers can practice proper hygiene.
- All agricultural workers should be trained in proper use of hygiene facilities. Training should include toilet use, proper disposal of toilet paper or equivalent, and proper hand washing and drying procedures.

As far as possible, sanitary facilities should be located close to the field and readily accessible to the work area.

- Sanitary facilities should be located in a manner to encourage their use and reduce the likelihood that agricultural workers will relieve themselves in the field. Facilities should be present in sufficient number to accommodate personnel (e.g., 1 per 10 people) and be appropriate for both genders if the workforce contains males and females.
- Portable facilities should not be located or cleaned in cultivation areas or near irrigation water sources or conveyance systems. Growers should identify the areas where it is safe to put portable facilities and to prevent traffic in case of a spill.
- Facilities should include clean running water, soap, toilet paper or equivalent, and single use paper towels or equivalent. Multiple use cloth drying towels should not be used. . Hand sanitizers should not replace hand washing and should be used only after hands have been washed.
- [In situations when clean, running water is unavailable, the use of hand wipes along with hand sanitizer could be considered].

3.2.3.2 Health status

The following should be considered:

- Growers should be encouraged to observe symptoms of diarrhoeal or food-transmissible, communicable diseases, keep records of it and reassign agricultural workers as appropriate.
- Agricultural workers should be encouraged to notice and report symptoms of diarrhoeal or food-transmissible, communicable diseases.
- Medical examination of agricultural workers should be carried out if clinically or epidemiologically indicated.

3.2.3.3 Personal cleanliness

When personnel are permitted to continue working with cuts and wounds covered by water proof dressings, they should wear gloves to cover the bandages thereby providing a secondary barrier between them and the melons they handle.

3.2.4 Equipment associated with growing and harvesting

Standard operating practices should be developed for the maintenance, cleaning and disinfecting operations of growing and harvesting equipment. In addition:

- Agricultural workers should be trained to follow the SOPs.
- Cutting equipment used to harvest melons should be thoroughly cleaned and disinfected before use and cutting edges should be kept smooth and sharp.

3.3 Handling, storage and transport

Melons such as cantaloupe are harvested based on the melon's stage of maturity as judged by the formation of an abscission zone between the vine and the melon. After the vine is separated from the melon, a stem scar is left on the fruit. Melon stem scars may provide a potential route for entry of foodborne pathogens, if present, to the edible portion of the melons. It is recommended that post-harvest handling practices be implemented to minimize stem scar and rind infiltration, such as during washing operations, of foodborne pathogens into the edible portions of melon flesh. Written SOPs should be developed and implemented to ensure appropriate handling, storage and transport of melons.

3.3.1 Prevention of cross-contamination

Specific control methods should be implemented to minimize the risk of cross-contamination from microorganisms associated with manual harvesting methods. The following should be considered:

- The field should be evaluated for the presence of hazards or contamination prior to harvest to determine if the field should be harvested.
- Particularly with manual harvesting, good personal hygiene should be implemented to prevent surface contamination of melons.
- Proper cleaning and disinfection of equipment should be done since knives, if improperly used, can wound melon rinds and provide a point of entry for contaminants that may be in soil and water.
- Avoid setting melons directly on soil after removal from the vine and before loading into transport vehicle to avoid contaminating the melon with contaminants in the soil.
- Harvest containers that come into contact with melons should not be used for purposes other than holding product (e.g., should not hold personal items, waste, etc.).

Melons are susceptible to damage during harvest and post-harvest handling operations. The following should be considered:

- When padding is used with post-harvest handling equipment to prevent damage to melons, it should be constructed of material that can be cleaned and disinfected. Ensure that padding is cleaned and disinfected before and during use.
- Minimize mechanical damage such as rind punctures, cracks, and bruising, as these wounds may provide entry points for pathogens and sites for microbial survival and multiplication.
- Train agricultural workers to recognize and not harvest melons that have mechanical damage.
- Dispose of culled melons in a way that melon culls will not attract animal and insect pests. This will reduce the potential for contaminating melons still on the vine.

3.3.2 Storage and Transport from the production site to the packing/processing facility

Refer to the *Code of Hygienic Practice for the Transport of Food in Bulk and Semi-Packed Food* (CAC/RCP 47-2001)

- Transportation of fresh melons should be managed to reduce or control the risk of contamination. Each transporter should have its own SOP for shipping containers/trailers to confirm that they are clean, sanitary and in good structural condition.
- Fresh melons should not be transported in vehicles used previously to carry animals, animal manure or biosolids unless they are adequately cleaned and disinfected. Receptacles and vehicles and/or

containers, when being used to transport melons, are not to be used for transporting anything which may result in contamination of melons.

