Foreword

This Philippine National Standard on the Code of Hygienic Practice for Berries was developed in response to the development of an Annex on Berries to the Codex Code of Hygienic Practice for Fruits and Vegetables (CAC/RCP 53-2003) by the Codex Committee on Food Hygiene in 2012. This Code of Hygienic Practice is therefore an adoption of the Codex Code of Hygienic Practice for Berries with some modifications to suit the local production practices in the Philippines. This Code supplements the Philippine National Standard: Code of Good Agricultural Practices for Fruits and Vegetable (GAP-FV) Farming (PNS/BAFPS 49:2007/2011 ICS 65.020.20), which is the basis for the granting of the Philippine Good Agricultural Practices (PhilGAP) certification and should be read in conjunction with it.

A Technical Working Group (TWG) was created through Special Order No. 45 Series of 2014 to develop the draft Code of Hygienic Practice for Berries. The TWG represented the relevant agencies of the Department of Agriculture (DA), the University of the Philippines- Diliman (UPD) and Los Baños (UPLB). Public consultations were conducted in the Cordillera Autonomous Region (CAR) and Nueva Vizcaya, which represented the major hubs of berries production and trade. Comments and recommendations were solicited from the relevant government agencies, academe, private sector, and non-government organizations. Therefore, this Code of Hygienic Practice is the final output of the public-private sector collaboration between and among the TWG, and the relevant stakeholders who participated in the public consultations.
INTRODUCTION

Berries as a commodity group include all soft berries that are consumed fresh, including blackberries, raspberries, strawberries, and blueberries. Berries are geographically diverse and represent a wide range of phenotypically unique fruits. Berries, aside from being diverse in size, shape and color, are also horticulturally diverse, 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 perennials but some are cultivated as annuals (e.g. strawberries). Most are cultivated while others are collected from the wild (e.g. wild blueberries).

Berries 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. The size and scope of berry production vary according to berry type, and include wild berry collection. Most berries are conveniently marketed as ready-to-eat fruits. Strawberries are considered to be the most important in terms of production and trade. In the Philippines, strawberries are largely produced in Benguet Province. Other berries found in the Philippines include blackberries (*Rubus fruticosus* L.), blueberries (*Vaccinium cyanococcus*), cloudberrys (pinit, sampinit) (*Rubus chamaemorus*) and mulberries (*Morus rubra* L.).

Berries were implicated in foodborne outbreaks caused by protozoa (*Cyclospora cayatenensis*, *Cryptosporidium parvum*), bacteria (*E. coli* O26, O157:H7), and viruses (Noroviruses, Hepatitis A virus) in North America and Europe. Incidence of pathogens in imported raspberries has been reported reflecting that microbial contamination extends beyond those countries where there have been outbreaks. A number of outbreaks has been associated with imported frozen berries. In such cases, viral agents are the hazard of concern. Freezing will maintain viral infectivity. The potential for amplification of foodborne pathogens on berries was considered small. Berries are typically acidic and do not provide a suitable environment for microbial growth. Also, viruses and parasites, the microbiological hazards most frequently associated with berries, will not replicate outside their host. However, low numbers of some of these hazards can be adequate to cause illness.

A unique characteristic of berries is that they can be harvested from the wild, aside from being cultivated. Thus, the diversity of the production chain and the industry can be extensive. Harvesting is also primarily done manually by a large number of people, which are potential sources of contamination. Due to the delicate nature of some berries, they are not washed prior to sale because it will affect its quality. Contamination of berries may occur during harvesting and water sprinkling operations before freezing. Primary sources of contamination include poor personal hygiene and sanitation, contaminated irrigation water, unprocessed manure as fertilizer and domestic and wild animals specially birds.

