DRAFT TANZANIA STANDARD

Raw milk – Specification

TANZANIA BUREAU OF STANDARDS

Raw milk – Specification

0 FOREWORD

Milk is a nutritious food produced by milking animals for the nourishment of the newly born. Dairy animals often produced milk in excess of the nutritional requirement of their young. Surplus milk is therefore extensively used for human nutrition in variety of forms.

Milk is used as raw material in processing various food products. Thus, of necessity raw milk must meet the required safety and quality requirements before it is processed into subsequent dairy products. This Tanzania standard is therefore being prepared to ensure safety and quality of raw milk produced and/or traded in the country.

In the preparation of this Tanzania standard considerable assistance was drawn from EAS 67:2007, *Raw cow milk – Specification*; published by the East African Community.

In reporting, the results of a test or analysis made in accordance with this standard, if the final value observed or calculated, is to be rounded off, it shall be done in accordance with TZS 4 (see clause 2).

1.0 SCOPE

This Tanzania Standard specifies requirements, methods of sampling and test for raw milk from dairy cows intended for human consumption and for further processing.

2.0 REFERENCES

For the purpose of this Tanzania standard, the following references shall apply. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies:

TZS 4 – Rounding off numerical values
TZS 109 – Food processing units – code of hygiene
TZS 112 – Milk – Production, processing, transportation and distribution – code of hygiene.
TZS 118 – Microbiology of food and animal feeding stuffs – Horizontal method for enumeration of microorganisms – Colony count technique at 30 ^{0}C.
TZS 119 – Microbiology – General guidance for the enumeration *of coliforms* – Most Probable Number technique (MPN).
TZS 122 – Microbiology of food and animal feeding stuffs – Horizontal method for the detection of *Salmonella spp.*
TZS 124 - Milk and milk products – sampling for microbiological examination.
TZS 125 – Microbiology of food and animal feeding stuffs – Horizontal method for the enumeration of coagulase-positive staphylococci (*Staphylococcus aureus* and other species) – Part 1: Technique using Baird-parker agar medium – Amendment 1: Inclusion of precision data.
TZS 131 – Microbiology - General guidance for enumeration of yeast and moulds – Colony count technique at 25 ºC.
TZS 731 – Microbiology of food and feeding stuffs – Horizontal method for detection and enumeration of presumptive *Escherichia coli* – Most Probable Number Technique
ISO 1211 – Milk -- Determination of fat content -- Gravimetric method (Reference method)
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 5764 – Milk -- Determination of freezing point -- Thermistor cryoscope method (Reference method)
ISO 13366-1 – Milk -- Enumeration of somatic cells -- Part 1: Microscopic method (Reference method).
CAC/MRL 2 - Maximum Residue Limits (MRLs) and Risk Management Recommendations (RMRs) for Residues of Veterinary Drugs in Foods.
ISO 14674 - Milk and milk powder -- Determination of aflatoxin M1 content -- Clean-up by immunoaffinity chromatography and determination by thin-layer chromatography

3.0 TERMS AND DEFINITIONS

For the purpose of this standard, the following terms and definitions shall apply:

3.1 milk
normal, clean and fresh secretions extracted from the udder of a healthy cow, properly fed and kept, but excluding that obtained during the first seven days after calving.

3.2 milk fat
a mixture of triglycerides containing saturated acids with four to twenty carbon atoms, and a range of unsaturated acids of which the main is oleic acid; in addition, there are small amounts of the more unsaturated linolenic acids.

3.3 solids not fat (SNF)
solids in milk, excluding fat, i.e. protein, lactose and salts; they serve as one of the indices of milk quality.

4.0 REQUIREMENTS

4.1 General requirements
Raw milk shall:

a) have white or creamy-white colour with natural odour and flavor.
b) be clean and free from any foreign matters.
c) have no protein precipitation under preliminary testing with alcohol test.
d) have methylene blue reduction time be longer than 4 hours or Resazurin reduction test be at least grade 4.5 at 1hour incubation.
e) have somatic cell count not exceeding 300, 000 cells/ml.