- Where conveyances and/or containers are used for transporting anything in addition to foodstuffs or for transporting different foodstuffs at the same time, there should, where necessary, be effective separation of products.
- When not in use, cleaned harvest containers and transport trailers should be covered and kept in a location and in a manner to prevent possible contamination (e.g., such as from pests, birds, rodents, dust, water, etc.).
- Damaged containers or transport trailers should be repaired or replaced.

3.4 Cleaning, maintenance and sanitation

3.4.1 Cleaning programs

The following should be considered:

- Harvesting equipment, including knives, pruners, machetes, that come into direct contact with melons should be cleaned and disinfected at least daily or as the situation warrants.
- Clean water should be used to clean all equipment directly contacting melons, including farm machinery, harvesting and transportation equipment, containers and knives.

3.4.2 Cleaning procedures and methods

Cleaning and disinfection programs should not be carried out in a location where the rinse water might contaminate melons.

Where appropriate or necessary, cleaning and disinfecting procedures should be tested to ensure their effectiveness.

SECTION 4 –ESTABLISHMENT: DESIGN AND FACILITIES

Refer to the *Guidelines on the Application of General Principles of Food Hygiene to the Control of Listeria monocytogenes in Ready-to-eat Foods* – CAC/GL 61-2007.

The provisions below apply to packing and processing establishments of melons.

4.2 Premises and rooms

4.2.1 Design and layout

It is important to consider the sanitary design and layout for packing/processing equipment and the establishment because of the seasonal nature of the melon harvest. Packing/processing establishment operations may be used only a few months of the year and thus be dormant for many months, leaving them susceptible to pest infestations. When dormant, packing/processing establishment should be appropriately protected from pest infestations. Their design should allow thorough cleaning before the start of the season.

4.4 Facilities

4.4.2 Drainage and waste disposal

Adequate drainage is critical to packing, cooling and processing facilities to avoid the risk of contaminating melons. To ensure adequate drainage of standing water, consider the following:

- Drainage in the facility should be designed with sloped floors to effectively drain standing water.
- Floors should be kept as dry as possible using appropriate methods.
- Food handlers should have proper training to remove standing water or push standing water to the drains.
- Drains should be cleaned periodically to prevent build-up of biofilms that may contain organisms of concern (e.g., *Listeria monocytogenes*).
- Areas for garbage recyclables and compostable waste should be identified and all waste should be stored and disposed of in a manner to minimize contamination.

- Waste should be disposed of on a frequent basis to avoid attracting pests (e.g., flies, rodents).

SECTION 5 - CONTROL OF OPERATION

5.1 Control of food hazards

Establishments should pay special attention to product flow and segregation from incoming soiled to outgoing washed product to avoid cross-contamination.

5.2 Key aspects of hygiene control systems

5.2.2 Specific process steps

5.2.2.1 Post-harvest water use

Water is often used in dump tanks to transport melons from field containers into the packing or processing establishment. If the temperature of the water in the dump tank is cold and the internal temperature of the melons is hot from field heat, a temperature differential is created that may aid in the infiltration of microbial pathogens into the rind and/or the edible portion of the fruit. The following should be considered when using post-harvest water:

- Areas for garbage recyclables and compostable waste should be identified and all waste should be stored and disposed of in a manner to minimize contamination.
- Clean water should be used in dump tanks. Antimicrobials may reduce, but will not eliminate microbial pathogens if present, as they are primarily used to disinfect the water.
- It is recommended that the time melons remain in dump tank water be minimized.
- Minimize or avoid fully submerging melons in colder dump tank water. When submerged, water is more likely to infiltrate into the melons.
- Where appropriate, the pH, soil (including organic) load, turbidity, water hardness, product throughput capacity should be controlled and monitored to ensure the efficacy of the antimicrobial treatment.
- Water temperatures should be higher than the internal temperatures of melons, so as to minimize the risk of water infiltration.
- If melons receive a wash treatment, the wash water should be potable.

5.2.2.2 Chemical treatments

Fungicides may be applied to melons by use of an aqueous spray or immersion to extend the post-harvest life of the fruit. The following are recommended:

- Areas for garbage recyclables and compostable waste should be identified and all waste should be stored and disposed of in a manner to minimize contamination.
- Clean water should be used in water-based chemical treatments to ensure that the water used is of sufficient microbial quality for the intended use and does not contaminate the melons with foodborne pathogens.
- If hot water treatments are used as an alternative to post-harvest chemical fungicide treatments, it is recommended that the water temperature and time be evaluated and monitored to ensure that the water temperature and time is maintained and that antimicrobial agents are present in the water at sufficient levels for the temperature used.

