

FINAL DRAFT
RECOMMENDED CODE OF PRACTICE FOR THE PROCESSING AND
HANDLING OF ETHNIC FLOUR-BASED CONFECTIONERIES
(POLVORON, PIAYA, AND BARQUILLOS)

1. SCOPE

This Code of Practice is concerned with the receipt of raw materials and ingredients, preparation and processing of ethnic flour-based confectioneries (*polvoron*, *piaya*, and *barquillos*) as defined in this Code, in order to conform with the required standards stated in PNS/FDA No. _____. Standards for Ethnic Flour-based Confectioneries (*Polvoron*, *Piaya*, and *Barquillos*). The product shall be prepared from a basic mixture of flour and sugar. This Code is intended to provide guidelines to achieve compliance with the standards for ethnic flour-based confectioneries (*polvoron*, *piaya*, and *barquillos*) packed in any suitable packaging material and/or container.

2. DEFINITION OF TERMS

For the purpose of this Code, the following definitions apply:

Confectionery - a group of food items primarily made of sugar and other sweeteners, and includes candies, caramels, toffees, and chocolate bars. It is a generic term for sweetened food products. Sugar confectionery refers to products such as sweets, candy and chocolates. These products are shelf-stable and usually have water activity below 0.85. (Dictionary of Food Science and Technology, International Food Information Service, Blackwell Publishing, UK, 2005.)

Container – any form of packaging material, which completely or partially encloses the food (including wrappers). A container may enclose the food as a single item or several units or types of prepackaged food when such is presented for sale to the consumer.

Current Good Manufacturing Practices (cGMP) – a quality assurance system aimed at ensuring that products are consistently manufactured, packed or repacked or held to a quality appropriate for the intended use. It is thus concerned with both manufacturing and quality control procedures.

Flavor and flavoring substances – substances which are added to impart flavor which are either natural, nature identical or artificial flavoring substances (A.O. No. 88-B s. 1984; Rules and Regulations governing the Labeling of Prepackaged Food Products distributed in the Philippines):

(a) natural flavor

flavoring substances derived through appropriate physical processes from spices, herbs, fruit or fruit juices, vegetable or vegetable juices, edible yeast, bark, bud, root, leaf or plant materials, meat, fish, poultry, eggs, dairy products or fermentation products thereof.

(b) nature-identical flavoring substances

substances chemically derived from aromatic materials or obtained synthetically, which are chemically identical to substances present in' natural products intended for human consumption.

(c) artificial flavoring substances

substances that impart flavor but which have not been identified in natural products or natural sources of flavorings.

Flour – a powdery substance that is the product of grinding or milling of cereal grains (such as but not limited to wheat, rice, barley, and maize), root crops and legumes.

Food - any processed substance which is intended for human consumption and includes drink for man, beverages, chewing gum and any substances which have been used as an ingredient in the manufacture, preparation or treatment of food. (R.A. 9711. Food and Drug Administration (FDA) Act of 2009).

Food Additives – any substance the intended use of which results or may reasonably be expected to result, directly or indirectly, in its becoming a component or otherwise affecting the characteristics of any food (including any substance

intended for use in producing, manufacturing, packing, processing, preparing, treating, packaging, transporting, or holding food; and including any source of radiation intended for any such use), if such substance is not generally recognized, among experts qualified by scientific training and experience to evaluate its safety, as having been adequately shown through scientific procedures to be safe under the conditions of the intended use (R.A. 3720. Food, Drug and Cosmetic Act).

Food and Drug Administration or FDA - formerly known as Bureau of Food and Drug (BFAD) of the Department of Health (DOH); which was renamed in accordance to RA 9711 (Food and Drug Administration (FDA) Act of 2009).

Food Standard – a regulatory guideline that defines the identity of a given food product (i.e. its name and the ingredients used for its preparation) and specifies the minimum quality factors and, when necessary, the required fill of the container. It may also include specific labeling requirements other than or in addition to the labeling requirements generally applicable to all prepackaged foods.

Ingredient - any substance including food additive, used as a component in the manufacture or preparation of a food and present in the final product in its original or modified form.

Label – includes any tag, brand, mark, pictorial, or other descriptive script, written, printed, marked, embossed or impressed on, or attached to the container.

Labeling – any written, printed or graphic matter (1) upon any article or any of its container or wrappers and/or (2) accompanying the packaged food.

Lot – food produced during a period of time and under more or less the same manufacturing condition indicated by a specific code.

Milk – the normal mammary secretion of milking animals obtained from one or more milkings without either addition to it or extraction from it, intended for consumption as liquid milk or for further processing (CODEX STAN 206-1999).

Milk product – a product obtained by any processing of milk, which may contain food additives, and other ingredients functionally necessary for the processing (CODEX STAN 206-1999).

Muscovado sugar – a non-centrifugal sugar which is primarily composed of sucrose and molasses. It includes three forms, namely: amorphous; lump or molded locally known as “*panocha*” or “*sangkaka*”; and thick, concentrated syrup locally known as “*inuyat*”.(BAFPS Draft Standards for Muscovado Sugar)

Packaging – the process of packing that is part of the production cycle applied to a bulk product to obtain the finished product. It also refers to any material, including painted material, employed in the packaging of a product including any outer packaging used for transportation of shipment. Packaging materials are referred to as primary or secondary according to whether or not they are intended to be in direct contact with the product.

Rancidity – formation of off-flavors in food due to lipid oxidation (oxidative rancidity) and/or release of free fatty acids by lipolysis (hydrolytic rancidity).

Water Activity – the ratio of vapor pressure of water in the food substrate to the vapor pressure of pure water at the same temperature (Jay *et. al.*, 2005). It is also a measure of water available for chemical reactions and microbial growth (Fennema, 1996).

3. RAW MATERIALS, INGREDIENTS AND PACKAGING MATERIAL REQUIREMENTS

3.1 Raw materials and ingredients.

Raw materials for processing shall not contain parasites, microorganisms, toxins, and decomposed or extraneous substances.

3.1.1 Basic Ingredients

Flour. May come from cereal grains, root crops, or legumes, and must conform to RA 8976 (Philippine Food Fortification Act of 2000) (for wheat flour), and other applicable food standards.

Sugar and other sweeteners. May include table sugar, muscovado sugar, corn syrup, and other similar food items, and must conform to RA 8976 (Philippine Food Fortification Act of 2000) (for refined sugar), and other applicable food standards. In some cases, sweetened condensed milk and similar milk products also act as the source of sugar and/or sweetener.