4.2 Specific requirements
The compositional requirement for raw milk shall be as prescribed in Table 1.

Table 1: Compositional requirement for raw milk

S/No	Characteristic	Limits	Methods of test
1)	Milk fat, %min	3.25	ISO 1211
2)	Protein, % min	3.00	ISO 8968-4
2)	Density at 20 °C, g/ml	1.028 – 1.032	Lactometer
3)	freezing point depression °C	0.525 - 0.550 °	ISO 5764
4)	Milk solid nonfat, %, min	8.5	Calculation
5)	Alcohol test.	negative	Annex A
6)	Clot on Boil test	negative	Annex B
7)	Titratable Acidity, %, max	0.17	Annex C
8)	Phosphatase test	positive	Annex D
9)	Peroxidase test	Positive	Annex E
10)	pH	6.6 - 6.8	Annex F

4.3 Food additives

No food additive is allowed in raw milk.

5.0 CONTAMINANTS

5.1 Pesticides

Pesticides in raw milk shall comply with maximum residual limits for pesticide residues as prescribed in Table 2.

Table 2: Pesticide limits in raw cow milk

S/N	Pesticide	Maximum limit (mg/kg) on whole milk basis
i.	Aldrin and dieldrin (total)	0.006
ii.	Heptachlor and heptachlorepoxide (total)	0.006
iii.	DDT and its analogues	Absent
iv.	Lindane	0.01
v.	SHC + HCH	0.01
vi.	Endrin	0.01

5.2 Veterinary drugs residues.

Veterinary drug residues in raw milk shall comply with maximum residual limits (MRLs) for veterinary drug residues as prescribed in the CAC/MRL 2.

5.3 Aflatoxin M1

Raw milk shall not contain aflatoxin M1 more than 0.5 µg/kg when tested in accordance with ISO 14674.

6 HYGIENE

6.1 Raw milk shall be produced, transported and /or distributed in accordance with the hygiene requirements set according to TZS 109 and TZS 112.

6.2 Sample of raw milk tested shall not contain microbiological counts more than the limits prescribed in Table 3, 4 and 5.

6.2.1 Total plate count

The plate count shall be incubated for 72 h at 30 °C. The counts when tested as per TZS 118 shall be graded as follows:

Table 3: Microbiological limits

S/NO.	Grade	Counts (per ml)
1)	I.	< 200 000
2)	II	>200 000 – 500 000
3)	III	> 500 000 – 1 000 000
4)	IV	>1 000 000 – 2 000 000

4.2.2 Coliform count

The tubes shall be incubated for 48 h at 37 °C. The coliform counts when tested by the MPN as per TZS 119 shall be graded as follows:

Table 4: Coliform limits

S/N	Quality	Counts (per ml)
a)	Very good	0-1000
b)	Good	1000-50000

4.2.3 Somatic cell count

Somatic cell count shall not be more than 300 000 per ml when tested in accordance with ISO 13366-1

Table 5: Microbiological requirements

S/No.	**Microorganisms**	**Requirements**	**Methods of test (see clause 2)**
i)	Total count, cfu/g max	10^5	TZS 118
ii)	*Escherichia coli*, cfu/g	Absent	TZS 731
iv)	*Salmonella spp* per 25g, cfu/g	absent	TZS 122
v)	Yeast and Moulds max	10	TZS 131

7.0 SAMPLING AND TESTS

7.1 Sampling

Sampling of raw milk shall be done according to TZS 124 and TZS 450 (see clause 2).

7.2 Tests

Testing of raw milk shall be done according to test methods prescribed in Table 1,2, 3, 4 and 5.

8.0 RAW MILK CARRIAGE AND TRANSPORTATION

8.1 Raw milk shall be carried and transported in approved clean and safe food grade containers recommended for raw milk carriage.

8.2 Raw milk shall be transported to processing destination as fast as possible under refrigeration condition (4-6 ^{o}C).

8.3 Milk carriages shall be clearly marked for milk transport only.

8.4 Milk shall not be transported with other commodities or human being.

8.5 The language on the label shall be “Kiswahili” or Kiswahili and English. Additional language may be used depending on the designated market.

8.6 The container may also be marked with TBS Certification Mark.

NOTE – The TBS Standards Mark of Quality may be used by the manufacturers only under licence from TBS. Particulars of conditions under which the licenses are granted may be obtained from TBS.

Annex F
(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 ± 1 °C for seven 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 ± 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 ± 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 C
(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

0.1 M. 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.2.3.1 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 (as indicated in A.2.1) 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

a) **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.3.2.1),

M is the molarity of the standard sodium hydroxide solution (see B.3.2.1),

w is the weight in g of the sample taken for the test (see B.3.2.1)

b) **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