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**BELIZE NATIONAL STANDARD SPECIFICATION FOR
LIQUID WHOLE (COW'S) MILK**

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**BELIZE NATIONAL STANDARD SPECIFICATION
FOR LIQUID WHOLE (COW'S) MILK**

0 FOREWORD

- 0.1 This standard was written to assist the local dairy industry, importers and consumers. In the interest of providing a commodity of consistent quality the standard specifies minimum requirements with respect to product composition, microbiological quality, packaging and labelling.
- 0.2 In the preparation of this standard considerable assistance was derived from the Jamaica Standard Specification for Liquid Whole Milk (cow's), JS 171: 1987 - Jamaica Bureau of Standards, the Saint Lucia National Standard Specification for Liquid Whole Cow's Milk – SLNS 27:1996 and the European Union Council Directive 92/46/EEC of 16 June 1992.

1 SCOPE

- 1.1 This standard prescribes the requirements and methods of test for whole cow's milk.

2 DEFINITIONS

For the purpose of this standard the following definitions apply:

- 2.1 **Butterfat or Milk Fat.** The fat of milk with a specific gravity of not less than 0.905 at a temperature of 15°C (59°F), with a tocopherol content of not more than 50 µg/g.
- 2.2 **Chemical Residues/Pollutants.** Any undesirable foreign material or contaminant found in milk, including any pesticide residues or adulterants, as well as any new or other chemicals as may be prescribed from time to time. Such substances include any mixture intended for use as a plant growth regulator, defoliant or desiccant, fertilizers, antibiotics and hormones. They also include any specified derivatives, such as degradation and conversion products, metabolites and reaction products, which are considered to be of toxicological significance.
- 2.3 **Competent Authority.** The central authority responsible for carrying out health or public health checks or any authority to which it has delegated that responsibility.
- 2.4 **Grade A Milk, Raw.** Milk which meets the requirements of this standard and which has a minimum methylene blue reduction time of 4½ h.
- 2.5 **Grade B Milk, Raw.** Milk which meets the requirements of this standard and which has a minimum methylene blue reduction time of 2 h.

- 2.6 **Heat Treatment.** Any treatment involving heat that causes, immediately after it has been applied, a negative reaction to the phosphatase test.
- 2.7 **Hermetically Sealed Container.** Container which, when sealed, is intended to protect the contents against the entry of micro-organisms during and after heat treatment and which is impervious.
- 2.8 **Homogenisation.** The processing of milk so that the fat particles are so finely divided and emulsified that the cream does not separate on standing.
- 2.9 **Homogenised Milk.** Raw unpasteurised milk or pasteurised milk which has been treated to break up its fat globules to such an extent, that after 48 hours of quiescent storage at 7.0°C (44.6°F), no visible cream separation occurs in the milk, and the fat percentage at the top 100 ml of milk in a litre container or of proportionate volumes in containers of other sizes, does not differ by more than 10% of itself from the fat percentage of the remaining milk as determined after thorough mixing.
- 2.10 **Milk.** The lacteal secretion practically free from colostrum, obtained directly by the complete milking of one or more healthy cows (Genus Bos).
- 2.11 **Multiunit Package.** A package containing two or more individual packages of milk in the same quantity, with the individual packages intended to be sold as part of the multiunit package, but capable of being sold individually in full compliance with all the requirements of this specification.
- 2.12 **Pasteurised Milk.** Raw unpasteurised milk, every particle of which has been accurately heated to and held continuously at or above one of the specified temperatures for the equivalent specified time as indicated in Table 1, and in such a way to ensure the requisite microbial destruction. Such milk shall then have been cooled immediately to not more than 7.0°C (44.6°F) and kept in a wholesome state below 5.0°C (41°F).

TABLE 1

Pasteurisation Time/Temperature Relationship

Temperature		Time
°C	°F	
62.8	145	30 min
71.6	161	15 s
88.3	191	1 s
95.5	201	0.05 s
100.0	212	0.01 s

