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CODEX COMMITTEE ON FOOD HYGIENE

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PROPOSED DRAFT ANNEX ON BERRIES TO THE *CODE OF HYGIENIC PRACTICE FOR FRESH FRUITS AND VEGETABLES (CAC/RCP 53-2003)*

(At Step 3)

Prepared by the Electronic Working Group led by Brazil

Governments and interested international organizations are invited to submit comments on the attached Proposed Draft Annex (*see* Appendix I) 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, 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 by **30 September 2012**.

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

1. At the 43rd Session of the Codex Committee on Food Hygiene (Miami, United States of America, 5 – 9 December 2011), the Committee agreed to begin new work on an Annex on berries and agreed to establish an electronic working (EWG), led by Brazil, to develop the Annex (REP 12/FH para 139-142 and Appendix VIII).
2. The objective of the working group was to prepare a Draft Annex on Berries 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 44th Session.
3. The working group considered an initial proposed draft, a second version was prepared with inputs from Brazil, Canada, France, Japan, United Kingdom, United States of America and OIV, and the current version of the document is the result of further comments from Argentina, Australia, Brazil, Canada, France, Iran, Japan, Paraguay, United Kingdom, United States of America and Uruguay.
4. An extensive discussion was held on the definition of berries and what types of processing to be covered.
5. The WG acknowledged and had adopted the definition of berries as established on the *Codex Classification of Foods and Animal Feeds (CAC/MISC 4)* for the current version of the Draft.
6. Section 2.1 – Scope, of the current version of the Draft, further depicted the list of berries that the Annex will address, taking into consideration the need to restrict the broad list of berries at Group 4 of CAC/MISC 4.

7. The examples listed at Section 2.1 - Scope, relates to berries that may pose a health risk concern and/or are cited on the FAO/WHO expert meeting on “Microbiological Hazards in Fresh Fruits and Vegetables” (19-21 October 2007).
8. Some comments received highlighted that the annex should not pose unnecessarily stringent controls to berries for further processing with a treatment that would eliminate or inactivate pathogens (e.g., Cranberries and Açai berries) and these berries were not listed on Section 2.1 – Scope.
9. The working group agreed that the proposed Draft Annex will mainly provide specific guidance to minimize microbiological hazards from primary production to consumption of berries that are intended to be consumed raw (e.g., fresh berries) and/or are processed without a microbiocidal step (e.g., frozen berries eaten raw and Ready-to-Eat berries) and consumer use.
10. Some comments received highlighted the statement at the FAO/WHO expert meeting that berries are extensively handled, and that human hands are considered the primary source of contamination and therefore a critical point in terms of hazard control. Other potential areas of control include irrigation water, use of manure as fertilizer, and protection against birds.
11. Others highlighted that there is a lot of duplication from the annex on melons, but the work progressed as far as the *Code of Hygienic Practice for Fresh Fruits and Vegetables* (CAC/RCP 53-2003) and its Annexes on Fresh Leafy Vegetables and Melons need to have the same framework to facilitate final use. Moreover the improved texts and procedures to enhance hygienic practices listed on the Fresh Leafy Vegetables and Melons Annexes are not applicable to berries as stated on their scopes.

Recommendations

12. The 44th Session of the CCFH is invited to consider the Proposed Draft Annex on Berries for the Code of Hygienic Practice for Fresh Fruits and Vegetables which is in Appendix I.
13. Special attention should be given to the list of examples of berries on Section 2.1 – Scope, as these will be the fruits addressed by the proposed Annex.
14. It is further recommended that the entire Code and all its annexes are reviewed by CCFH to ensure consistency and remove duplication with the *Code of Hygienic Practice for Fresh Fruits and Vegetables* (CAC/RCP 53-2003) once the work on the Annex on Berries has been finalized.

Appendix I

PROPOSED DRAFT ANNEX ON BERRIES TO THE *CODE OF HYGIENIC PRACTICE FOR FRESH FRUITS AND VEGETABLES (CAC/RCP 53-2003)*

(AT STEP 3)

INTRODUCTION

Berry crops are geographically diverse and represent a wide range of phenotypically unique fruits. Not only are they diverse in the size, shape and colours of their fruits, they are also diverse horticulturally, from low growing berries (e.g., strawberries), to small bushes (e.g., blackberries, blueberries, raspberries) and tall shrubs (e.g., blackcurrant and gooseberry). All are perennial but some are cultivated as annuals (e.g., strawberry); most are cultivated while others are collected from the wild (e.g., wild blueberries).