Given the food safety issues that surround berry production and the domestic trade of berries, this Code of Hygienic Practice is therefore developed to ensure that berries produced in the Philippines are safe from microbiological hazards and comply with regulatory requirements. This Code adopts the Annex on Berries to the Codex Code of Hygienic Practice for Fruits and Vegetables (CAC/RCP 53-2003) and provides additional specific food safety recommendations based on the current production practices of berries in the Philippines.
This Code of Hygienic Practice addresses the essential principles of food safety applicable to primary production, postharvest and transport operations. It encompasses Good Agricultural Practices (GAP), Good Hygienic Practices (GHP) and Good Manufacturing Practices (GMP) that will help minimize microbiological hazards associated with all stages of production to consumption of berries. Primary aim of this Code is the reduction of microbiological hazards. This Code provides general recommendations to allow flexible and uniform adoption even when production practices and environmental conditions are diverse. Therefore, this Code is also applicable to micro and small-scale producers.

**Section 1 - OBJECTIVES**

The objective of this PNS/BAFS is to provide specific guidance on how to minimize microbiological hazards during primary production, packing, distribution and consumption of fresh berries. It adopts to the general hygienic recommendations for the primary production of fresh fruits based on *Codex Code of Hygienic Practice for Fresh Fruits and Vegetables (CAC/RCP 53-2003)*.

**Section 2 - SCOPE, USE AND DEFINITIONS**

**2.1 Scope**

This Code 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 microbicidal step.

This Code encompasses all edible varieties of strawberries (*i.e. Fragaria x ananassa* Duch.), raspberries (*i.e. Rubus idaeus* L.), blackberries (*i.e. Rubus fruticosus* L. spp.), mulberries (*i.e. Morus* L.), blueberries (*i.e. Vaccinium cyanococcus* spp.), currants and gooseberries (*i.e. Ribes uva-crispa* L.) and ground cherries (*i.e. Physalis peruvina* L.) For wild berries, only the measures for handling and postharvest activities (*i.e. from Section 3.3 onwards*) apply.

**2.2 Use**

This Code adopts and follows the general format of the *Codex Code of Hygienic Practice for Fresh Fruits and Vegetables (CAC/RCP 53-2003)*. Only the specific sections of the *Codex Code of Hygienic Practice for Fresh Fruits and Vegetables (CAC/RCP 53-2003)* that relate to the microbiological safety of berries are discussed in this Code. Therefore, this Code should be read in conjunction with the *Codex Code of Hygienic Practice for Fresh Fruits and Vegetables (CAC/RCP 53-2003)*, the *Codex Recommended International Code of Practice-General Principles of Food Hygiene (CAC/RCP 1-1969, Rev. 4-2003)* and other applicable codes.

2.3 Definitions

For the purpose of this Code, the following terms are operationally defined:

**Berries**- fleshy fruit produced from a single flower and containing one ovary. The berry is the most common type of fleshy fruit in which the entire ovary wall ripens into an edible pericarp.

**Biofilm**- a microbial consortium adhering to a surface.

**Clean water**- water that does not compromise food safety in the circumstances of its use.

**Cull**- to remove any product that shows signs of physical damage (such as skin breaks or decay, deformed, and diseased strawberries).

**Grower/agricultural worker**- any person that undertakes one or more of the following: cultivation, harvesting and packing of berries.

**Potable water**- water which meets the quality standards of drinking water such as described in the World Health Organization Guidelines for Drinking Water Quality.

**Reclaimed wastewater**- water taken from industrial wastewater and treated to a level suitable for its intended use.

**Section 3 - PRIMARY PRODUCTION**

3.1 Environmental Hygiene

3.1.1 Location of Production Site

The following should be considered in the location of production sites for berries:

- Slope and potential for run-off from nearby fields;
- Flood risks as well as hydrological features of nearby sites in relation to the production site; and
- Proximity to high risk production sites (animal production facilities, hazardous waste sites and waste treatment facilities).

Measures to mitigate the risks associated with runoff and flooding include mapping the production field, terracing, construction of shallow ditch to prevent runoff from entering the fields. Environmental events such as heavy rains and flooding increase the exposure of berries to pathogens if contaminated soil splashes onto fruit surfaces. Postpone harvesting of berries that are directly consumed, and/or subject berries to treatment that will minimize the risk from foodborne pathogens. Berries that have been in contact with flood waters should not be used. Wet berries are very susceptible to spoilage and often resemble overripe berries leaking juice. Growers/agricultural workers should allow a drying period, if possible, before harvesting berries to reduce risk of contamination with foodborne pathogens.