Milk and milk products. Applicable as basic ingredient only for *polvoron*. Must conform to requirements prescribed by PNS/BAFPS 36:2008 (Philippine National Standard for Fresh Milk), FDA A.O. No. 132 s. 1970 (Regulation Prescribing the Standard of Identity and Quality of Milk and Milk Products, B-4.12-01), and other applicable food standards.

Milk and milk products used in the production of ethnic flour-based confectioneries (*polvoron*, *piaya*, and *barquillos*) should come from healthy animals. Milk and milk products should have been produced under hygienic conditions as required by the regulatory agency and/or authority for this type of food items.

Butter, margarine, lard, oil, and other similar food items. Applicable as basic ingredient for *polvoron* and *piaya*. Must comply with RA 8976 (Philippine Food Fortification Act of 2000) (for cooking oil), FDA A.O. No. 230 s. 1974 (Regulation: B-4 Definition and Standards for Food; B-4.15 Fats and Oils, B-4.15-01 Shortening), FDA A.O. No. 243 s. 1975 (Regulation: B-4 Definition and Standards of Food; B-4.18 Margarine), and other applicable food standards.

3.1.2 Optional Ingredients

Eggs. Must be fresh eggs, and must comply with the requirements prescribed by PNS/BAFPS 35: 2005 (Philippine National Standards for Table Egg), and other applicable food standards.

Fruit, vegetables, nuts, and root crops. May include fresh items or preserves and must conform to all applicable food standards

Flavor and Flavoring Substances. - All flavor/seasoning substances as defined in subsection 2.4 shall be food grade, and must comply with FDA's B.C. No. 016 s.2006 (Updated List of Food Additives).

Water. Must be water fit for human consumption and potability determined by health authorities as cited in Philippine National Standards for drinking water (Department of Health A.O. No. 2007-0012. Philippine National Standards for Drinking Water 2007).

Only clean, potable water (Annex A) shall be used for the preparation and for all the pretreatment and processing steps of confectionery production.

Non-potable water may be used only for operations not in direct contact with the food materials provided that this does not pose a hazard to health as determined and approved by the official agency having the jurisdiction over it.

Sesame Seeds. Must conform to applicable food standards.

3.2 Packaging materials. The packaging materials used shall be made of suitable, food-grade materials that would not adversely affect product quality and safety. The packaging materials should be appropriate for the product to be packed and for the expected conditions of handling during distribution and storage. These should provide the products adequate protection from contamination and should be sufficiently durable to withstand mechanical, chemical and thermal stresses encountered during processing and normal distribution. All packaging materials must be clean and free from defects that may affect the product or package integrity. These shall be stored in a clean and sanitary manner.

4. HYGIENE

It is recommended that the product covered by the provisions of this code of practice be prepared and handled in accordance with the appropriate sections of the

Recommended International Code of Practice – General Principles of Food Hygiene (CAC/RCP 1–1969, Rev 4 (2003)), Code of Hygienic Practice for Milk and Milk Products (CAC/RCP 57-2004), Recommended International Code of Hygienic Practice for Egg Products CAC/RCP 15-1976 (amended 1978, 1985), and/or the FDA A.O. No. 153 s. 2004 - Guidelines, Current Good Manufacturing Practices in Manufacturing, Packing, Repacking or Holding Food, covering the plant facilities and operations requirement including the construction and layout of processing plant, hygienic facilities, equipment, utensils and working surfaces.

5. PREPARATION AND PROCESSING

The preparation of ethnic flour-based confectioneries (*polvoron*, *piaya*, and *barquillos*) is described from the receipt of raw materials until the packing operations. The production process should be supervised by personnel with adequate technical training and experience.

5.1 Preparation of Raw Materials and Ingredients

5.1.1 Flour

Receipt

Flour shall only be accepted if it is sound and suitable for processing, according to the requirements stipulated in sub-subsection 3.1.1. Those found with contamination should be rejected. Special precautions must be taken to reject flour showing signs of deterioration and contamination. Choose only those contained in clean, non-toxic, and properly labeled packaging materials.

Storage/holding

Flour held for processing should be stored in any suitable type of closed container to protect from domestic animals, parasites, chemical or microbiological contaminants, debris, and dust. Flour should be stored at a cool, dry place.

5.1.2 Sugar and other sweeteners

Receipt and Inspection

Sugar and sweeteners used for the production of ethnic flour-based confectioneries (*polvoron*, *piaya*, and *barquillos*) shall only be accepted if it is sound and suitable for processing, according to the requirements stipulated in sub-subsection 3.1.1. Those found with contamination which could not be removed to acceptable levels by normal plant sorting or preparation procedures should be rejected.

Sugars and other sweeteners must conform to applicable, existing standard specifications for white sugar (PNS/BAFPS 82:2010), raw cane sugar (PNS/BAFPS 81:2010), coconut sap sugar (PNS/BAFPS 76:2010), and other types of sweeteners. Choose only those contained in clean, non-toxic, and properly labeled packaging materials.

Storage/holding

Sugars and sweeteners held for processing should be stored in any suitable type of closed container to protect from domestic animals, parasites, chemical or microbiological contaminants, debris, and dust. These ingredients should be stored at temperature and relative humidity conditions that will minimize deterioration of quality. The storage area should also be free from strong odors or aroma. Regular inspection of the storage facility should be done to avoid infestation.

5.1.3 Milk and Milk Products

Receipt

Milk and milk products shall only be accepted if it is sound and suitable for processing, according to the requirements stipulated in sub-subsection 3.1.1. Those found with contamination should be rejected. Special precautions must be taken to reject milk and milk products showing signs of spoilage, and deterioration.

If prepackaged processed milk products are to be used as raw material, choose only those contained in clean, non-toxic, and properly labeled packaging materials.

Storage/holding

Milk and milk products held for processing should be stored in any suitable type of closed container to protect from domestic animals, parasites, chemical or microbiological contaminants, debris, and dust.

The storage temperature for milk and milk products should be sufficient to maintain product safety and suitability. Fresh milk and similar fluid milk products must be stored at temperatures less than 7°C. Canned and dried milk products may be stored at a cool, dry place.

5.1.4. Butter, margarine, lard, oil, and other similar food items

Receipt

Butter, margarine, lard, oil, and other similar food items shall only be accepted if it is sound and suitable for processing, according to the requirements stipulated in sub-subsection 3.1.1. Those found with contamination should be rejected. Special precautions must be taken to reject items showing signs of rancidity, spoilage, and deterioration. Choose only those contained in clean, non-toxic, and properly labeled packaging materials.