These fruits are relevant to international trade due to increasing consumption of fresh produce and globalization as a result of changes and/or optimization in production and distribution. There is increasing awareness on the risk factors associated with berry consumption on the part of public health officials. Berries have been associated with several foodborne illness outbreaks caused by a broad range of etiological agents, from virus (Hepatitis A, Norovirus)¹, to bacteria (*E. coli* O26, O157:H7)^{2,3} and protozoa (*Cyclospora cayetanensis*, *Cryptosporidium parvum*)¹.

Most berries are conveniently marketed as ready to eat fruits. The manipulation of berries during production and harvesting and the broad range of etiological agents that have been associated with berry consumption suggest that the safety of those fruits that are consumed raw is highly dependent on maintaining good hygienic practices along the food chain, including up to the point of consumption.

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 to minimize microbiological hazards during primary production through packing and distribution of fresh berries, as well as fresh berries that are processed without a microbiocidal step (e.g., frozen berries eaten raw and ready-to-eat berries) and consumer use.

SECTION 2 - SCOPE, USE AND DEFINITION

2.1 Scope

This annex covers specific guidance related to all areas, from primary production to consumption, of berries that are intended to be consumed raw (e.g., fresh berries) and/or are processed without a microbiocidal step. This Annex encompasses all varieties of strawberries, caneberries (i.e., raspberries, blackberries and mulberries), blueberries and Ribes (i.e., currants and gooseberries).

2.2 Use

This Annex follows the format of the *General Principles of Food Hygiene (CAC/RCP 1-1969)* 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)*, Annex I, the *Annex for Ready-to-Eat Fresh Pre-cut Fruits and Vegetables, Annex II of the Guidelines on the Application of General Principles of Food Hygiene to the Control of Viruses in Food*, the *Code of Practice for Packaging and Transport of Fresh Fruits and Vegetables (CAC/RCP 44-1995)*, and the *Code of Practice for the Processing and Handling of Quick Frozen Foods (CAC/RCP 8-1976)*.

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:

¹ Report - Microbiological hazards in fresh fruits and vegetables of reference for an FAO/WHO Expert Consultation to support the development of commodity-specific annexes for the Codex Alimentarius.

² Non-O157 Shiga toxin-producing *E. coli* (STEC) outbreaks, United States. CDC Foodborne Outbreak Online Database (2006)

³ Fresh Strawberries From Washington County Farm Implicated In *E. coli* O157 Outbreak In NW Oregon. At <http://oregon.gov/ODA/FSD/strawberries.shtml> (2011)

Berries - berries including other small fruits are derived from a variety of perennial plants and shrubs having fruit characterized by a high surface : weight ratio. The entire fruit, often including seed, may be consumed in a succulent or processed form⁴.

SECTION 3 - PRIMARY PRODUCTION

Berries are grown in production sites indoors (e.g., greenhouses) and outdoors, harvested, and may be field packed or transported to a packing establishment.

3.1 Environmental hygiene

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, flood risk as well as hydrological features of nearby sites in relation to the production fields. Growers should take measures to mitigate the risks associated with runoff and flooding, e.g., mapping the production field, terracing, construction of a shallow ditch to prevent runoff from entering the fields, etc.

The effects of some environmental events, such as heavy rains, cannot be controlled. For example, heavy rains may increase the exposure of berries to pathogens if soil contaminated with pathogens splashes onto fruit surfaces. Where appropriate, growers should take into consideration natural uncontrolled events such as heavy rains and evaluate postponing harvesting for direct consumption berries and/or to design and validate cleaning and disinfection steps prior to packing berries that will be frozen.

Wet berries are very susceptible to spoilage and often resemble overripe berries leaking juice. Growers should allow a drying period before harvesting berries to reduce the risk of contamination with foodborne pathogen.

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 production fields or the water sources used with microbial or other environmental hazards via, for example, runoff, faecal material, aerosols or organic waste. When the risks are serious these production sites should not be used for berry production unless adequate measures can be taken to mitigate the risks.