Neighboring sites such as animal production facilities, hazardous wastes sites, and waste treatment facilities have the potential to contaminate berries production fields or its water
sources through runoff, fecal material, aerosols, and organic wastes. When the risks are serious, the location should not be used for berry production until corrective or control measures are carried out.

3.1.2 Wild and Domestic Animals and Human Activity

Many wild and domestic animals are potential carriers of foodborne pathogens. Domestic and wild animals, and human activity present a risk from direct contamination of the berries 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 berry production area, to the extent possible, in compliance with the local and national environmental, and animal protection regulations;
- Minimize standing water in fields;
- Restrict access by animals to water sources (based on local ordinances for public irrigation systems);
- Keep berry production sites free of wastes and clutter; and
- Evaluate for evidence of the presence of wildlife or domestic animal activity (e.g., presence of animal feces, hairs, large areas of animal tracks, burrowing or decomposing remains). If there is evidence of such activity, the growers/agricultural workers should evaluate the risk whether the affected parcel of berry production should still be harvested for direct consumption. Seek technical assistance from the competent authorities if necessary.

3.2 Hygienic Primary Production of Berries

The three (3) major characteristics that pre-dispose berries to microbiological contamination during primary production are: (1) its high moisture content (2) soft skin, and (3) direct contact with soil during fruit growth and development.

The high moisture content and soft skin of berries makes them more susceptible to physical damage that accelerates deterioration of berries by increasing water loss, and provide conditions for contamination during production, harvest, and transport. Berries may be physically damaged during harvesting from the use of sharp-edged storage containers, improper field packing procedure or through poor handling. Rodents, insects and birds may also damage berries that lead to increased microbiological spoilage and potential transmission of foodborne pathogens.

Some berries frequently get in contact with the soil during growth and/or harvesting. Bird droppings and airborne contaminants (i.e. birds nesting around the packing area, nearby livestock, and poultry areas, or manure storage or treatment facilities, etc.) may also pose a risk of contamination of berries.

The following are generally recommended:

- Reduce the extent of damage fruits during production;
- Use proper production practices (e.g. site selection, wind breaks) to minimize contact of berries with airborne contaminants;
• Minimize contact of berries to animal droppings, soil amendments (including natural fertilizers) and irrigation water;
• Use mulch or biodegradable materials (e.g. rice straw, plastic mulch, grass clippings) to minimize contact of berries with the soil during growing. Use clean plastic or biodegradable materials (e.g. leaves or papers as liners of biodegradable baskets) during collection of harvested fruits; and
• Prohibit the use of newspapers and papers with print as liners.

If biodegradable materials are used, the following are recommended:

• Ensure that biodegradable materials are clean and sanitary; and
• Use biodegradable materials only once to prevent cross-contamination.

3.2.1.1 Water for Primary Production

Only clean water should be used for berry production. Sources of water should be identified. Growers/agricultural workers should seek assistance of competent authorities (e.g. from Local Government Unit or LGU) to assess and manage the microbiological risk of contamination of the water source, which are as follows:

• Assess the microbiological quality of the sources of water used on the farm for the presence of foodborne pathogens. This should include a documented check detailing the potential for microbiological contamination from all possible human and/or animal feces 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. When contamination sources of the water are identified, corrective actions should be taken to minimize the risk of contamination. The effectiveness of corrective actions should be verified;
• Identify and implement corrective actions to prevent and minimize contamination such as, 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 use of water treatment facilities. If water treatment is needed, consult with water safety experts;
• Determine if microbiological and chemical testing should be done by local authorities such as the LGU, and the Bureau of Soils and Water Management (BSWM) 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 is conducted the following should be documented:
  • What tests need to be performed, (e.g., which foodborne 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.
• Determine the frequency of water testing depending on the source of the irrigation water (less for adequately maintained deep wells, more for surface waters) and the risk of environmental contamination, including intermittent or temporary contamination (e.g. heavy rain, flooding, etc.);
• If water testing is limited to non-pathogenic indicators (such as coliforms, Aerobic Plate Count or APC, etc.), frequent water tests may be useful to establish the baseline water quality so that subsequent changes in the levels of contamination can be identified; and
• If the water source is found to have unacceptable levels of indicator organisms (such as E. coli) 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.