Storage/holding

Butter, margarine, lard, oil, and other similar food items held for processing should be stored in any suitable type of closed container to protect from domestic animals, parasites, chemical or microbiological contaminants, debris, and dust.

These ingredients should be stored at temperature and relative humidity conditions that will minimize deterioration of quality. The storage area should also be free from strong odors or aroma. Regular inspection of the storage facility should be done to avoid infestation.

5.1.5 Optional Ingredients

5.1.5.1 Eggs

Receipt

Egg used for the production of ethnic flour-based confectioneries (*polvoron*, *piaya*, and *barquillos*) shall only be accepted if it is fresh, and suitable for processing, according to the requirements stipulated in sub-subsection 3.1.2. Those found with contamination which could not be removed to acceptable levels by normal plant sorting or preparation procedures should be rejected. Special precautions must be taken to reject eggs with broken shells, or those with signs of degradation, abnormal color or odor.

Inspection and sorting

Eggs shall be inspected and sorted according to quality and size specifications before processing (PNS/BAFPS 35:2005. Philippine National Standard: Table Egg). Choose only those contained in clean, non-toxic, and properly labeled packaging materials.

Storage/holding

Eggs held for processing should be stored in any suitable type of closed container to protect from domestic animals, parasites, chemical or microbiological contaminants, debris, and dust.

Eggs should be stored at temperature and relative humidity conditions that will minimize deterioration of egg quality. Eggs are kept at refrigerated temperatures during storage particularly when these are not immediately used for processing. The storage area should also be free from strong odors or aroma. Regular inspection of the storage facility should be done to avoid infestation.

Washing and/or sanitizing

Eggs are washed to remove dirt, dust, soil, insect, and filth that might contaminate or affect the color, aroma or flavor of the eggs. Water used for washing and rinsing should be of potable quality. Only approved sanitizing agents may be used in the wash or rinse water for eggs.

5.1.5.2 Other optional Ingredients

Receipt

Optional ingredients to be used in the preparation of ethnic flour-based confectioneries (*polvoron*, *piaya*, and *barquillos*) shall conform to the requirements stipulated in sub-subsection 3.1.2. Whenever applicable, certificates of analyses (COA) from ingredient suppliers shall be secured to confirm their suitability for processing. Ingredients shall be rejected if they do not conform to the requirements and are found to have signs of deterioration, decomposition, or contamination to an extent which renders them unfit for human consumption.

Storage/Holding

Optional ingredients shall be in closed containers as protection against infestation by domestic animals, parasites, filth, and chemical and microbiological contaminants. Storage requirements such as temperature and humidity may vary depending on the ingredient, and these should be provided accordingly by the storage facilities to be used.

Stored stocks of ingredients should be used on a “first in-first out” (FIFO) or a “first to expire-first to use” (FEFU) basis.

5.2 Processing Operations

5.2.1 Preparation

If raw milk is used as basic ingredient, pasteurization must be done to ensure the safety of the product. Sufficient time and temperature combinations for pasteurization must be used to ensure that the milk used does not pose a health hazard. Pasteurization may be done by heating the milk at 63–66°C for at least 30–32 minutes. Under FDA A.O. No. 132 s. 1970 (Regulation Prescribing the Standard of Identity and Quality of Milk and Milk Products, B-4.12-01), pasteurized milk should have been subjected to a temperature not lower than 63°C and held continuously at that temperature for not less than 30 minutes. The milk should then be immediately cooled to 10°C or lower. Pasteurization could also be done by keeping the milk temperature at not lower than 72°C for at least 15 seconds, and immediately cooling the milk to 10°C or lower.

Breaking eggs, and/or separating the egg yolk from the egg white must be performed in a hygienic manner to prevent contamination.

5.2.2 Mixing, Cooking, and Forming

5.2.2.1 *Polvoron*

Using a pan or skillet, the flour is toasted over moderate heat until it is light brown. The toasted flour is transferred to a bowl, and allowed to cool. Sugar, and milk and milk products are then added and mixed thoroughly with the toasted flour. Butter and/or margarine is lightly heated to melt it, and then added to the flour-sugar-milk mixture. After thorough mixing, the *polvoron* mixture can then be formed manually into oval shapes, or *polvoron* press or molders could be used. The formed *polvoron* may be chilled to produce a firmer texture that will allow the product to hold its shape.

5.2.2.2. *Piaya*

To form the base dough, flour and shortening (in the form of vegetable lard, oil, butter or margarine) are mixed together. Water may also be added to the dough mixture. The dough is then divided into small, round portions. The filling is placed inside the small round portion and then flattened. Traditionally, the filling used in *piaya* is muscovado sugar. Other filling formulations may also consist of a combination of water, starch, and other forms of sugar such as white sugar.

The dough stuffed with filling is pressed into flat, round shapes, and sprinkled with sesame seeds. The *piaya* is then cooked either by grilling or by baking in an oven, until the product is light brown in color.

5.2.2.3. *Barquillos*

Flour and sugar are mixed with other ingredients such as milk, butter and/or eggs, until a batter with smooth consistency is formed. The ingredients may be mixed by hand or by using an electric mixer.

Cooking may be done through the use of a wafer iron (*barquillera*) or by baking in an oven. When using a wafer iron (*barquillera*), a small portion of the batter is dropped into the center of the hot iron, and then the hot plates are pressed together and heated until the product is light brown in color. While the product is still warm and pliable, the cooked product is immediately rolled into cylinders using stainless steel rods or sticks. The *barquillos* is then allowed to cool.

Another method of cooking *barquillos* is by baking in an oven. Small portions of the batter are dropped into baking sheets and thinly spread into circular shapes using a spatula or spoon. The batter is then baked in a preheated oven until the edges of the wafer are brown in color. The wafers are removed from the baking sheets, formed into cylinders while the product is still warm, and then allowed to cool.

Barquiron is made by stuffing or filling the hollow portion of the *barquillos* with *polvoron*.

5.2.3 Wrapping

Polvoron and *barquiron* shall be individually wrapped in suitable, food-grade packaging materials.

5.3 Packing

Packing can be done either mechanically or manually. It is important to standardize the fill-in weight for economic reasons.

5.4 Closing or Sealing of Containers

Seams and other closures of containers shall be sealed air-tight to meet the requirements of the processors.

