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DRAFT EAST AFRICAN STANDARD

UHT milk — Specification

EAST AFRICAN COMMUNITY

Third Edition 2018

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Foreword

Development of the East African Standards has been necessitated by the need for harmonizing requirements governing quality of products and services in the East African Community. It is envisaged that through harmonized standardization, trade barriers that are encountered when goods and services are exchanged within the Community will be removed.

The Community has established an East African Standards Committee (EASC) mandated to develop and issue East African Standards (EAS). The Committee is composed of representatives of the National Standards Bodies in Partner States, together with the representatives from the public and private sector organizations in the community.

East African Standards are developed through Technical Committees that are representative of key stakeholders including government, academia, consumer groups, private sector and other interested parties. Draft East African Standards are circulated to stakeholders through the National Standards Bodies in the Partner States. The comments received are discussed and incorporated before finalization of standards, in accordance with the Principles and procedures for development of East African Standards.

East African Standards are subject to review, to keep pace with technological advances. Users of the East African Standards are therefore expected to ensure that they always have the latest versions of the standards they are implementing.

The committee responsible for this document is Technical Committee EASC/TC 017, *Milk and milk products*.

Attention is drawn to the possibility that some of the elements of this document may be subject of patent rights. EAC shall not be held responsible for identifying any or all such patent rights.

This third edition cancels and replaces the second edition (EAS 27: 2007), which has been technically revised.

UHT milk — Specification

1 Scope

This Draft East African Standard specifies requirements, sampling and test methods for UHT milk.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

AOAC 999.10, *Official method for lead, cadmium, zinc, copper, and iron in foods Atomic absorption Spectrophotometry after microwave Digestion*

CAC/RCP 1, *General principles for food hygiene*

CAC/RCP 57, *Code of hygienic practice for milk and milk products*

EAS 38, *Labelling of pre- packaged foods — General requirements*

EAS 803, *Nutrition labelling — Requirements*

ISO 707, *Milk and milk products — Guidance on sampling*

ISO 2446, *Milk — Determination of fat content*

ISO 4832, *Microbiology of food and animal feeding stuffs — Horizontal method for the enumeration of coliforms — Colony count technique*

ISO 4833-1, *Microbiology of the food chain — Horizontal method for the enumeration of microorganisms — Part 1: Colony count at 30 degrees C by the pour plate technique*

ISO 5764, *Milk — determination of freezing point — Thermistor cryoscope method (Reference method)*

ISO 6579-1, *Microbiology of the food chain — Horizontal method for the detection, enumeration and serotyping of Salmonella — Part 1: Detection of Salmonella spp*

ISO 6731, *Milk, cream and evaporated milk — Determination of total solids content (Reference method)*

ISO 6888-3, *Microbiology of food and animal feeding stuffs — Horizontal method for the enumeration of coagulase-positive staphylococci (Staphylococcus aureus and other species) — Part 3: Detection and MPN technique for low numbers*

ISO 8968-4, *Milk and milk products — Determination of nitrogen content — Part 4: Determination of protein and non-protein nitrogen content and true protein content calculation (Reference method)*

ISO 14501, *Milk and milk powder — Determination of aflatoxin M1 content — Clean-up by immunoaffinity chromatography and determination by high-performance liquid chromatography*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1
cow
lactating female of cattle (*Bos indicus* and *Bos Taurus* or their crosses)

3.2
cow milk
normal, clean and fresh secretion extracted from the udder of a healthy cow but excluding that obtained during the first seven days after calving

3.3
pasteurized milk
milk which has been subjected to pasteurization either by batch method, flash pasteurization or High Temperature Short Time method (HTST)

3.4
homogenization
process by which milk fat globules are finely divided and interspersed to form a homogeneous product so as to prevent the fat from floating on the surface and adhering to the inside of the container

3.5
UHT milk
milk that is treated under ultra-high temperatures (at 135° – 150° centigrade for 2 sec - 6 sec), homogenized, filled and sealed aseptically into sterile retail containers in order to maintain commercial sterility under room temperatures

3.6
commercial sterility
condition achieved by application of heat sufficient, alone or in combination with other appropriate treatment to render food free from microorganisms capable of growing in the food as normal non-refrigerated conditions at which the food is likely to held during distribution and storage

3.7
reconstituted milk
product resulting from the addition of water to the dried or concentrated form of the product in the amount necessary to re-establish the appropriate water to solids ratio.

3.8
recombined milk
product resulting from the combining of milkfat and milk-solids-non-fat in their preserved forms with or without the addition of water to achieve the appropriate milk product composition.

3.9
toned milk
product prepared by a mixture of cow milk with skimmed milk or powdered milk in the amount necessary to re-establish the appropriate milk product composition.