- 2.13 **Raw Unpasteurised Milk.** Milk which has not been heated beyond 40°C (104°F) or undergone any treatment that has an equivalent effect.
- 2.14 **Solids-not-Fat.** A measure of the percentage by weight after subtracting the milk fat content from the total solids content of the milk.
- 2.15 **Sterilized Milk.** Raw unpasteurised milk, which has been subjected to a sufficiently high heat treatment before or after packaging to render the product free from any microorganisms likely to proliferate within the product. The product shall be able to remain stable and show no sign of bacterial development after incubation at 2 temperatures: 30 ± 1°C (86±1.8°F) for fourteen days and 55 ± 1°C (131± 1.8°F) for seven days respectively.
- 2.16 **Thermized Milk.** Raw milk that has been heated for at least 15 seconds at a temperature between 57°C (134.6°F) and 68°C (154.4°F) such that after treatment the milk shows a positive reaction to the phosphatase test.
- 2.17 **Total Solids.** The mass of total solids residue after drying a known amount of milk at constant temperature to constant weight.
- 2.18 **Ultra-High-Temperature (UHT) Milk.** Raw unpasteurised milk or thermized milk that has been ultra-pasteurised by heating by means of direct injection of steam or indirect heating to the range of 135°C to 150°C (275°F to 302°F) for a few seconds, followed by cooling and the aseptic filling of containers. The shelf life of UHT milk stored under ambient temperature (26°C to 30°C, 78.8°F to 86°F) is from 4 weeks to 8 weeks or longer, depending on the method of packaging.
- 2.19 **Whole Milk.** Pasteurised or raw unpasteurised milk, which shall contain not less than 3.25% of milk fat, 8.25% of non-fat solids and 11.5% of total solids. The prescribed percentages shall be obtained only by the addition or removal of cream or milk, or by the addition of pasteurised or raw milk from which the fat has been wholly or partially removed, and to the exclusion of dried milk solids, butteroil, butterfat, non-milk solids and non-milk fat.

3 RAW MILK FOR THE MANUFACTURE OF HEAT TREATED WHOLE MILK – GENERAL REQUIREMENTS

- 3.1 Raw milk used for the manufacture of heat treated whole milk must meet the following requirements:
- 3.1.1 It must come from cows and holdings that are checked at regular intervals by the Competent Authority.
- 3.1.2 It must come from cows that undergo regular veterinary inspections.
- 3.1.3 It must come from herds, which are officially tuberculosis and officially brucellosis free.
- 3.1.4 The cow must not show any symptoms of infectious diseases communicable to human beings through milk.

- 3.1.5 The cow's general state of health is not impaired by any visible disorder and is not suffering from any infection of the genital tract with discharge, enteritis with diarrhoea and fever or a recognizable inflammation of the udder.
- 3.1.6 The cow must not show any udder wound likely to affect the milk.
- 3.1.7 Milk from cows which have been treated with substances dangerous or likely to be dangerous to human health that are transmissible to milk must not be used for human consumption unless the cow has complied with an official waiting period laid down by the competent authority.
- 3.1.8 The isolation of animals which are infected, or suspected of being infected, with any of the diseases from the rest of the herd must be possible and effective.
- 3.1.9 Premises where milking is performed or raw milk is stored, handled or cooled must be so sited and constructed to avoid risk of contamination of the milk. They must be easy to clean and disinfect and have at least:
 - 3.1.9.1 Walls and flooring which are easy to clean in those areas liable to soiling or infection.
 - 3.1.9.2 Flooring laid in such a way as to facilitate the draining of liquids and satisfy means of disposing of waste.
 - 3.1.9.3 Adequate lighting and ventilation.
 - 3.1.9.4 An appropriate and sufficient supply of potable water.
 - 3.1.9.5 Adequate separation from all sources of contamination such as lavatories and dung heaps.
 - 3.1.9.6 Fittings and equipment that are easy to clean and disinfect.
- 3.1.10 Milking must be carried out hygienically.
- 3.1.11 Immediately after milking, the milk must be placed in a clean place which is so equipped as to avoid adverse effects on the milk.
- 3.1.12 Absolute cleanliness is required of milking staff. Milking staff must wash their hands and forearms immediately before milking commences and keep them clean as far as is practicable throughout the milking. For this purpose, near the place of milking, suitable facilities are required to enable persons performing milking or handling raw milk to wash their hands and arms.
- 3.1.13 Raw milk should contain no added water beyond that unavoidable from rinse water residues after cleaning of equipment.