The seal area of flexible containers must be free of food material and wrinkles. Sealing temperature and pressure shall conform to the sealing equipment to be used.

5.5 Coding of Sealed Containers

Coding of sealed container shall be indelible with details of production date and time, batch code, product code, the product line in which product is packed, the manufacturing plant and other information necessary for product traceability. Where the container does not permit the code to be embossed or inked, the label shall be legibly perforated or otherwise marked, and securely affixed to the product container.

5.6 Post-Process Container Handling

Mechanical shocks leading to breakage of semi-rigid containers due to container abuse must be avoided. These occur by knocking against each other during conveying, packaging and labeling operations, among others.

Flexible containers/pouches shall be handled singly rather than in bunches, and care must be exercised so as to prevent damage by roughened contact surfaces.

6. FOOD ADDITIVES

6.1 Food additives when used shall be in accordance with the regulations established by the Food and Drugs Administration (FDA) (Bureau Circular No. 016 s.2006. Updated List of Food Additives) and/or the Codex Alimentarius Commission.

The following food additives listed in, but not limited to, Table 1, may be used for the manufacture of ethnic flour-based confectioneries (*polvoron*, *piaya* and *barquillos*).

6.2 All others that have not been included in the above list shall be allowed as carry-over provided they are approved by FDA regulation (B.C. No. 016 s. 2006; Updated List of Food Additives) and shall be in accordance to the Section 4 of the Preamble of the General Standard for Food Additives (GFSA) (Codex Stan 192-1995, Rev. 5 (2004)). These additives include those that are used for the raw materials and other ingredients.

Table 1. **Food Additives for Ethnic flour-based confectioneries (*polvoron*, *piaya*, and *barquillos*)** (B.C. No.016 s. 2006. Updated List of Food Additives)

Function	Food Additive	Max. level of usage
Anti-caking agent	Polydimethylsiloxane	10 mg/kg ^b
Antioxidant	Ascorbyl Esters	200 mg/kg (As ascorbyl stearate) ^d

	BHA	100 mg/kg (Fat or oil basis) ^b
		200 mg/kg (Fat or oil basis) ^b
		50 mg/kg ^c
	BHT	200 mg/kg (Fat or oil basis) ^b
		50 mg/kg ^c
		25 mg/kg ^d
	Gallate, propyl	200 mg/kg (Fat or oil basis) ^b
Tertiary Butylhydroquinone	200 mg/kg (Fat or oil basis) ^b	
	200 mg/kg ^c	
Tocopherols	500 mg/kg (Fat or oil basis) ^b	
Color	Allura Red AC	348 mg/kg ^b
	Amaranth	100 mg/kg ^b
	Annatto Extracts	25 mg/kg (As total bixin or norbixin) ^b
	Brilliant Blue FCF	300 mg/kg ^b
	Caramel Colour, Class III	GMP ^b
		GMP ^c
		GMP ^d
	Caramel Colour, Class IV	GMP ^b
		GMP ^c
	Carotenoids	GMP ^c
		200 mg/kg ^d
Fast Green FCF	100 mg/kg ^b	
	100 mg/kg ^d	
Sunset Yellow FCF	400 mg/kg ^b	
Preservative	Benzoates	1500 mg/kg (As benzoic acid) ^b
	Hydroxybenzoates, p-	2000 mg/kg (As p-hydroxybenzoic acid) ^b
		300 mg/kg (As p-hydroxybenzoic acid) ^d
Stabilizer	Polysorbates	10000 mg/kg ^b
		5000 mg/kg (Flour basis) ^c
		5000 mg/kg ^d
	Sorbates	2000 mg/kg (As sorbic acid) ^b
	Sorbitan Esters of Fatty Acids	20000 mg/kg ^a
		5000 mg/kg (Flour basis) ^c
10000 mg/kg ^d		
Sweetener	Alitame	300 mg/kg ^a
	Acesulfame Potassium	3500 mg/kg ^b
		10000 mg/kg ^b
	Aspartame	5000 mg/kg ^d
		3000 mg/kg ^b
	Saccharin	2000 mg/kg ^d
1500 mg/kg ^b		
Sucralose	1500 mg/kg ^b	

^a Based on the Food Category System: 5.0 Confectionery;

^b Based on the Food Category System: 5.2 Sugar-based confectionery including hard and soft candy, nougats, etc. other than food categories 05.1, 05.3, and 05.4;

^c Based on the Food Category System: 7.1.2. Crackers, excluding sweet crackers

^d Based on the Food Category system: 7.2 Fine bakery wares

7. LABELING

7.1 Each container shall be labeled and marked with the following information in accordance with FDA's Labeling Regulation (A.O. 88-B s. 1984; Rules and Regulations governing the Labeling of Prepackaged Food Products distributed in the Philippines):

(a) The name of the product shall be known as *Polvoron*, *Piaya*, or *Barquillos*. Additional descriptors pertaining to the ingredients used or the product form may also be included (e.g. *Barquiron*, Purple yam *piaya*; Chocolate *polvoron*, Pandan-flavored *barquillos*). Other local or regional names referring to similar products may also be included, provided that these names are acceptable in the area of distribution and in accordance with the customs or practices of the area or country in which the product is distributed.

(b) The complete list of ingredients and food additives used in the preparation of the product in descending order of proportion.

(c) The net quantity of content by weight in the metric system. Other systems of measurement required by importing countries shall appear in parenthesis after the metric system unit.

(d) The name and address of the manufacturer, packer and/or distributor of the food.

(e) Open date marking

The words "Best/Consume Before/Expiry Date" indicating end of period at which the product shall retain its optimum quality attributes at defined storage conditions.

(f) Lot or code number identifying product lot.

(g) The words "Product of the Philippines", or the country of origin if imported.

(h) Additional requirements

A pictorial representation of raw material or end-product on the label should not mislead the consumer with respect to the raw material or end-product so illustrated.

(i) Optional information

Any special conditions for the storage of the food may be indicated in the label. Where practicable, storage instructions shall be in close proximity to the open date marking.

7.2 Nutrition Labeling

Nutrition labeling shall conform to the established regulations of FDA and/or authority.

8. QUALITY ASSURANCE

8.1 Inspection of Finished Products

All processed products shall be inspected before labeling and casing and defective products shall be withdrawn or rejected. The company must have an approved policy and procedures based on the FDA A.O. No. 153 s. 2004 – Guidelines on Current Good Manufacturing Practices in Manufacturing, Packing, Repacking or Holding Food.