3.10
pasteurized milk
milk which has been efficiently heat treated at a sufficiently high temperature for appropriate period of time to ensure complete destruction of all pathogenic organisms, so as to enable the product to be transported, distributed and consumed as liquid milk

4 Requirements for UHT milk

4.1 Raw materials

Raw materials for UHT milk may include:

a) raw milk;

b) reconstituted milk;

c) recombined milk;

d) pasteurized milk; or

e) toned milk

4.1 General requirements

UHT milk shall:

a) be processed without affecting the composition of the product;

b) have characteristic of texture and colour; and

c) be free from preservatives, off-flavours and odour.

4.2 Specific requirements

UHT milk shall comply with the physico-chemical requirements given in Table 1 when tested in accordance with tests methods specified therein.

Table 1 — Physico-chemical requirements for UHT milk

S/N	Characteristic	Requirement	Test method
i.	pH variation, max.	0.3	Annex A
ii.	*Titratable acidity* variation, % lactic acid, max.	0.02	Annex B
iii.	Density at 20 °C, g/ml	1.028 - 1.036	Annex C
iv.	Milk fat content (%), m/m		ISO 2446
	a) Whole milk/full cream milk, min.	3.25	
	b) Fat reduced milk/semi skimmed milk	1.51 - 3.24	
	c) Low fat milk/skimmed milk	0.51 - 1.50	
	d) Fat free milk, max.	0.50	
v.	Milk Solids Non-Fat, %, max.	8.5	ISO 6731
vi.	Protein content, %, min.	3	ISO 8968-4
vii.	Freezing point, °C	-0.550 to -0.525	ISO 5764

4.3 Microbiological requirements

UHT milk shall comply with microbiological requirements given in Table 2 when tested in accordance with test methods specified therein.

Table 2 — Microbiological requirements for UHT milk

S/N	Micro-organisms	Maximum limits	Test method
i.	Total plate count, CFU/ ml	10	ISO 4833-1
ii.	Coliform, CFU/ ml	absent	ISO 4832
iii.	*Staphylococcus aureus (coagulase positive)*/ ml	absent	ISO 6888-3
iv.	*Salmonella spp, per* 25 ml	Absent	ISO 6579-1

5 Contaminants

5.1 Pesticide residues

UHT milk shall conform to maximum limits residues set by Codex Alimentarius Commission.

5.2 Veterinary drugs residues

UHT milk shall conform to maximum tolerable residue limits for antibiotics and other veterinary drugs set by Codex Alimentarius Commission.

5.3 Heavy metals

The level of Lead (Pb) shall not exceed 0.02 mg/kg when tested in accordance with AOAC 999.10.

5.4 Mycotoxin

When tested in accordance with ISO 14501 the level of Aflatoxin M1 shall not exceed 0.50 µg/kg.

6 Hygiene

Raw milk shall be produced and handled in accordance with CAC/RCP 57 and CAC/RCP 1.

7 Packaging

7.1 The packaging material used for UHT milk shall:

a) be lightproof;

b) be gas proof;

c) be mechanically strong;

d) be non-toxic;

e) not impart any off-flavour to the milk;

f) be able to withstand aseptic packaging pre-treatment procedure; and

g) allow hermetic sealing.

7.2 The UHT milk shall be packaged aseptically into sterile packaging material and sealed hermetically.

7.3 UHT milk packages shall not be deformed, creased, dented or have crushed corners.

8 Labelling

The containers shall be labelled in compliance with the requirements of EAS 38 and EAS 803. In addition, the following particulars shall be legibly and indelibly labelled on the container:

a) name of the product as follows:

   i. UHT milk (if raw milk or pasteurized milk are used as raw materials);

   ii. Recombined UHT milk;

   iii. Toned UHT milk; or

   iv. Reconstituted UHT milk.

b) fat content;

c) net content in SI units;

d) name and physical address of manufacturer;

e) batch or code number;

f) the fat content;

g) nutritional information;

h) the date of manufacture and expiry date;

i) instruction for storage and use; and

j) country of origin;

9 Sampling

Sampling for UHT milk shall be done in accordance with ISO 707.

Annex A
(normative)

Determination of pH variation

A.1 Apparatus

A.1.1 Incubator adjusted at 55 °C ± 1 °C

A.1.2 pH meter

A.2 Procedure

A.2.1 Determine the pH of 50 ml of the sample in the flask, with a glass electrode at 20 °C and note reading. Then incubate another 50 ml of the sample at 55 °C ± 1 °C for five days. Examine the flask each day, then shake and replace it in the incubator. If any physical alteration of the contents is observed (coagulation with, or without exudation, grittiness, flocculation, formation of bubbles or scum peptonization or proteolysis) the result of the test shall be considered positive and the sample as nonsterile.

A.2.2 If no alteration takes place during the five days incubation at 55 °C ± 1 °C remove the sample from the incubator and cool to room temperature. Take a small portion of it and measure the pH in the pH meter with glass electrode at 20 °C. From this pH value subtract the initial pH value (A.2.1).

