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Fermented (non-alcoholic) cereal beverages — Specification



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Requests for permission to reproduce this document should be addressed to

The Executive Director
Uganda National Bureau of Standards
P.O. Box 6329
Kampala
Uganda
Tel: 256 414 505 995
Fax: 256 414 286 123
E-mail: unbs@infocom.co.ug
Web: www.unbs.go.ug

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Foreword

Uganda National Bureau of Standards (UNBS) is a parastatal under the Ministry of Tourism, Trade and Industry established under Cap 327, of the Laws of Uganda. UNBS is mandated to co-ordinate the elaboration of standards and is

- (a) a member of International Organisation for Standardisation (ISO) and
- (b) a contact point for the WHO/FAO Codex Alimentarius Commission on Food Standards, and
- (c) the National Enquiry Point on TBT/SPS Agreements of the World Trade Organisation (WTO).

The work of preparing Uganda Standards is carried out through Technical Committees. A Technical Committee is established to deliberate on standards in a given field or area and consists of representatives of consumers, traders, academicians, manufacturers, government and other stakeholders.

Draft Uganda Standards adopted by the Technical Committee are widely circulated to stakeholders and the general public for comments. The committee reviews the comments before recommending the draft standards for approval and declaration as Uganda Standards by the National Standards Council.

This draft Uganda Standard (DUS 872:2009) was developed by the sub-committee on Cereals, Pulses and related products and processes (SC – 3) under supervision of technical committee on Food and Agriculture standards (UNBS TC2). This Draft Uganda Standard has been proposed as a result of a need to provide guidance to industry in production and regulation of fermented cereal beverages.

Fermented (non-alcoholic) cereal beverages — Specification

1 Scope

This Final Draft Uganda Standard specifies requirements and methods of sampling and test for fermented (non-alcoholic) cereal beverages.

2 Normative references

The following referenced documents are indispensable for the application 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.

US 7, *General standard for the labelling of pre-packaged foods*

US 28/EAS 39, *Code of practice for hygiene in the food and drink manufacturing industries*

US 45, *General standard for food additives*

US 201, *Drinking (potable) water — Specification*

US 500, *General requirements for nutrition labelling*

US 508, *General requirements for nutrition and health claims*

US 566, *Use of nutrition terms — Requirements*

US 217-2/EAS 217-2, *Methods for the microbiological examination of foods — Part 2: General Guidance for the Enumeration of Micro-Organisms-Colony Count Technique at 30 °C*

US 217-6/EAS 217-6, *Methods for the Microbiological Examination of Foods — Part 6: Examination for Salmonella Spp*

US 217-8/EAS 217-8, *Methods for microbiological examination of foods —Part 8: Enumeration of yeasts and moulds*

US ISO 7251, *Microbiology of food and animal feeding stuffs — Horizontal method for the detection and enumeration of presumptive Escherichia coli — Most probable number technique*

FDUS ISO 750, *Fruit and vegetable products —Determination of titratable acidity*

3 Terms and definitions

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

3.1

cereal grains

grains of grasses such as wheat, millet, sorghum, oats, or corn, the starchy grains of which are used as food.

3.2 fermented (non-alcoholic) cereal beverage
acidic non alcoholic beverage produced by lactic acid fermentation of milled cereal and/or milled cereal (the fermentation being carried out without the addition of any acid other than lactic acid and with the addition of wheaten products)) and that consists wholly or partially of gelatinized milled cereal acidified by the acids introduced or produced during the lactic acid fermentation process, and that may contain permitted sweeteners, edible protein(s), minerals or vitamins (or a combination of these)

3.3 lactic acid fermentation technology
fermentation process involving the activities of a group of Gram-positive, non-sporing, non-motile, catalase-negative, bacteria, which ferment carbohydrates to produce lactic acid as the sole or major organic acid

3.4 bushera
an opaque, acidic, non-alcoholic, naturally sweetened beverage produced by lactic acid fermentation of malted and milled sorghum and/or millet

4 Requirements for raw materials

4.1 General quality factors

The milled cereal or other raw material used in the production of the fermented (non-alcoholic) cereal beverage shall be clean and sound when examined using sensory attributes and in every way fit for use in the preparation of a product for human consumption.

Where a national standard has been declared for such milled cereal or other raw material, the milled cereal or other raw material shall conform to that national standard.

4.2 Essential ingredients for fermented (non-alcoholic) cereal beverages

The following ingredients shall be used in the preparation of fermented (non-alcoholic) cereal beverages:

- cereal flour complying with relevant standards;
- wheat flour complying with relevant standards;
- sugar;
- yeast;
- lactic acid culture; and
- potable water complying with US 201.