- 3.1.14 Microbiological analysis results for raw milk should be calculated as follows:
 - 3.1.14.1 Plate count at 30°C (86°F) - Geometric average over a period of 2 months, with at least 2 samples per month.
 - 3.1.14.2 Somatic cell count-Geometric average over a period of 3 months, with at least one sample per month. The specification may be adjusted according to seasonal conditions by approval from the Competent Authority.
- 3.1.15 Raw milk must be transported under satisfactory conditions of hygiene.
 - 3.1.15.1 Plate count at 30°C (80°F) – Geometric average over a period of 2 months, with at least 2 samples per month.
- 3.1.16 Transport tanks/container for raw milk must bear a clear indication that they may only be used for foodstuffs for human consumption.
- 3.1.17 Animals of all species must be kept away from premises and sites where milk is stored, processed or cooled.
- 3.1.18 Equipment and instruments or their surfaces which are intended to come into contact with milk or milk contact surfaces must be made of smooth materials which are easy to clean and disinfect, resists corrosion and does not transfer substances into the milk in such quantities as to endanger human health or impair the composition of the milk or adversely affect it's organoleptic characteristics.
- 3.1.19 Equipment and instruments, after use, must be cleaned and disinfected. After each journey or series of journeys where there is a very short space of time between unloading and loading, but in any event at least once per day.

4 HEAT TREATED MILK

- 4.1 Processing of milk must conform to the Belize Agricultural Health Authority (BAHA) Food Safety Regulations.
- 4.2 Raw milk used to produce heat-treated milk must meet the requirements of section 3 of this standard.
- 4.3 Raw milk must be treated within 4 hours of acceptance at a treatment establishment or be cooled to a temperature not exceeding 6°C (42.8°F) and maintained at that temperature until heat-treated.
- 4.4 The operator or manager of the processing establishment must take all necessary steps to ensure that the raw milk is treated within 36 hours of acceptance if the milk is kept at a temperature not exceeding 6°C (42.8°F) or

within 48 hours of acceptance if the milk is kept at a temperature of 4°C (39.2°F) or lower.

- 4.5 Raw milk must be purified or filtered prior to treatment.
- 4.6 It shall be white or creamy white in colour and free from abnormal taste or odour.
- 4.7 It may be homogenised and shall be free from abnormal taste or odour.
- 4.8 Milk tanks/containers premises, installations and working equipment may be used for other foodstuffs for human consumption provided that all appropriate measures are taken to prevent contamination or deterioration of heat-treated whole milk.
- 4.9 Whole milk that is in final package form for beverage use shall have been pasteurised, ultra-high temperature treated or sterilized.
- 4.10 Immediately after pasteurisation it must be cooled to a temperature not exceeding 6°C (42.8°F).
- 4.11 UHT milk must have been obtained by applying to raw or thermized milk a continuous flow of heat entailing the application of a high temperature short time (not less than +135°C (+275°F) for not less than 1 second).
- 4.12 Where the UHT milk treatment process is employed by direct contact of milk and steam, the steam must be obtained from potable water and must not leave deposits of foreign matter in the milk or affect it adversely.
- 4.13 UHT milk must be of preservability such that no deterioration can be observed by means of random sampling checks after it has spent 15 days in a closed container at a temperature of +30°C (+86°F), where necessary provision can also be made for a period of 7 days in a closed container at a temperature of 55°C (+131°F).
- 4.14 Sterilized milk must have been heated and sterilized in hermetically sealed wrappings or containers, the seal of which must remain intact.
- 4.15 Sterilized milk must be of a preservability such that no deterioration can be observed after it has spent 15 days in a closed container at a temperature of +30°C (+85°F), where necessary provision can also be made for a period of 7 days in a closed container at a temperature of +55°C (+131°F)".
- 4.16 Heat-treated milk should contain no added water beyond that unavoidable from rinse water residues after cleaning of equipment.
- 4.17 The operator or manager of the treatment establishment shall, in the event of an immediate human health risk, withdraw from the market the quantity of products obtained in technologically similar conditions and likely to present the same risk. This withdrawn quantity must stay under the supervision and

control of the competent authority until it is destroyed, used for purposes other than human consumption or, after authorization by the Competent Authority, reprocessed in an appropriate manner to ensure its safety.

- 4.18 It shall comply with the requirements for maximum limits for chemical residues and pollutants as established by the Codex Alimentarius Commission.
- 4.19 Heat-treated milk must not be subjected to any chemical adulterance.

TABLE 2

Analysis Specification for Liquid Whole (Cow's) Milk (Raw and Processed)