3.1.2 Wild and domestic animals and human activity

Many animal species (e.g., insects, birds, amphibians, chickens, feral pigs, livestock and domestic or wild dogs) and humans that may be present in the production environment are known to be potential carriers of foodborne pathogens. Domestic and wild animals and human activity can present a risk both from direct contamination of the crop and soil as well as from contamination of surface water sources and other inputs. The following should be considered:

- Domestic and wild animals should be excluded from the production area, 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.
- Berry production areas should be properly maintained to reduce the likelihood of vector attraction (e.g., domestic and wild animals). Activities to consider include efforts to minimize standing water in fields, restrict access by animals to water sources (may be based on local ordinances for public irrigation systems), and keep production sites and handling areas free of waste and clutter.
- Berry production areas should be evaluated for evidence of the presence of wildlife or domestic animal activity (e.g., presence of animal faeces, bird nests, hairs/furs, large areas of animal tracks, burrowing, or decomposing remains). Where such evidence exists, growers should evaluate the risks and whether the affected parcel of the berry production site should not be harvested for direct consumption.

⁴ Codex Classification of Foods and Animal Feeds as contained in Volume 2 of the Codex Alimentarius (1993)

3.2 Hygienic primary production of berries

Berries are pulpy fruits with high moisture content and a soft skin, which makes them susceptible to physical damage that accelerates deterioration of berries by increasing water loss and provide conditions for contamination during production, harvest and transport. Physical damage to the berries may occur during harvesting from the use of sharp edged storage containers, improper field packing or through careless and poor handling. Rodents, insects and birds may also damage berries, leading to increased microbial spoilage and the potential transmission of foodborne pathogens. Growers should take measures to reduce the extent of damaged fruits during production.

Some berries frequently contact soil directly during growth and/or harvesting. Bird droppings and airborne contaminants (birds nesting around the packing area, nearby livestock, poultry areas or manure storage or treatment facilities, etc.) may also pose a risk of contamination to berries. Growers should use production practices to minimize the contact of berries with airborne contaminants and limit contact with the soil, animal droppings, soil amendments (including natural fertilizers) or direct contact with water used for irrigation or agricultural chemicals.

Where materials are used under the berries during growing, to minimize contact with the soil, e.g. mulch or biodegradable materials or during harvest, e.g. plastic, to collect harvested fruits, it is recommended that:

- Plastic should be clean and sanitary.
- If biodegradable materials and/or mulch are used, they should be applied only once and not reused in order to prevent cross contamination.

3.2.1.1 Water for primary production

Only clean water should be used for berry 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.). Growers should assess and manage the risk posed by water as follows:

- Assessing the microbial quality of the sources of water used on the farm for the presence of pathogens should include a documented check detailing the potential for microbial contamination from all possible human and/or animal faecal sources of contamination (e.g., from animals, human habitation, leaks from sanitary facilities on field, sewage treatment, manure and composting operations) and the water's suitability for its intended use. In the case of identified contamination sources of the water used on the farm, corrective actions should be taken to minimize the contamination risks. The effectiveness of corrective actions should be verified.
- Verification of the microbial quality of water includes testing for *Escherichia coli* as an indicator of faecal pollution. *E. coli* provides strong evidence of recent faecal pollution and should not be present in water for irrigation and production. The frequency of testing for *E. coli* contamination should be established according to the source of the water (less frequent for adequately maintained deep wells, more frequent for surface waters), environmental conditions (e.g., temperature fluctuations, heavy rainfall) and the status of the irrigation system.
- Identifying and implementing corrective actions is a means to prevent or minimize contamination of water for primary production (e.g., settling or holding ponds that are used for subsequent irrigation and/or harvesting may attract animals or in other ways increase the microbial risks associated with water for irrigation). 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. If water treatment is needed, consult with water safety experts.

Reassessment of the potential for microbial contamination is necessary when events or other conditions indicate that water quality may have changed.

3.2.1.2 Manure, biosolids and other natural fertilizers

The use of untreated manure and liquid manure should be avoided to the extent possible. Pathogenic microorganisms can persist in soil for long periods of time and as some berries have a short production cycle, they could become contaminated by pathogens in the manure.