4.3 Essential ingredients for Bushera

The following ingredients shall be used in the preparation of bushera.

- Millet and/or sorghum grains complying with relevant standards.
- Potable water complying with US 201
- Lactic acid culture

4.4 Optional ingredients for Bushera

Yeast

5 Requirements

5.1 General quality factors

Fermented (non-alcoholic) cereal beverages shall be practically free from off-odours and off-flavours when judged using the normal sensory tests.

Fermented (non-alcoholic) cereal beverages shall be practically free from filth (impurities of animal origin, including dead insects) when judged using the normal senses.

Fermented (non-alcoholic) cereal beverages shall be practically free from objectionable matter.

The appearance and consistency of fermented (non-alcoholic) cereal beverages shall be uniform and characteristic of the product.

5.2 Essential composition factors

Fermented (non-alcoholic) cereal beverages shall conform to the compositional requirements in Table 1.

Table 1 — Compositional requirements for fermented cereal beverages

Characteristic	Requirement	Method of Test
Total solids content, %, (m/m), min.	8	Annex A
Acidity, (% m/m, as lactic acid), max.	0.4	FDUS ISO 750
Alcohol content, %, (m/m), max.	0.25	Annex B

5.3 Nutrients

Nutrients including vitamins, minerals and specific amino acids may be added to fermented cereal beverages in conformity with the requirements stipulated in national legislation

6 Food additives

Fermented (non-alcoholic) cereal beverages may contain only permitted additives in accordance with US 45.

7 Contaminants

7.1 Heavy metals

The product shall be free from heavy metals in amounts which may represent a hazard to human health.

7.2 Pesticide residues

The product shall comply with those maximum residue limits established by the Codex Alimentarius Commission for this product.

7.3 Mycotoxins

The product shall comply with those maximum mycotoxin limits established by the Codex Alimentarius Commission for this product.

8 Hygiene

Fermented (non-alcoholic) cereal beverages shall be produced and handled in hygienic manner in accordance with US 28. Fermented (non-alcoholic) cereal beverages shall conform to the limits for microbiological contaminants in Table 2.

Table 2 – Microbiological limits for fermented (non-alcoholic) cereal beverages

Microorganisms	Maximum limit	Method of Test
Total aerobic count, CFU/mL	100	US 217-2/EAS 217-2
<i>E. coli</i> , per mL	Not detected	US ISO 7251
<i>Salmonella</i> per 25 mL	Negative	US 217-6/EAS 217-6
Yeasts and moulds, CFU/mL	20	US 217-8/EAS 217-8

9 Packaging

Fermented (non-alcoholic) cereal beverages shall be packaged in food grade containers which will safeguard the hygienic, nutritional, technological, and organoleptic qualities of the product.

The containers, including packaging materials, shall be made of substances which are safe and suitable for their intended use. They shall not impart any toxic substance or undesirable odour or flavour to the product.

If packages are crated or packed in outer containers, the crates or outer containers shall be clean, neat and in good repair, and shall be capable of protecting the packages from damage during normal handling and transportation. Only packages bearing the same date of manufacture or the same batch identification (as relevant) and containing product of the same kind shall be packed together in an outer container.

10 Labelling

The following information shall appear on the label in accordance to the requirements of US 7:

- a) name of the product, "Fermented (non-alcoholic) cereal beverage";
- b) list of ingredients;
- c) lot identification number;
- d) date of minimum durability (expiry date);
- e) name and physical address of manufacturer;
- f) net content; and
- g) country of origin

Nutritional labelling, nutrition and health claims may be made in accordance with US 500, US 508 and US 566.

11 Sampling

11.1 Scale of sampling

11.1.1 Lot

All containers in a consignment belonging to the same batch of manufacture shall constitute a lot. If the consignment is declared to consist of different batches of manufacture, containers of the same batch shall be grouped together and each group so formed shall constitute a separate lot.

Samples shall be tested from each lot for ascertaining conformity to the requirements of this standard.

11.1.2 Sample size

The number of containers to be selected from a lot for testing for microbiological and other requirements shall depend on the size of the lot and shall be in accordance with Table 3.

Table 3 – Number of containers to be selected for sampling

No. of containers in the lot (N)	No. of containers to be selected (n)	
	Microbiological	Other tests
up to 1300	12	18
1301 to 3200	18	24
3201 and above	24	30

11.1.3 Sampling method

The containers to be selected for testing shall be chosen at random from the lot by the following procedure. Starting from any container, count them as 1,2,3..... up to r. Every rth containers thus counted shall be withdrawn, r being the integral part of N/n, where N is the total number of containers in the lot and n is the total number of containers to be chosen (see Table 3).