Analysis	Raw Milk	Thermized Milk	Processed Milk	UHT and Sterilized Milk	Recommended Test Method
Butterfat	3.00% min	3.00% min	3.00% min	2.25% min	AOAC 989.04
Percentage added water (freezing point depression)	0.0 % (-0.525°C or below per herd, -0.520°C or below per cow)	0.0 % (-0.525°C or below)	0.0 % (-0.525°C or below)	0.0 % (-0.525°C or below)	AOAC 980.15 Cryoscopy method
Acidity Titratable	0.145 to 0.17% lactic acid	Not applicable	Not applicable	Not applicable	AOAC 947.05
Methylene blue	Grade A; 4½ h min Grade B; 2 h min	Not applicable	Not applicable	Not applicable	AOAC 920.11
Phosphatase	Not applicable	Positive	Negative	Not applicable	CHARM TEST
Listeria monocytogenes	Not applicable	Not applicable	Absent in 1 g	Absent in 1 g	FDA BAM
Salmonella ssp.	Not applicable	Not applicable	Absent in 25 g n=5, c=0	Absent in 25 g n=5, c=0	FDA BAM
Somatic cell count	<400,000/ml	Not applicable	Not applicable	Not applicable	CHARM TEST
Total plate count	≤100,000 cfu/ml (≤300,000 cfu/ml if ≥236 hrs)	≤100,000 cfu/ml	Not applicable	≤0.1 cfu/ml	FDA BAM
Coliform	Not applicable	Not applicable	m=0 M=5 n=5 c=1	Not applicable	FDA BAM
Antibiotics and/or other inhibitory substances: presence	No detectable zone	Not applicable	Not applicable	Not applicable	APHA test method (A) Bacillus subtilis method

TABLE 2 (CONTINUED)

Analysis	Raw Milk	Thermized Milk	Processed Milk	UHT and Sterilized Milk	Recommended Test Method
Hydrogen Peroxide	Not applicable	Not applicable	Not applicable	Not applicable	AOAC 957.08
Organo-phosphates	MRL	Not applicable	Not applicable	Not applicable	Charm Test and GC
Carbamates	MRL	Not applicable	Not applicable	Not Applicable	Charm test and HPLC
Aflatoxin	MRL	Not applicable	Not applicable	Not applicable	Charm test and HPLC
Solids-not-fat	8.25 min	Not applicable	8.25 min	Not applicable	BS 734:Part 2
Total solids	11.50 min	Not applicable	11.50 min	Not applicable	BS 1747

- Where
- n = number of sample units comprising the sample
 - c = number of sample units where the bacteria count may be between 'm' and 'M' the sample being considered acceptable if the bacteria count of the other sample units is 'm' or less
 - M = maximum value for the number of bacteria, the result is considered unsatisfactory if the number of bacteria in one or more sample units is 'M' or more
 - m = threshold value for the number of bacteria, the result is considered satisfactory if the number of bacteria in one or more sample units does not exceed 'm'

5 OPTIONAL INGREDIENTS

- 5.1 Vitamins may be added in such amounts as to ensure that the nutritive value of the milk is maintained at not less than the values set out in Table 3, throughout the indicated shelf life. In adding vitamins allowances shall be made for any deterioration, which may occur under the conditions of storage as indicated on the package.
- 5.1.1 Vitamin D, if added, shall be of food quality grade and shall be present in such quantity that each litre of the milk contains not less than 5 μg (200 IU's) and not more than 10 μg (400 IU's).

- 5.1.2 Vitamin A, if added, shall be of food quality grade and shall be present in such quantity that each litre of the milk contains not less than 400 μg RE (1332 IU's) and not more than 600 μg RE (1998 IU's).
- 5.2 Added vitamins may be from natural or artificial sources.
- 5.2.1 Vitamin A may be added in the form of natural retinol, B-carotene and carotenoid pro-vitamins, or in the form of food grade synthetic acetate and palmitate esters, provitamins, A carotenoids and B apo-8-carotenal and other carotenals and carotenic acids.
- 5.2.2 Vitamin D may be added from natural sources or as commercial vitamin D₂ and D₃, the chemically synthesized metabolites of cholecalciferol or ergocalciferol and related derivatives.
- 5.3 Minerals of food quality grade may be added in such amounts as to ensure that the nutritive value of the milk is maintained at not less than the values set out in Table 3, throughout the indicated shelf life.

TABLE 3

Average Nutrient Mineral/Vitamin Values for Liquid Whole (Cow's) Milk

Nutrient	Nutrient per litre
Calcium	1232 mg
Iron	1.06 mg
Vitamin A (RE)	400 μg
Thiamin	0.41 mg
Riboflavin	1.55 mg
Nicotinic acid equivalent	8.88 mg
Vitamin C	10.56 mg
Vitamin D	0.30 μg

- 5.4 The addition of skimmed milk powder, butterfat and other such milk products to milk shall not be permitted.

6 PACKAGING AND STORAGE REQUIREMENTS**6.1 General**

- 6.1.1 The receiving, holding, packaging, storage and delivery of milk shall be such as to promote the highest quality of finished product.