8.2 Record Keeping

Permanent and legible dated records of time, temperature code mark and other pertinent details shall be kept concerning each load. Such records are essential as a check on processing operations.

Written records of all container closure examinations shall specify the code lot, the date and time of container closure inspections, the measurements obtained and all the corrective actions taken.

Records shall be maintained identifying initial distribution of the finished product to facilitate, if necessary, the segregation of specific food lots that may have been contaminated or otherwise unfit for intended use.

All process deviations involving failure to satisfy the minimum requirements of the process shall be recorded detailing those deviations and the actions taken.

8.3 Good Manufacturing Practices (GMP)

Processing establishments shall have developed, documented and implemented prerequisite programs based on Food and Drug Administration's Current Good Manufacturing Practices (cGMP) and Hygiene Control. An effective GMP and Hygiene Control program will decrease the number of critical control points that a manufacturer must face during the hazard analysis of the product/process.

9. STORAGE AND TRANSPORT OF FINISHED PRODUCT

Storage and transport conditions of the finished product shall be such that the integrity of the product container, and the safety and quality of the product are not adversely affected.

Cases and cartons must be thoroughly dry. They must be of proper size so that the containers fit snugly and are not subject to damage from movement within the case. They must be strong enough to withstand normal transport.

Extreme fluctuations in temperature and humidity during storage and transport of the product must be avoided to prevent product deterioration.

10. LABORATORY CONTROL PROCEDURES

Each food processing establishment shall have access to laboratory control of both the processes used and the finished products. All food ingredients and food products declared unfit for human consumption by the laboratory shall be rejected.

Representative samples for each lot or batch shall be taken to assess the safety and quality of the product.

Microbiological laboratory shall be separated from the processing area. No pathogens shall be handled within the premises of manufacturing plant.

Laboratory procedures for quality control of the processes and the product must follow recognized or standard methods for easy interpretation of results.

11. END PRODUCT SPECIFICATIONS

Appropriate methods shall be used for sampling analysis and determinations to meet the following specifications:

1. To the extent possible in good manufacturing practices, the products shall be free from any objectionable characteristics.
2. The product shall not contain any toxic substances originating from microorganisms and chemicals.
3. The product shall be free from chemical pollutants in amounts which may pose hazard to health.
4. The product shall comply with the requirements set forth by the Food and Drugs Administration, the Fertilizer and Pesticide Authority of the Department of Agriculture, and the Codex Alimentarius Commission on Pesticide Residues and Food Additives.

12. REFERENCES

Abiva, C. C. 2001. **A Quick Guide to Filipino Food and Cooking**. Anvil Publishing, Inc. Pasig City, Philippines.

A.O. No. 88-A s. 1984. **Regulatory Guidelines Concerning Food Additives**. Department of Health. San Lazaro Compound, Sta. Cruz, Manila, Philippines.

A.O. No. 88-B s. 1984. **Rules and Regulations governing the Labeling of Prepackaged Food Products distributed in the Philippines**. Bureau of Food and Drugs. Department of Health. Alabang, Muntinlupa City, Philippines.

A.O. No. 132 s. 1970. **Regulation Prescribing the Standard of Identity and Quality of Milk and Milk Products (B-4.12-01)**. Department of Health. San Lazaro Compound, Sta. Cruz, Manila, Philippines.

A.O. No. 230 s. 1974. **B-4 Definition and Standards of Food; B-4.15 Fats and Oils; B-4.15-01 Shortening**. Department of Health. San Lazaro Compound, Sta. Cruz, Manila, Philippines.

A.O. No. 243 s. 1975. **B-4 Definition and Standards of Food; B-4.18 Margarine**. Department of Health. San Lazaro Compound, Sta. Cruz, Manila, Philippines.

A.O. No. 153 s. 2004. **Guidelines, Current Good Manufacturing Practice in Manufacturing, Packing, Repacking or Holding Food**. Department of Health. San Lazaro Compound, Sta. Cruz, Manila, Philippines.

A. O. No. 2007-0012. **Philippine National Standards for Drinking Water 2007**. Department of Health, Manila, Philippines

Association of Analytical Chemists. **Official Methods of Analysis Manual**. 16th ed., 1995. AOAC International. 481 North Frederick Ave., Suite 500, Gaithersburg, MD 20877-2417. U.S.A.

BAFPS. **Draft Standards for Muscovado Sugar**. Bureau of Agriculture and Fisheries Product Standards. Department of Agriculture. Visayas Ave., Quezon City.

B.C. No. 6-A s. 1998. **Permissible Net Content Variation in Prepackaged Food**. Bureau of Food and Drugs. Department of Health. Alabang, Muntinlupa City, Philippines.

B.C. No. 01-A s. 2004. **Guidelines for the Assessment of Microbiological Quality of Processed Foods**. Bureau of Food and Drugs. Department of Health. Alabang, Muntinlupa City, Philippines.

B.C. No.016 s. 2006. **Updated List of Food Additives**. Bureau of Food and Drugs, Department of Health. Alabang, Muntinlupa City, Philippines.

Belitz, H.-D., W. Grosch, and P. Schieberle. 2009. **Food Chemistry**. 4th revised and extended ed. Springer-Verlag, Heidelberg, Germany.

Codex Alimentarius Commission. 1995. **FAO/WHO Codex Alimentarius Commission Manual**. Food and Agriculture Organization. Viale delle Terme di Caracalla, 00100 Rome, Italy.

Dictionary of Food Science and Technology, International Food Information Service, Blackwell Publishing, UK, 2005

DOH. 2000. Implementing Rules and Regulations for the Food Fortification Act of 2000 (RA 8976 s. 2006). Department of Health. San Lazaro Compound, Sta. Cruz, Manila, Philippines.

FNRI. 1997. **The Philippine Food Composition Tables**. Food and Nutrition Research Institute, Department of Science and Technology, Bicutan, Taguig, Philippines.

Food, definition. ALINORM 04/27/41, para. 88 and Appendix VI. 2005. Codex Alimentarius Commission. Food and Agriculture Organization. Viale delle Terme di Caracalla, 00100 Rome, Italy.

Konkel, P. J. 2001. *Confectionery Products*. Chapter 56. In **Compendium of Methods for the Microbiological Examination of Foods**. 4th ed. edited by F.P. Downes and K. Ito. American Public Health Association, Washington, DC, USA.

PNS/BAFPS 35:2005. **Philippine National Standard: Table Egg**. Bureau of Product Standards, Department of Trade and Industry, Makati City, Philippines.