Growers who are purchasing manure, biosolids and other natural fertilizers that have been treated to reduce microbial or chemical contaminants should obtain documentation from the supplier that identifies the origin, treatment used, tests performed and the results thereof. Growers may also evaluate the need to verify the information provided by the supplier on testing for contamination of natural fertilizer samples or auditing the composting process.

3.2.3 Personnel health, hygiene and sanitary facilities

Personal hygiene is critical with manual harvesting due to the amount of human handling that could lead to contamination of berries. All agricultural workers should properly wash their hands using soap and clean running water before handling berries, 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. Glove use alone is not a suitable substitute for good hand washing practices.

Where appropriate, each business operating primary production 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.

Non-essential persons, casual visitors and, to the extent possible, 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

Sanitary facilities should be readily accessible to agricultural workers during harvesting and packing.

Growers should identify the areas where it is safe to put portable facilities and have written Standard Operating Procedures (SOPs) or documentation for proper cleaning and/or exhausting procedures.

3.2.3.2 Health Status

The following should be considered:

- Growers should be encouraged to note symptoms of diarrhoeal or food-transmissible communicable diseases, and reassign agricultural workers as appropriate.
- Agricultural workers should be encouraged and, where feasible, be motivated with appropriate incentives to 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 waterproof dressings, they should wear gloves to cover the bandages thereby providing a secondary barrier between them and the berries 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.
- Containers used repeatedly during harvest should be cleaned after each load.
- Containers that are no longer cleanable increase the risk of microbial contamination of fresh fruits and should be disposed of.
- Harvesting containers should not be placed directly on the ground.

- If the containers are stored outside, they should be cleaned and disinfected before being used to transport berries.

3.3 Handling, Storage and Transport

Some berries may have high respiration rates making them more perishable. Enzymes and biochemical reactions play an important role in the ripening process but also accelerate spoilage of damaged fruits and increase susceptibility of berries to microbial contamination.

Growers should implement safe handling, transport and storage practices and immediately cool berries after harvesting. Precooling (i.e., rapid removal of field heat) berries within the first 2 hours after harvesting is important to maintain freshness and quality and contributes to the control of foodborne pathogens. Growers should use potable water for ice and hydrocooler when precooling to minimize risks of contamination.

- Manual harvest considerations:
 - Appearance and firmness of berries are commonly associated with fruit quality and freshness. Over handling the berries may damage and affect fruit quality. Moreover, adverse temperatures during harvesting in hot and/or humid weather also decreases quality and may affect food safety due to fruit damage and juice leakage, which may spread contamination over healthy fruits.
 - Training and supervision of the agricultural workers is essential to the success of any harvesting operation. Growers should have a responsible person to supervise harvesting at all times to assure harvesters use proper hand washing and follow procedures not to harvest wet, bruised and/or damaged fruits. Additionally, berries that had fallen on the ground should not be harvested.
 - Growers should take measures to train agricultural workers on safe handling, transport and storage practices to ensure that berries are immediately cooled after harvesting.
- Mechanical harvest considerations:
 - Mechanical harvest is a common practice for some berries and may create food safety hazards if the equipment breaks down during the harvest, if it has received poor maintenance and cleaning or if it damages the fruit.
 - Growers should avoid moving harvesting equipment across fields where manure or compost was applied.
 - Before and after harvesting growers should perform proper cleaning and disinfection of all surfaces of equipments that have been in contact with berries. Moreover harvesting equipment should be cleaned and disinfected seasonally or as needed (e.g., if the equipment runs over an area with heavy animal intrusion and faecal deposits).

3.3.1 Prevention of cross-contamination

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

- The extent of soil and extraneous matter debris on the fruit during and after harvesting may pose a risk of foodborne contamination. Growers should take measures to improve sorting and selection of berries.
- Harvest workers should not handle culled fruit in the field in order to prevent cross-contaminating healthy berries during harvest. It is recommended that culls be removed from the field by a worker who is not harvesting healthy fruit.
- Harvest containers used repeatedly should be cleaned and disinfected seasonally or as needed.
- Training should be provided and reinforced for agricultural workers on good hygienic practices relevant to the growing, harvesting and post-harvesting activities of berries. Poor hygiene practices can significantly increase the risk of the microbial contamination.