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

3.2.1.2 Manure, Bio solids and other Natural Fertilizers

• Growers/agricultural workers should prohibit use of untreated manure and liquid manure to the extent possible since foodborne pathogens can persist in soil for long periods of time and some berries have short production cycle;
• Animal manure/plant waste materials are allowed only when fully decomposed; and
• Human manure and urine are not allowed.

Obtain documentation from the supplier that identifies the origin, treatment used, tests performed and the results thereof, and evaluate information when necessary for those manure, biosolids and other natural fertilizers that have been treated to reduce microbiological and chemical contaminants.

3.2.3 Personnel Health, Hygiene and Sanitary Facilities

The following should be considered:

• Whenever possible, reduce berry handling during harvesting, packing and inspection operations;
• All growers/agricultural workers should properly wash their hands using soap and clean running water and dry their hands before handling berries, particularly during harvesting and post-harvest handling;
• 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 farm should have written Sanitation Standard Operating Procedures (SSOP) that relate to health, hygiene, and sanitary facilities. The SSOP should address training, facilities, and supplies to enable growers/agricultural workers to practice proper hygiene, and company policies that relate to worker hygiene and illness reporting.
• Non-essential persons, casual visitors, and to the extent possible, young 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

The following should be considered:

• Provide areas away from the field and packing area for taking breaks and meals. These areas should provide access to clean toilet and hand-washing facilities;
• Sanitary facilities should be readily accessible to the work area, encouraging their use and prohibit the growers/agricultural workers to relieve themselves in the field or in the production site;
• Prohibit the growers/agricultural workers to do the following: disposal of waste, eating, smoking, spitting, and any activity that will introduce contamination;
• Sanitary facilities should be present in sufficient number in relation to the number of workers (refer to the Code on Sanitation of the Philippines);
• Portable sanitary facilities should not be located or cleaned in cultivation areas or near irrigation water sources or conveyance systems. Growers/agricultural workers should identify the areas where it is safe to put portable facilities. Sanitary facilities should include clean running water, soap, toilet paper or equivalent, single use paper towels or equivalent. Multiple use cloth drying towels should not be used. Hand sanitizers should not replace hand washing and should only be used only after hands have been washed; and
• If clean running water is not available, an acceptable alternative hand washing method should be recommended by the relevant competent authority.

When necessary, consult competent authorities with regards to personnel hygiene and sanitation.

3.2.3.2 Health Status

The following should be considered:

• Growers/agricultural workers should be encouraged (with appropriate incentives, if feasible) to note and report symptoms of diarrheal or food-transmissible, communicable diseases. Reassign growers/agricultural workers, as appropriate; and
• Medical examination of growers/agricultural workers should be carried out if clinically or epidemiologically indicated.

3.2.3.3 Personnel Cleanliness

When growers/agricultural workers are permitted to continue working with cuts and wound covered by waterproof dressings, they should wear clean gloves to cover bandages thereby providing a second barrier between them and the berries they handle. Otherwise, reassign the concerned growers/agricultural workers to another working area where there is no direct handling of berries.
3.2.4 Equipment Associated with Growing and Harvesting

Sanitation Standard Operating Procedures (SSOP) should be developed for the maintenance, cleaning and disinfecting operations of growing and harvesting equipment. The following are recommended:

- Containers used repeatedly during harvest should be cleaned after each load;
- Containers (including liners of containers made from biodegradable materials) that are no longer cleanable should be disposed of since they may increase the risk of microbiological contamination of berries;
- Harvest containers should not be placed directly on the ground; and
- If 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 may play an important role in the ripening process, but also accelerate spoilage of damaged fruits and increase susceptibility of berries to microbiological contamination.