PNS/BAFPS 36:2008. **Philippine National Standard: Fresh Milk**. Bureau of Product Standards, Department of Trade and Industry, Makati City, Philippines

R.A. 3720. **Food, Drug and Cosmetic Act**. Bureau of Food and Drugs. Department of Health. Alabang, Muntinlupa City, Philippines.

R.A. 9711. **Food and Drug Administration (FDA) Act of 2009**. Bureau of Food and Drugs. Department of Health. Alabang, Muntinlupa City, Philippines.

Vaclavik, V. and E. Christian. 2008. **Essentials of Food Science**. 3rd edition. Springer Science+Business Media, LLC., New York, USA.

ANNEX A
Standard Parameters and Values for Drinking Water
 Philippine National Standards for Drinking Water 2007 (DOH AO 2007-0012)

Table 1. Standard values for bacteriological quality

Parameter	Value/Unit	Point of Compliance
Total Coliform	< 1.1 MPN/100 ml	Service Reservoir Water treatment works Consumers' taps Refilling stations Water haulers Water vending machines
Fecal Coliform	< 1.1 MPN/100 ml	Service Reservoir Water treatment works Consumers' taps Refilling stations Water haulers Water vending machines Point sources - Level 1
Heterotropic Plate Count	< 500 CFU/ml	Service Reservoir Water treatment works Consumers' taps nearest meter Refilling stations Water vending machines

Table 2. Standard values for Physical and Chemical Quality for Acceptability Aspects for Drinking Water

Constituents	Maximum Level (mg/L) or Characteristic	Constituents	Maximum Level (mg/L) or Characteristic
Taste	No objectionable taste	Hydrogen Sulfide	0.05
Odor	No objectionable odor	Iron	1.0
Color	Apparent = 10 color units True = 5 color units	Manganese	0.4
Turbidity	3 NTU	pH	6.5 – 8.5
Aluminum	0.2	Sodium	200
Chloride	250	Sulfate	250
Copper	1.0	Total Dissolved Solids	500
Hardness	300 as CaCO ₃	Zinc	5.0

Table 3. Standard Values for Organic and Inorganic Chemical Constituents of Health Significance in Drinking Water

Inorganic Chemicals

Constituents	Maximum Level (mg/L)	Constituents	Maximum Level (mg/L)
Antimony	0.02	Fluoride	1.0
Arsenic	0.05	Lead	1.01
Barium	0.7	Mercury (total)	0.001
Boron	0.5	Nickel	0.02
Cadmium	0.003	Nitrate	50
Chromium (Total)	0.05	Nitrite	3.0
Cyanide (Total)	0.07	Selenium	0.01

Organic Chemicals

Constituents	Maximum Level (mg/L)	Constituents	Maximum Level (mg/L)
Benzene	0.01	Ethylbenzene	0.30
Carbon tetrachloride	0.004	Nitrilotriacetic acid (NTA)	0.20
1,2-Dichlorobenzene	0.1	Polyaromatic hydrocarbons (PAHs)	0.20
1,4-Dichlorobenzene	0.5	Polynuclear aromatic	0.0007
1,2-Dichloroethane	0.003	Tetrachloroethene	0.02
1,1-Dichloroethene	0.05	Styrene	0.04
1,2-Dichloroethene	0.07	Tetrachloroethene	0.70
Dichloromethane	1.0	Trichloroethene	0.07
Di(2-ethylhexyl) phthalate	1.01	Vinyl chloride	0.0003
Edetic Acid (ADTA)	0.001	Xylene	0.5

Organic Pesticides

Constituents	Maximum Level (ug/L)	Status in the Philippines
Aldrin and Dieldrin (combined)	30.0	Banned
Atrazine	0.03	Registered
Carbofuran	2.0	Registered
Chlordane	7.0	Banned
DDT **	0.2	Banned
1,2-Dibromo-3-chloropropane (DBCP)	1.0	Banned
2,4-Dichlorophenoxyacetic acid (2,4-D)	1.0	Registered
Endrin	30.	Banned
1,2-Dibromomethane (Ethylene dibromide)	0.6	Banned
Heptachlor and Heptachlor epoxide (combined)	0.03	Banned
Lindane	2.0	Restricted
MCPA (4-(2-methyl-4-chloro) phenoxy) acetic acid	2.0	Registered
Pendimethalin	20.0	Registered
Pentachlorophenol (PCP)	9.0	Banned

ANNEX B

Determination of Water Activity (AOAC 978.18)

A. Principle

Water activity, a_w , is ratio of vapor pressure of H₂O in product to vapor pressure of pure H₂O at same temperature. It is numerically equal to 1/100 of relative humidity (RH) generated by product in closed system. RH can be calculated from direct measurement of partial vapor pressure or dew point or measured indirectly by sensors whose physical or electric characteristics are altered by RH to which they are exposed. Instruments are checked or calibrated on basis of RH generated by standard salt slushes.

B. Instruments and Systems

(Select 1 of following instruments or systems to perform test. Each has different application limitations because of interferences from other volatile components of products being measured. check with instrument manufacturer for more specific limitations.)

- (a) Change in electrical conductivity of immobilized salt solution. – Instrument available from Beckman Industrial, Rosemount Analytical Div., 89 Commerce Rd, Cedar Grove, NJ 07009; Nova Sina AG, Andreastrasse 7-11, CH 8050, Zurich, Switzerland; Rotronic Instrument Corp., 160 E. Main St, Huntington, NY 11743. Immobilized salt sensors are affected by polyols such as glycerol and glycol and by volatile amines
- (b) Change in electrical capacitance of polymer thin films. – Instrument available from General Eastern Instruments, 50 Hunt St, Watertown, MA 02172. Polymer thin film sensors are affected by CH₃COOH.
- (c) Dew point by chilled mirror technique. – Instrument available from EG&G, Environmental Equipment Division, 217 Middlesex Turnpike, Burlington, MA 01803 or General Eastern Instruments. Dew point measurements can be affected by condensables with lower critical temperature than H₂O.
- (d) Longitudinal change in dimensions of water-sorbing fiber. – Instrument available from G Lufft Metallbarometerfabrik, D-7, Postfach 692, Neue Weinsteige 22, Stuttgart, Germany.
- (e) Partial water vapor pressure by manometric system. – Partial H₂O vapor pressure measurements can be made useless by living products that respire, such as grains or nuts; by active fermentation; or by products that expand excessively when subjected to high vacuum.
- (f) Relative weight of moisture sorbed by anhydrous hydrophilic solid, e.g., microcrystalline cellulose.-see J. Agr. Food chem. 22, 326(1974).