A.3 Interpretation of results

A sample which does not show any physical alteration during incubation at 55 °C ± 1 °C for five days and where the pH does not show a difference of more than 0.3 unit from the initial pH is considered sterile.

Annex B
(normative)

Determination of titratable acidity

B.1 Apparatus

B.1.1 Incubator

B.1.2 Burette; with soda-lime guard tube

B.1.3 Porcelain dishes; white hemispherical of approximately 60 ml

B.1.4 Stirring rods; of glass, flattened at one end

B.2 Reagents

B.2.1 Standard sodium hydroxide solution

Prepare concentrated stock solution of sodium hydroxide by dissolving equal parts of sodium hydroxide (stocks or pellets) in equal parts of water in a flask. Tightly stopper the flask with a rubber bung and allow any insoluble sodium carbonate to settle down for three to four days.

Use the clear supernatant liquid for preparing the standard 0.1 M solution. About 8 ml of stock solution is required per litre of distilled water. The solution should be accurately standardized against acidic potassium phthalate or oxalic acid.

B.2.2 Phenolphthalein indicator solution

Dissolve 1 g of phenolphthalein in 110 ml rectified spirit. Add 0.1 M sodium hydroxide solution until one drop gives a faint pink coloration.

B.2.3 Rosaniline Acetate Stock Solution

Dissolve 0.121 g of rosaniline acetate in approximately 50 ml of rectified spirit, containing 0.5 ml of facial acetic acid. Make up to 100 ml with rectified spirit.

B.2.4 Bench solution

Dilute 1 ml of stock solution to 500 ml with a mixture of rectified spirit and distilled water in equal proportions by volume.

The stock and the bench solutions shall be stored in dark brown bottles securely stoppered with rubber bungs.

B.3 Procedure

B.3.1 Acidity of fresh sample

Weigh 10.0 g of the sample into each of the two white porcelain dishes of approximately 60 ml capacity; add to both 10 ml of water and stir to disperse the sample. Prepare from one dilution a colour control by adding

and stirring 2 ml dilute rosaniline acetate solution. Stir 2 ml phenolphthalein solution into the other dilution and while stirring vigorously, add as rapidly as possible sodium hydroxide solution from a 10-ml burette fitted with a soda-lime guard tube, until the colour matches the pink colour of the control. The titration shall be done in bright light.

B.3.2 Acidity after incubation

Incubate another 20 g of sample at 55 °C ± 1 °C for five days. Examine the flask each day, then shake and replace it in the incubator. If any physical alteration of the content is observed the results of the test shall be considered positive and the sample as non-sterile.

If no alteration takes place during the five days incubation remove the sample from the incubator and cool to room temperature. Weigh 10 g of the incubated sample and determine acidity as described in B.3.1.

B.4 Calculation

B.4.1 Acidity of fresh sample

Titratable acidity (as lactic acid) per cent by weight = $\frac{9V.M}{m}$

Where,

V=is the volume in ml of the standard sodium hydroxide required for titration (see B.3.1)

M=is the molarity of the standard sodium hydroxide solution (see B.3), and

m=is the mass in g of the sample taken for test (see B.3.1).

B.4.2 Acidity after incubation

B.4.2.1 Titratable acidity (as lactic acid) percent by weight = $\frac{9V.M}{w}$

Where,

V=is the volume in ml of the standard sodium hydroxide required for titration (see B.2.1),

M=is the molarity of the standard sodium hydroxide solution (see B.2.1),

w=is the weight in g of the sample taken for the test (see B.2.1)

B.4.2.2 Subtract the value obtained in B.4.1 from the value obtained in B.4.2 which would give increase in acidity.

B.5 Interpretation of results

A sample which does not show any physical alteration during incubation at 55 °C ± 1 °C for five days and where the acidity does not show a difference of more than 0.02 g from the initial acidity is considered sterile.

Annex C
(normative)

Determination of Density in milk

C.1 General

The density is a relationship between the body mass and the volume this body occupies in the space. The density test is performed in order to be used in the detection of adulteration in the milk since, the addition of water only would cause the decrease in density, whereas the skimming(fat removal) would cause an increased density in the milk, beside supplying important information for the determination of the total dry extract.

C.2 Equipment

The following equipment shall be used:

a) Thermolactodensimeter (TLD); and

b) Test tube (250 mL)

C.3 Methods

The density determination is accomplished by the Thermolactodensimeter because the practicability of this method.

C.4 Procedure

C.4.1 Place the sample to be analyzed in the clean and dry test tube by taking the care of inclining the test tube and allowing the liquid to flow down the walls of the glass for avoiding the incorporation of the air which would reduce the density of the milk.

C.4.2 Immense TLD into the test tube and make it rotate slowly on its own axis.

C.4.3 **Perform** the reading of both density and temperature of the milk as soon as TLD stabilizes.

C.4.4 Proceed to the correction of the influence from the temperature, by using an adequate scale. The result will correspond to the corrected milk density.