5.2.2.3 Cooling melons

- Forced air cooling operations can avoid the risk of melon infiltration with cooling water, but also may spread product contamination if forced-air cooling equipment is not cleaned and disinfected regularly.
- Water that is used in hydro-coolers should be potable. Water that is used only once and not recirculated is preferable.

- If water is used for cooling and is recirculated, it should be evaluated and monitored to ensure that disinfectant levels are sufficient to reduce the potential risk of cross-contaminating melons.
- Cooling and cold storing melons as soon as possible after harvest is recommended to prevent multiplication of foodborne pathogens, if present, on or from the rind surface of melons.
- Cooling equipment should be cleaned and disinfected on a regular basis according to written procedures to ensure that the potential for cross-contamination is minimized.

5.2.2.5 Cutting, slicing and peeling melons

- Melons should be washed with potable water before cutting or peeling.
- Before cutting or other processing, a further reduction in microbial contamination may be achieved by scrubbing in the presence of a sanitizer or application of an alternate surface decontamination process such as hot water, steam or other treatments.
- Cutting or peeling knife blades should be cleaned and disinfected on a regular basis according to written procedures to reduce the potential for cross-contaminating melons during the cutting or peeling process.
- Knife blade disinfecting solutions should be monitored to ensure that the disinfectant is present at sufficient levels to achieve its intended purpose and does not promote the potential for cross-contamination.
- It is recommended that pre-cut melons should be refrigerated as soon as possible and distributed under refrigeration temperatures (i.e., 4°C or less).

5.2.3 Microbiological and other specifications

Microbiological testing can be a useful tool to evaluate and verify the effectiveness of safety and sanitation practices, provide information about an environment, a process, and even a specific product lot, when sampling plans and methodology are properly designed and performed. The intended use of information obtained (e.g., evaluating the effectiveness of a sanitation practice, evaluating the risk posed by a particular hazard, etc.) can aid in determining what micro-organisms are most appropriate to test for. Test methods should be selected that are validated for the intended use. Consideration should be given to ensure proper design of a microbiological testing program. Trend analysis of testing data should be undertaken to evaluate the effectiveness of food safety control systems.

5.2.4 Microbiological cross-contamination

- Where dry dump stations are used for unloading field containers (e.g., bins, gondolas, trailers, or wagons), melon contact surfaces (including padding materials to protect melons from physical damage) should be constructed of material that can be cleaned and disinfected.
- Where wet dump stations are used for unloading field containers, the containers should not be directly immersed into dump tanks to reduce the potential for product cross-contamination with field or road debris.

5.3 Incoming material requirements

- Avoid using whole melons that have visible signs of decay or damaged rinds (e.g., mechanical damage or cracking) due to the increased risk of the presence of foodborne pathogens in melons with decay or damage.
- Damaged or decayed melons should be discarded in a manner that does not serve to attract pests.

5.5 Water

5.5.3 Ice

For cooling or keeping melons cold during transport and distribution, putting ice on the top of melons should be avoided since this practice is not hygienic. Ice melts at refrigeration temperatures such that water will drip from one melon to another, potentially cross-contaminating the melons. It is recommended that an alternative

means of cooling be used with melons to avoid the risk of cross-contamination, both within and among the pallets of melons.

5.7 Documentation and records

Where practicable, a comprehensive written food safety control plan that includes a written description of each of the hazards identified in assessing environmental hygiene, as well as the steps that will be implemented to address each hazard, should be prepared by the business managing the melon primary production operation. The description should include, but is not limited to, the following: an evaluation of the production site, water and distribution system, manure use and composting procedures, personnel illness reporting policy, sanitation procedures and training programs.

The following are examples of the types of records that should be retained:

- Microbiological testing results and trend analyses
- Water monitoring and test results
- Employee training records
- Pest control records
- Cleaning and sanitation reports
- Equipment monitoring and maintenance records
- Inspection/audit records

5.8 Recall procedures

In the event of a foodborne illness outbreak associated with melons, maintaining appropriate records of production, processing and distribution may help to identify the source of contamination in the melon food chain and facilitate product recalls. Growers/packers/processors/distributors should consider developing and maintaining a traceability/product tracing system. The traceability/product tracing system should be designed and implemented according to the principles for *Traceability/Products Tracing as a Tool within a Food Inspection and Certification System* (CAC/GL 60-2006), especially to enable the withdrawal of the products, where necessary.