C. Apparatus and Reagents

(As needed for instrument or system selected.)

- (a) Dew point instrument. – Equipped to measure temperature to $\pm 0.1^\circ$. See 978.18B(c).
- (b) Forced-draft cabinet. – Constant temperature, set to maintain $25 \pm 1^\circ$; capacity $\geq 0.06 \text{ m}^3$ (2 cu ft); with access port to accommodate instrument sensor leads. Use in conjunction with (c).
- (c) Insulated box with cover. – Large enough to hold test container, (e), and small enough to fit in forced-draft cabinet, (b); with access port to accommodate instrument sensor leads. Protect test container from short-term temperature fluctuations.
- (d) Manometric system. – Sensitive to pressure differential of $\pm 0.01 \text{ mm Hg}$ (1.33 Pa). See 978.18B(e).
- (e) Test containers. – 120 or 240 mL (4 or 8 oz) wide-mouth or Mason glass jars with Al- or Teflon-lined screw caps and gaskets. Check integrity of cap seals and sensor leads by any means available, e.g., ability of system to hold vacuum, using Tesla coil.
- (f) Water bath. – Capable of maintaining temperature constant within 0.1° at $25 \pm 1^\circ$; capacity sufficient to hold measuring chamber of selected apparatus.

(g) Hydrophilic solid. – Microcrystalline cellulose, Type PH-101 (FMC Corp., Pharmaceutical and Bioscience Division, 1735 Market St, Philadelphia, PA 19103, or equivalent).

(h) Reference salts. – ACS reagent grade, fine crystal. see Table 978.18.

Table 978.18 Water Activity of Reference Salt Slushes at 25°

Salt	a_w	Salt	a_w
MgCl ₂	0.328	KBr	0.809
K ₂ CO ₃	0.432	(NH ₄) ₂ SO ₄	0.810
Mg(NO ₃) ₂	0.529	KCl	0.843
NaBr	0.576	Sr(NO ₃) ₂	0.851
CoCl ₂	0.649	BaCl ₂	0.902
SrCl ₂	0.709	KNO ₃	0.936
NaNO ₃	0.743	K ₂ SO ₄	0.973
NaCl	0.753		

D. Preparation of Reference Salt Slushes

Place selected reference salt in test container to depth of ca 4 cm for more soluble salts (lower a_w), to depth of ca 1.5 cm for less soluble salts (higher a_w), and to intermediate depth for intermediate salts. Add H₂O in ca 2 mL increments, stirring well with spatula after each addition, until salt can absorb no more H₂O as evidenced by free liquid. Keep free liquid to minimum needed to establish saturation of salt with H₂O. Slushes are ready for use upon completion of mixing, and are usable indefinitely (except for some high a_w salts susceptible to bacterial attack), if contained in manner to prevent substantial evaporation losses. Some slushes, e.g., NaBr, may solidify gradually by crystal coalescence, with no effect on a_w .

E. Calibration

Select ≥ 5 salts to cover a_w range of interest or range of sensor being used. Measure humidity generated by each salt slush in terms of instrument readout, as in 978.18F. Plot readout against a_w values given in Table 978.18 for selected salts, using cross-section paper scaled for reading to 0.001 a_w unit. Draw best average smooth line through plotted points. Use this calibration line to translate sensor instrument readout of samples to a_w or to check vapor pressure or dew point instruments for proper functioning.

F. Determination

Place calibration slush or sample in forced-draft cabinet, (b), or H₂O bath, (f), until temperature is stabilized at 25 \pm 1°. Transfer salt slush or sample to test container, (e), seal container with sensing device attached, and place in temperature control device. Use volume of sample or slush $>1/20$ total volume sample container plus any associated void volume of sensing system, but not so much as to interfere with operation of system. Record instrument response at 15, 30, 60, and 120 min after test container is placed in temperature control device, or record response on strip chart. Two consecutive readings, at indicated intervals, which vary by <0.01 a_w unit are evidence of adequately close approach to equilibrium. Continue readings at 60-min intervals, if necessary. Convert last reading to a_w by calculation from physical measurements or by reference to calibration line. Make all measurements within range of calibration points; do not extrapolate calibration line. Make all measurements in same direction of change, and, if required by properties of sensor, expose sensor to controlled RH below ambient before starting each measurement.

ANNEX C

Enumeration of Yeast and Mold Count

Enumeration of Yeasts and Molds in Food--Dilution Plating Technique (USFDA, 2001)

A. Equipment and materials

1. Basic equipment (and appropriate techniques) for preparation of sample homogenate
2. Equipment for plating samples
3. Incubator, 25°C
4. Arnold steam chest
5. pH meter
6. Water bath, 45 ± 1° C

B. Media and reagents

1. Dichloran rose bengal chloramphenicol (DRBC) agar
2. Dichloran 18% glycerol (DG18) agar
3. Plate count agar (PCA), standard methods; add 100 mg chloramphenicol/liter when this medium is used for yeast and mold enumeration. This medium is not efficient when "spreader" molds are present.
4. Malt agar (MA)
5. Malt extract agar (Yeasts and Molds) (MEAYM)
6. Potato dextrose agar (PDA), dehydrated; commercially available

C. Procedures

Sample preparation

Analyze 25-50 g from each subsample; generally, larger sample sizes increase reproducibility and lower variance compared with small samples. Test individual subsamples or composite according to respective Compliance Program for the food under analysis. Add appropriate amount of 0.1% peptone water to the weighed sample to achieve 10⁻¹ dilution, then homogenize in a stomacher for 2 min. Alternatively, blending for 30-60 sec can be used but is less effective. Make appropriate 1:10 (1+9) dilutions in 0.1% peptone water. Dilutions of 10⁻⁶ should suffice.

Plating and incubation of sample

Spread-plate method. Aseptically pipet 0.1 ml of each dilution on pre-poured, solidified DRBC agar plates and spread inoculum with a sterile, bent glass rod. DG18 is preferred when the water activity of the analyzed sample is less than 0.95. Plate each dilution in triplicate.