6.2 Packaging

- 5.4.1 The milk shall be packaged in containers which will satisfactorily protect the milk against contamination, maintain nutritional quality and ensure that no deterioration of flavour, odour or composition occurs under required conditions of storage, trade and transport over the stated shelf life.
- 5.4.2 Packaging materials shall be used which will provide sufficiently low permeability to air and vapour, to prevent the formation of mould growth and surface oxidation.
- 5.4.3 Packaging materials shall be used which will provide a sufficient barrier to penetration by light to prevent deterioration of the nutrient quality of the product over the stated shelf life.
- 6.2.4 Packaging materials shall be resistant to puncturing, tearing, cracking or breaking under normal conditions of handling, transport and storage.
- 6.2.5 Package type shall be as described in column 1 of Table 4.

6.3 Storage

- 6.3.1 Care shall be taken to prevent deterioration of the product from heat, light, mould growth, absorbed odours, drippage or condensation, vermin or insect infestation.
- 6.3.2 The product shall be held under controlled conditions of humidity and temperature at all times, to prevent deterioration of product and container.
- 6.3.2 Raw milk, unless processed within 2 h after being received, shall be cooled and held at a temperature of 4.0°C (39.2°F) or lower but above 0°C (32°F) until processed.
- 6.3.4 Finished products in containers shall be stored at temperatures, which will best maintain the initial quality of the product (as indicated in Table 4).

Table 4

Packaging/Storage/Shelf Life Relationships of 4 Processing Methods

Type	Required Storage Temperature	Minimum Expected Shelf Life	Required Package Transport Temperature
(a) Glass	below 4.0°C	10 days	below 5.0°C
(b) Paperboard (wax) coated or polyethylene coated	below 4.0°C	10 days	below 5.0°C
(c) Flexible plastic pouch	below 4.0°C	10 days	below 5.0°C
(d) Paperboard with polyethylene liner	below 4.0°C	10 days	below 5.0°C
(e) Aseptic Packaging (1) in aluminum foil flexible Laminate	(a) ambient temp. (26°C to 30°C)	(a) 3 mths to 6 mths	(a) ambient temp. (26°C to 30°C)
(2) in cans	ambient temp. (26°C to 30°C)	3 mths to 6 mths	ambient temp. (26°C to 30°C)

(a), (b) (c) and (d) in the above table apply to the following processes:

- (1) Pasteurization [Batch or holding method at 62.8°C (145°F) for 30 min]
- (2) HTST (High temperature short time) method and (e) applies to:
- (3) UHT (Ultra-high-temperature) method
- (4) Sterilization

NOTE

4.0°C = 39.2°F

5.0°C = 41°F

26°C = 78.8°F

30°C = 86.0°F

7 LABELLING

- 7.1 Shall conform to the Belize National Standard Specification for Labelling, Part 3: Labelling of Pre-packaged Foods BZS 1: Part 3: 1998.
- 7.2 In addition to 7.1, the following shall apply:
- 7.2.1 The name of the product, '**MILK**', shall appear on the principal display panel, and shall be qualified by any special treatment it has undergone such as 'PASTEURIZED', 'HOMOGENIZED', 'VITAMIN A added', accordingly.
 - 7.2.2 Where vitamins or minerals are added, an indication shall be made on the label in conjunction with the name of the food.
 - 7.2.3 Nutrition information is required on the information panel of the label whenever nutrition claims are made in label statements.
 - 7.2.4 Nutrition information shall be given as nutrition information per serving. The serving size is one cup (8 fl oz or 227 ml) of milk, unless, otherwise stated on the label.
 - 7.2.5 Nutrition information shall appear on the label and be written in accordance with accepted international practice or the recommendations of the Belize Bureau of Standards.
 - 7.2.6 Where a multiunit package of milk is intended for retail sale as a unit, the label of the unit of milk shall comply with this specification.
 - 7.2.7 Where the individual units of a multiunit package of milk may be sold individually and separate from the multiunit package of milk, each shall be labelled in accordance with the requirements of this specification.

NOTE: All new labels shall be submitted to the Belize Bureau of Standards at the design stage for approval.

8 METHODS OF ANALYSIS

- 8.1 Analysis shall be done in accordance with the test methods specified in Table 2.

9 RECORD KEEPING

- 9.1 The operator or manager of the treatment establishment must keep a written or registered record of the information required by this standard. The results of the checks and tests shall be kept for a period time as specified by the Competent Authority.

10 CRITERIA FOR CONFORMITY

10.1 The lot shall be considered as conforming to this standard if the sample tested satisfies all the requirements of this specification.