Detailed records should be kept that link each supplier of the product with the immediate subsequent recipient of the melons throughout the food chain. The information needed to link each supplier should include, if available, the packer name, address, and phone, date packed, date released, type of melon (e.g., cantaloupe, watermelon, etc.) including brand name, lot identification and number of lots, and transporter.

SECTION 6 – ESTABLISHMENT: MAINTENANCE AND SANITATION

6.3 Pest control systems

Melons have a very high sugar content and are extremely attractive to flies and other insects that may cross-contaminate melons. It is recommended that an aggressive melon cull disposal and waste removal program be implemented to reduce the potential for insect-to-melon contamination.

SECTION 8 – TRANSPORTATION

Refer to the *Recommended International Code of Practice for the Packaging and Transport of Fresh Fruits and Vegetables* (CAC/RCP 44-1995)

SECTION 9 – PRODUCT INFORMATION AND CONSUMER AWARENESS

9.4 Consumer education

The following should be considered:

All stakeholders – government, industry, consumer organizations and the media – should work together to communicate clear consistent messages on handling melons safely to avoid giving contradictory advice and causing confusion.

Consumer information on handling melons safely should cover:

- Avoiding the selection of melons with damaged rinds or rotten areas.

- Transporting to home. Increase in product temperature during transportation can be considerable. Time in transit for pre-cut melons between retail/market and the home should be kept as short as possible.
- Storage/ refrigeration of whole and pre-cut melons. Whole melons should preferably be stored in a cool environment. All prepackaged and pre-cut melons should be refrigerated as soon as possible,
- Once removed from the refrigerator, pre-cut fruit should be consumed as soon as possible.
- Washing and/or scrubbing whole melons, particularly the netted varieties, (i.e., cantaloupes) using potable running water. Pre-cut products should not be rewashed.
- Correct hand washing methods².
- Cross-contamination. Consumers need to handle, prepare, and store melons safely to avoid cross-contamination with pathogens from various sources (e.g., hands, sinks, cutting boards, utensils, raw meats).

SECTION 10 – TRAINING

10.2 Training programs

Personnel involved in primary production, packing, processing or transport operations of melons should receive training appropriate to their tasks and should be periodically assessed while performing their duties to ensure tasks are being completed correctly. Training should be delivered in a language and manner to facilitate understanding of what is expected of them and why, and should emphasize the importance of using hygienic practices. A well-designed training program considers the barriers to learning of the trainees and develops training methods and materials to overcome those barriers.

The following training considerations should be addressed:

- Longstanding entrenched trainee behaviours, attitudes or personal beliefs.
- Transient nature of workforce with no prior training in food safety and hygiene
- Concerns about children/infants who may accompany parents working in the production site with the potential for transfer of pathogens with a human reservoir
- Diverse cultural, social and traditional practices
- Literacy and education level
- Language and dialect of trainees
- Need to make food safety practices realistic and easy to implement (identify enabling factors, motivators and incentives)
- Raising awareness among trainees of the symptoms and signs of disease and encourage them to act upon it (taking personal responsibility for health)

Training programs should be repeated periodically, and updated whenever there is a change in the product, process or staff and monitored for effectiveness and modified when necessary.

Increased emphasis on training in cold chain logistics and management is recommended, in line with advancing knowledge and technologies for both refrigeration and temperature monitoring and expanding international trade.

² WHO Guidelines on Hand Hygiene in Health Care.

GENERAL GUIDANCE FOR THE PROVISION OF COMMENTS

In order to facilitate the compilation and prepare a more useful comments' document, Members and Observers, which are not yet doing so, are requested to provide their comments under the following headings:

- (i) General Comments
- (ii) Specific Comments

Specific comments should include a reference to the relevant section and/or paragraph of the document that the comments refer to.

When changes are proposed to specific paragraphs, Members and Observers are requested to provide their proposal for amendments accompanied by the related rationale. New texts should be presented in **underlined/bold font** and deletion in ~~strikethrough font~~.

In order to facilitate the work of the Secretariats to compile comments, Members and Observers are requested to refrain from using colour font/shading as documents are printed in black and white and from using track change mode, which might be lost when comments are copied / pasted into a consolidated document.

In order to reduce the translation work and save paper, Members and Observers are requested not to reproduce the complete document but only those parts of the texts for which any change and/or amendments is proposed.