- Poor hygienic practices of agricultural workers in the field can significantly increase the risk of contaminating berries. In order to prevent microbial cross-contamination of berries, growers should continually reinforce the importance of good hygienic practices during pre-harvest, harvest and post-harvest activities.
- Prevent cross-contamination between raw and washed berries, which will be frozen, from sources such as wash water, rinse water, equipment, utensils and vehicles.

3.3.3 Field packing

Preference should be given to the field packing into consumer ready containers of berries that will not be washed after harvest (e.g., strawberries), to minimize the possibility of microbial contamination through additional handling steps.

Clean and disinfected pallets and containers should be used and growers should take measures to ensure that the containers do not come into contact with soil and manure during field packing. Growers should assess the relative risk and determine specific control measures for field packing based on the risk associated with the particular berry.

SECTION 4 – PACKING ESTABLISHMENT: DESIGN AND FACILITIES

Refer to the *General Principles of Food Hygiene* (CAC/RCP 1-1969) in conjunction with 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 for cooling and/or washing berries in a packing establishment.

4.1 Location

4.1.1 Establishments

To the extent possible and based on the risk associated with the particular berry, growers may consult an expert to assess the relative risk and determine recommendations specific for the location of packing establishments.

4.1.2 Equipment

Whenever possible, equipment should be designed and placed to facilitate cleaning and disinfection, and to prevent build-up of biofilms that may contain organisms of concern.

Written SOPs should be available for the cleaning and disinfection of equipment used for post-harvest treatment.

4.2 Premises and Rooms

4.2.1 Design and Layout

For berries that are washed (e.g., berries which will be frozen), premises and rooms should be designed to separate areas for incoming soiled and outgoing washed berries. This can be accomplished in a number of ways, including linear product flow.

Where feasible, raw material handling areas should be separated from processing/packing areas. Within each of these areas, cleaning operations should be conducted separately to avoid cross-contamination between equipment and utensils used in each operation.

For products that are not immediately wrapped or packed (i.e. the berries are exposed to contaminants from the environment), the rooms where final products are packaged and stored should be designed and maintained to be as dry as possible. The use of water or having a wet environment enhances the growth and spread of pathogenic bacteria.

Berry packing and/or processing establishments may be seasonal, and used for only a few months per year. The facilities may be dormant for many months, leaving them susceptible to pest infestations. Measures to minimize pest infestations should be put in place. Prior to the start of the season, the facility should be cleaned and all food contact surfaces should be cleaned and disinfected.

SECTION 5 - CONTROL OF OPERATION

Refer to the *General Principles of Food Hygiene* (CAC/RCP 1-1969) in conjunction with the *Guidelines on the Application of General Principles of Food Hygiene to the Control of Viruses in Food*.

5.1 Control of food hazards

Prevention of contamination is a key control point for berries and packing establishments should pay special attention to product flow and segregation of incoming soiled and/or damaged and outgoing product to avoid cross-contamination.

Care should be taken to ensure that berries are not damaged nor become cross-contaminated during transport and processing. Prior to packing, berries that are soiled, come with debris (e.g., insects), or that are damaged, should be inspected and culled.

Culled berries should be removed from the field or packing facility and disposed of to prevent contamination of other fruit. Dispose of culled fruit hygienically to prevent it from attracting pests.

5.2 Key aspects of hygiene control systems

5.2.2 Specific process steps

Code of Practice for the Processing and Handling of Quick Frozen Foods (CAC/RCP 8-1976).

5.2.2.1 Post-harvest water use

Most berries intended for direct consumption are generally not washed after harvest.

Clean or preferably potable water should be used for berries that are washed. It is recommended that water used in pre-washing and washing tanks in packing establishments be controlled and monitored, i.e. recording the pH and temperature, turbidity, water hardness and product throughput capacity.

Any antimicrobial agents used in the water should be maintained at sufficient levels to ensure that water used in pre-washing and washing tanks does not act as a source of contamination for the fruit.

If antimicrobials and/or disinfectants are used to control pathogenic bacteria in post-harvest water, the efficacy of the treatment should be demonstrated/validated against a target organism under appropriate conditions (see Section 5.2.3).