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

For manual harvesting, the following should be considered:

- Since appearance and firmness of berries are commonly associated with fruit quality and freshness, avoid over-handling of berries as this may damage and affect fruit quality;
- Avoid harvesting in adverse temperatures (hot/and or humid weathers), which decrease quality and may affect food safety due to fruit damage and juice leakage that may spread contamination over healthy fruits. 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. Berries that have fallen on the ground should also be discarded unless they are processed with a microbicidal step; and
- Train growers/agricultural workers on safe handling, transport and storage practices to ensure that berries are immediately cooled after harvesting.
3.3.1 Prevention of Cross-Contamination

The following should be considered for the pre-harvesting, harvesting and postharvest handling of berries:

- Growers/agricultural workers should take measures to improve sorting and selection of berries as the extent of soil and extraneous matter/debris during and after harvesting may pose a risk of contamination;
- Growers/agricultural workers should not handle culled fruit in the field in order to prevent cross-contaminating healthy berries during harvest. It is recommended that culled fruit be removed from the field by growers/agricultural workers who are not harvesting healthy fruits; and
- Growers/agricultural workers should continually reinforce the importance of good hygienic practices since poor hygienic practices can significantly increase the risk of contaminating berries.

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 microbiological contamination through the additional handling steps.

Growers/agricultural workers should ensure that clean pallets and containers (disinfected when necessary) are used and that containers do not come in contact with soil and manure during field packing operations.

Section 4 - ESTABLISHMENT: DESIGN AND FACILITIES


4.1 Location

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 foodborne pathogens of concern.

4.2 Premises and Rooms

4.2.1 Design and Layout

Premises and rooms should be designed to separate the area for incoming berries from the field (areas for incoming soiled and outgoing washed berries) from the area of handling. 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 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 foodborne pathogens.

Berry packing and/or processing establishments may be seasonal, and used only for 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. The design should allow thorough cleaning and disinfection of food contact surfaces.

Section 5 - CONTROL OF OPERATIONS

Refer to the Codex Recommended International Code of Practice – General Principles of Food Hygiene (CAC/RCP 1-1969, Rev. 4-2003) in conjunction with the Guidelines on the Application of General Principles of Food Hygiene to the Control of Viruses in Food (CAC/GL 79-2012) and the Code of Practice for the Processing and Handling of Quick Frozen Foods (CAC/RCP 8-1976).

5.1 Control of Food Hazards

Prevention of microbiological contamination is a key control point for all fresh produce operations, including berries operations. Establishment should carefully consider product flow and segregation of incoming soiled and/or damaged, and outgoing berries to avoid cross-contamination.

Care should be taken to ensure that berries are not damaged and do not become cross-contaminated during transport and handling. Prior to packing, berries that are soiled, berries that 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. Culled fruit should be hygienically disposed of to avoid it from attracting pests.

5.2 Key Aspects of Hygiene Control Systems

5.2.2 Specific Process Steps

5.2.2.1 Post-Harvest Water Use

Most berries intended for direct consumption are generally not washed after harvest. However, for berries that are washed after harvest, clean or preferably potable water should be used. It is recommended the quality of the water used in packing establishments be controlled and monitored (i.e. record testing for indicator organisms and/or foodborne pathogens).
If water is used in pre-washing and washing tanks, additional controls (e.g. changing water whenever necessary and controlling of product throughput capacity) and monitoring (e.g. recording the pH, temperature, turbidity, and water hardness) should be adopted.

Potable water should be used for final rinses.

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, and to prevent antimicrobial agents from damaging fruit skin structure.

If antimicrobials and/or disinfectants are used to control foodborne pathogens 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 of an environment, process and specific product lot should be performed to evaluate and validate the safety and effectiveness of cleaning practices, methodology and sampling plan.

5.2.4 Microbiological 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.

To prevent cross-contamination, segregate the washed and unwashed berries. Avoid contamination of washed berries from wash water, rinse water, equipment, utensils, and vehicles.

Only growers/agricultural workers who have been trained on hygienic handling should be assigned to pack berries.