Pour-plate method. Use sterile cotton-plugged pipet to place 1.0 ml portions of sample dilution into pre-labeled 15 x 100 mm Petri plates (plastic or glass), and immediately add 20-25 ml tempered DG18 agar. Mix contents by gently swirling plates clockwise, then counterclockwise, taking care to avoid spillage on dish lid. After adding sample dilution, add agar within 1-2 min; otherwise, dilution may begin to adhere to dish bottom (especially if sample is high in starch content and dishes are plastic) and may not mix uniformly. Plate each dilution in triplicate.

From preparation of first sample dilution to pouring or surface-plating of final plate, no more than 20 min (preferably 10 min) should elapse. **Note:** Spread plating of diluted sample is considered better than the pour plate method. When the pour plate technique is used, fungal colonies on the surface grow faster and often obscure those underneath the surface, resulting in less accurate enumeration. Surface plating gives a more uniform

growth and makes colony isolation easier. DRBC agar should be used for spread plates only.

Incubate plates in the dark at 25°C. Do not stack plates higher than 3 and do not invert. **Note:** Let plates remain undisturbed until counting.

Counting of plates

Count plates after 5 days of incubation. If there is no growth at 5 days, re-incubate for another 48 h. Do not count colonies before the end of the incubation period because handling of plates could result in secondary growth from dislodged spores, making final counts invalid. Count plates containing 10-150 colonies. If mainly yeasts are present, plates with 150 colonies are usually countable. However, if substantial amounts of mold are present, depending on the type of mold, the upper countable limit may have to be lowered at the discretion of the analyst. Report results in colony forming units (CFU)/g or CFU/ml based on average count of triplicate set. Round off counts to two significant figures. If third digit is 6 or above, round off to digit above (e.g., 456 = 460); if 4 or below, round off to digit below (e.g., 454 = 450). If third digit is 5, round off to digit below if first 2 digits are an even number (e.g., 445 = 440); round off to digit above if first 2 digits are an odd number (e.g., 455 = 460). When plates from all dilutions have no colonies, report mold and yeast counts (MYC) as less than 1 times the lowest dilution used.

Isolate individual colonies on PDA or MA, if further analysis and species identification is necessary.

ANNEX D

Enumeration of Coliform and *E.coli* Count (Enumeration of *Escherichia coli* and the Coliform Bacteria (USFDA, 2001))

Conventional Method for coliforms, fecal coliforms and *E. coli*

A. Equipment and materials

1. Covered water bath, with circulating system to maintain temperature of $45.5 \pm 0.2^\circ\text{C}$. Water level should be above the medium in immersed tubes.
2. Immersion-type thermometer, $1-55^\circ\text{C}$, about 55 cm long, with 0.1°C subdivisions, certified by National Institute of Standards and Technology (NIST), or equivalent
3. Incubator, $35 \pm 1.0^\circ\text{C}$
4. Balance with capacity of ≥ 2 kg and sensitivity of 0.1 g
5. Blender and blender jar
6. Sterile graduated pipets, 1.0 and 10.0 mL
7. Sterile utensils for sample handling
8. Dilution bottles made of borosilicate glass, with polyethylene screw caps equipped with Teflon liners. Commercially prepared dilution bottles containing sterile Butterfield's phosphate buffer can also be used.
9. Quebec colony counter, or equivalent, with magnifying lens
10. Longwave UV light [~ 365 nm], not to exceed 6 W.
11. pH meter

B. Media and Reagents

Brilliant green lactose bile (BGLB) broth, 2% (M25)

Lauryl tryptose (LST) broth (M76)

EC broth (M49)

Levine's eosin-methylene blue (L-EMB) agar (M80)

Butterfield's phosphate-buffered water (R11) or equivalent diluent (except for shellfish)

Lauryl tryptose MUG (LST-MUG) broth (M77)

Peptone Diluent, 0.1% (R56)

MPN - Presumptive test for coliforms, fecal coliforms and *E. coli*

Weigh 50 g food into sterile high-speed blender jar. (see Chapter 1 and current FDA compliance programs for instructions on sample size and compositing) Frozen samples can be softened by storing it for ≤ 18 h at $2-5^\circ\text{C}$, but do not thaw. Add 450 mL of Butterfield's phosphate-buffered water and blend for 2 min. If < 50 g of sample are available, weigh portion that is equivalent to half of the sample and add sufficient volume of sterile diluent to make a 1:10 dilution. The total volume in the blender jar should completely cover the blades.

Prepare decimal dilutions with sterile Butterfield's phosphate diluent. Number of dilutions to be prepared depends on anticipated coliform density. Shake all suspensions 25 times in 30 cm arc or vortex mix for 7 s. Do not use pipets to deliver $< 10\%$ of their total volume. Transfer 1 mL portions to 3 LST tubes for each dilution for at least 3 consecutive dilutions. Hold pipet at angle so that its lower edge rests against the tube. Let pipet drain 2-3 s. Not more than 15 min should elapse from time the sample is blended until all dilutions are inoculated in appropriate media.

NOTE: Use 5-tube MPN for analysis of shellfish and shellfish harvest waters.

Incubate LST tubes at 35°C. Examine tubes and record reactions at 24 ± 2 h for gas, i.e., displacement of medium in fermentation vial or effervescence when tubes are gently agitated. Re-incubate gas-negative tubes for an additional 24 h and examine and record reactions again at 48 ± 2 h. Perform confirmed test on all presumptive positive (gas) tubes.

MPN - Confirmed test for coliforms

From each gassing LST tube, transfer a loopful of suspension to a tube of BGLB broth, avoiding pellicle if present. Incubate BGLB tubes at 35°C and examine for gas production at 48 ± 2 h. Calculate most probable number (MPN) of coliforms based on proportion of **confirmed** gassing LST tubes for 3 consecutive dilutions.

MPN - Confirmed test for fecal coliforms and *E. coli*

From each gassing LST tube from the Presumptive test, transfer a loopful of each suspension to a tube of EC broth (a sterile wooden applicator stick may also be used for these transfers). Incubate EC tubes 24 ± 2 h at 45.5 °C and examine for gas production. If negative, reincubate and examine again at 48 ± 2 h. Use results of this test to calculate fecal coliform MPN. To continue with *E. coli* analysis, proceed to Section F under Enumeration of Escheria coli and the Coliform Bacteria of the USFDA Bacteriological Analytical Manual (2001). The EC broth MPN method may be used for seawater and shellfish since it conforms to recommended procedures (1). (Caution: see Note below).

NOTE: Fecal coliform analyses are done at 45.5± 0.2°C for all foods, except for water testing and in shellfish and shellfish harvest water analysis, which uses an incubation temperature of 44.5± 0.2g°C.