11.2 Test samples and reference samples

11.2.1 Samples for microbiological tests

The sample containers selected for microbiological tests (see Table 3) shall be divided at random into three equal sets and labelled with all particulars of sampling. One of these sets of sample containers shall be for the buyer, another for the supplier and the third set is the reference.

11.2.2 Samples for other tests

The sample containers selected for other tests (see Table 3) shall be divided at random into three equal sets and labelled with all the particulars of the sample. One of these sets of sample containers shall be for the buyer, another for the supplier and third is the reference.

11.2.3 Reference samples

Referee samples shall consist of set of sample containers for microbiological tests (see 11.2.1) and a set of sample containers for other tests (see 11.2.2) and shall bear the seals of the buyer and supplier or as agreed to between the two.

12 Methods of analysis

Test of fermented (non-alcoholic) cereal beverages shall be done in accordance with the Uganda Standard stated in the relevant clauses.

Annex A (normative)

Method for determination of total solids content

- A.1** Weigh a suitable size evaporating dish and record the mass m_1 .
- A.2** By means of a measuring cylinder, transfer approximately 25 mL of the test sample to the evaporating dish.
- A.3** Weigh the dish and the test specimen and record the mass m_2 .
- A.4** Heat the dish on a boiling water bath until all the liquid has evaporated, then transfer the dish to an air oven, and dry for 30 min at $103\text{ °C} \pm 1\text{ °C}$.
- A.5** Cool in a desiccator.
- A.6** Reweigh the dish and the dried test specimen (residue) and record the mass m_3 . Calculate the total solids content as follows:

$$\text{Total solids content, \% (m/m)} = \frac{m_3 - m_1}{m_2 - m_1} \times 100$$

where

m_1 is the mass, in grams, of the dish;

m_2 is the mass, in grams, of the dish and specimen; and

m_3 is the mass, in grams, of the dish and dried specimen.

Annex B (normative)

Method for determination of alcohol content

NOTE If the alcohol determination cannot be carried out immediately, stop the fermentation by freezing the sample or by the addition of, for example, 1 g of mercuric chloride per litre.

B.1 Apparatus

- B.1.1 **Gas chromatograph**, of a suitable type and fitted with a hydrogen flame ionization detector
- B.1.2 **Millivolt recorder**, having a full scale deflection of at least 1 mV
- B.1.3 **Electronic integrator**, capable of determining the peak areas of the components
- B.1.4 **Glass chromatographic column**, of internal diameter 4 mm and of length 2.0 m, packed with a suitable column packing material

B.2 Reagents

- B.2.1 **Ethanol**, reference standard of accurately known concentration
- B.2.2 **n-Propanol**, analytical reagent grade
- B.2.3 **Nitrogen**, source of pure nitrogen gas

B.3 Gas chromatograph test conditions

B.3.1 Temperatures

- i) Column: 150 °C
- ii) Detector: 200 °C
- iii) Injector: 200 °C

- B.3.2 **Carrier gas** (nitrogen) flow rate: 30 mL/min

B.4 Calibration

B.4.1 Prepare an internal standard by pipetting 10 mL of the propanol into a 200 mL volumetric flask. Make up to volume with distilled water.

B.4.2 From the ethanol reference standard, prepare a standard solution by pipetting 5 mL of the ethanol into a tared 100 mL volumetric flask. Stopper the flask and reweigh (m_1). Make up to volume with distilled water and mix thoroughly. Pipette 10 mL of this solution and 10 mL of the internal standard into a 100 mL volumetric flask and make up to volume with distilled water.

B.4.3 Connect the chromatographic column to the gas chromatograph. Inject 3 μL of the standard solution into the column under the conditions laid down in B.3 and record the chromatogram. Use the electronic integrator or the recorder to determine the peak areas of the standard and the internal standard.

B.5 Procedure

Weigh out in duplicate approximately 20 g of the test sample (m_2) into a 100 mL volumetric flask. Add 10 mL of the internal standard and make up to volume with distilled water and mix thoroughly.

Use the procedure given in B.4.3 to obtain a chromatogram of each of the two test solutions to determine the peak areas of the alcohol in each sample and the peak areas of the internal standard.

NOTE Porapak Q has been found to be a suitable column packing material.

B.6 Calculation

$$\text{Alcohol content, \%}(m/m) = \frac{R_s}{R_{\text{std}}} \times \frac{m_1}{m_2} \times \frac{C}{10}$$

where

C is the ethanol concentration, %

m_1 is the mass, in grams, of reference standard ethanol

m_2 mass, in grams, of test sample

$$R_s = \frac{\text{area of sample}}{\text{area of internal standard of sample}}$$

$$R_{\text{std}} = \frac{\text{area of standard}}{\text{area of internal standard of sample}}$$

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