5.3 Incoming Material Requirements

The following are recommended:

- For berries that are intended to be consumed raw, as well as to be frozen, sorting and grading should be implemented to avoid using berries that have visible signs of decay or damage due to the increased risk of microbiological contamination; and
- Berries should be cooled and stored as soon as possible under temperature controls within the processes.
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 the following:

- Evaluation of the production site
- Water and distribution system
- Manure and compost use and their corresponding procedures
- Personnel illness reporting policy
- Sanitation procedures
- Training programs

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

- Microbiological testing results and trend analyses
- Water quality monitoring and test results
- Employee training records
- Pest control records
- Cleaning and sanitation reports
- Equipment monitoring and maintenance records
- Inspection/audit records
- Corrective action reports
- Volume and quality of harvest production
- Profile of farm/field
- Market of the product

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/agricultural workers/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 Codex Principles for Traceability/Product 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, phone number, date packed, date released, type of berries (i.e. 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 of the season and throughout the berry season to ensure that foodborne pathogens do not become established in the facility or on the equipment.

6.1.2 Cleaning Procedures and Methods

Written SSOP should be developed and implemented for the cleaning and disinfection of equipment used for post-harvest treatment.

Section 7 - ESTABLISHMENT: PERSONAL HYGIENE

Refer to the Codex Recommended International Code of Practice- General Principles of Food Hygiene (CAC/RCP 1-1969, Rev. 4-2003).

SECTION 8 - TRANSPORTATION

Refer to the 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

Refer to the “WHO Five Keys to Safer Food” message and its supporting materials for simple and clear guidance for food handlers including consumers on safe food handling (http://www.who.int/foodsafety/publications/consumer/en/5keys_en.pdf). The following are applicable to berry production:

1. Keep Clean
   - Wash your hands before handling berries and often during cutting/slicing of berries
   - Wash your hands after going to the toilet
   - Wash and sanitize all surfaces and equipment used for berries
   - Protect berry preparation areas from insects, pests and other animals

2. Separate Raw and Cooked
   - Separate berries from raw meat, poultry and seafoods
   - Use separate equipment and utensils such as knives and cutting boards for handling berries
   - Store berries in containers to avoid contact with prepared foods
3. Keep Food at Safe Temperatures
   - Refrigerate berries preferably below 4°C to prevent growth of *Listeria monocytogenes*
   - Do not store berries too long in the refrigerator

4. Use Safe Water and Raw Materials
   - Use safe water and treat it to make it safe
   - Select fresh berries
   - Wash berries with potable water

Relevant stakeholders (government, industry, consumer organizations and the media) should work together to communicate clear consistent messages on handling berries safely.

Consumer information on handling berries safely should cover the following:

- Avoid the purchase of trays or cases with damaged or rotten berries;
- Keep berries in insulated containers during transport. Berries should be preferably stored in a cool environment. All pre-packaged berries should be refrigerated as soon as possible;
- Once removed from the refrigerator, berries should be consumed as soon as possible;
- Handle, prepare and store berries safely to avoid cross-contamination with foodborne pathogens from various sources (e.g. hands, sinks, cutting boards, utensils, raw meats); and
- Wash berries with potable water before consuming.

**SECTION 10 - TRAINING**

10.2 Training Programs

Since producing berries for direct consumption is labor intensive, which increases the risk of contamination from manipulation, special attention is needed to properly select and train all growers/agricultural workers involved in primary production, packing, processing or transport operations of berries that are intended to be consumed. Ensure that only experienced pickers harvest berries that are intended for direct consumption. All growers/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 programs should include the following:

- Importance of sorting and grading berries;
- Orientation on and implementation of SSOP, GAP, GHP and GMP; and
- Cold chain logistics and management, in line with advancing knowledge and technologies for both refrigeration and temperature monitoring, and expanding international trade.
Growers/agricultural workers should be trained before immersion to actual operations. Training activities of growers/agricultural workers should be documented.

Training should be delivered in a language and manner that facilitate understanding of what is expected of the trainees and why. It 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. Training program should be monitored for effectiveness and modified when necessary.
REFERENCES:


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


Codex Guidelines on the Application of General Principles of Food Hygiene to the Control of Viruses in Food (CAC/GL 79-2012).


Codex Traceability/Product Tracing as a Tool within a Food Inspection and Certification System (CAC/GL 60-2006).

Food and Agriculture Organization (FAO) and World Health Organization. 2008.


(https://www.who.int/foodsafety/publications/consumer/5keys/en/).

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The Code of Sanitation of the Philippines (Presidential Decree No. 856)
# Bureau of Agriculture and Fisheries Standards (BAFS)
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