5.2.3 Microbiological and other specifications

Microbiological testing can be a useful tool to evaluate and verify safety and the effectiveness of cleaning practices and to 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 microorganisms 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 Microbial cross-contamination

Berries that have undergone cleaning and/or chemical treatment should be effectively separated, either physically or by time, from raw material and environmental contaminants.

Only workers who have been trained on proper hand washing and drying procedures should be assigned to pack berries.

5.3 Incoming material requirements

The following are recommended:

- For fresh or frozen berries sorting and selection should be implemented to avoid using fruits that have visible signs of decay or damage due to the increased risk of microbial contamination.
- Berries should be cooled and stored as soon as possible under temperature controls within the processes.

- Maintain physical separation of incoming unwashed berries from in-process or packed berries (i.e., finished product).

5.7 Documentation and records

Where practicable, a 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 operating the primary production. 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 test results and trend analyses
- Water monitoring and test results
- Storage room temperature levels
- Employee training records
- Pest control records
- Cleaning and disinfection reports
- Equipment monitoring and maintenance records
- Inspection/audit records

5.8 Recall procedures

In the event of a foodborne illness outbreak associated with berries, maintaining appropriate records of production, processing, packaging and distribution may help to identify the source of contamination in the berry 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 berries throughout the food chain. The information needed to link each supplier should include, if available, the packer name, address, and phone number, date packed, date released, type of berry (e.g., strawberry, blueberry, etc.) including brand name, lot identification and number of lots, and transporter.

SECTION 6 – ESTABLISHMENT: MAINTENANCE AND SANITATION

6.1 Maintenance and Cleaning

6.1.1 General

Food contact surfaces should be cleaned and disinfected before the start and throughout the season of the specific fruit to ensure microbial pathogens do not become established in the facility or on the equipment.

SECTION 9 – PRODUCT INFORMATION AND CONSUMER AWARENESS

9.4 Consumer education⁵

The following should be considered:

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

⁵ The WHO Five Keys to Safer Food message and its supporting materials offer simple and clear guidance for food handlers including consumers on safe food handling (http://www.who.int/foodsafety/publications/consumer/en/5keys_en.pdf).

Consumer information on handling berries safely should cover:

- Avoiding the selection of damaged or rotten berries.
- Transporting to home. Increase in product temperature during transportation can be considerable.
- Storage/ refrigeration of berries. Berries should preferably be stored in a cool environment. All prepackaged berries should be refrigerated as soon as possible.
- Once removed from the refrigerator, fruit should be consumed as soon as possible.
- Correct hand washing methods⁶.
- Cross-contamination. Consumers need to handle, prepare, and store berries 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

Since producing berries for direct consumption is labour intensive, which increases the risk of contamination from manipulation, special attention is needed to properly select and train all personnel involved in primary production, packing, processing or transport operations of berries that are intended to be consumed.

Growers should train personnel to ensure that only experienced pickers harvest berries that are intended for direct consumption.

All agricultural workers should receive training appropriate to their tasks and should be periodically assessed while performing their duties to ensure tasks are being completed correctly.

Specific employee training records should include the following:

- Training to recognize and harvest only ripe berries.
- The importance of sorting out berries with visible defects, such as broken skin, decay, mould, soiled and insect and/or bird damaged fruit.
- The importance to minimize post harvest handling, thereby increasing the shelf life and safety of the berries.
- The importance of recognizing and recording field contamination indicators (e.g., broken fences, animal droppings, high incidence of insects) and taking appropriate measures to mitigate the risks.
- The importance of proper berry handling techniques to minimize or prevent damage to the fruit and microbial contamination.
- The importance of proper use of hygienic facilities. Training could include, for example, toilet use, proper disposal of toilet paper or equivalent, and proper hand washing and drying procedures.
- Training in cold chain logistics and management, in line with advancing knowledge and technologies for both refrigeration and temperature monitoring and expanding international trade.

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.

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.

⁶ WHO Guidelines on Hand Hygiene in Health Care

APPENDIX II

**LIST OF PARTICIPANTS
LISTE DES PARTICIPANTS
LISTA DE PARTICIPANTES**

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