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Supplementary foods for the management of moderate acute malnutrition (MAM)/Fortified Processed Cereal Based Foods (Super cereal plus products)— Specification

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Foreword

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This African Standard was prepared by ARSO Technical Harmonization Committee on ARSO/TC 15 on Nutrition and foods for special dietary uses.

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Introduction

An individual needs approximately different nutrients, in different amounts, in order to grow, develop and remain healthy. This is reflected in the established Recommended Nutrient Intakes (RNI) established by the World Health Organization for individuals of different age, sex, activity level and physiological state. Meeting the nutrient requirements of an infant and a young child requires consumption of an adequately diverse diet, including breast milk and a variety of plant Source foods (vegetables, fruits, staples), animal source foods (dairy, eggs, fish, meat) as well as fortified foods.

Inappropriate execution of recommended complementary feeding practices can be attributed in large part to the difficulty of acquiring the recommended quality and quantity of foods. Vitamin-rich fruits and vegetables are often available only during certain seasons, making yearround consumption challenging. Animal source foods, an important source of fat and bio-available protein, are either unavailable or expensive for inclusion in most households' daily consumption patterns. Most rural households suffer from chronic food insecurity, making it difficult to feed children in sufficient quantities and frequencies.

Staple foods produced and consumed in rural households are not screened for common toxins, which may be contributing to poor nutritional outcomes. Contaminants such as aflatoxins can be carcinogenic and cause growth retardation, and high levels of aflatoxins in human diets are associated with stunting in young children. Food processing can use state of the art technology to detect aflatoxins in raw materials like maize, in order to ensure that they do not contaminate the food products, but this level of processing is inaccessible to the target populations.

Households need access to an affordable, high quality complementary food that provides the full suite of nutrients necessary for 6 months - 24 months old children, to fill all of the nutritional gaps left after breastfeeding, and to achieve healthy growth and development. Packaging the necessary nutrients into a single product eases administration for the mother and ensures that children are not vulnerable to seasonal and economic gaps in access to nutritious local foods. Considering the essential role of adequate nutrient intake by young children in the prevention of under-nutrition and its life-long consequences, and the fact that meeting nutrient requirements from the combination of breast milk and foods naturally rich in essential nutrients is very challenging for many households, which is to a large part due to availability and affordability constraints.

Supplementary foods for the management of moderate acute malnutrition (MAM) in infants and children 6-59 months of age/Fortified Processed Cereal Based Foods (Super cereal plus products)— Specification

1 Scope

This Draft African Standard specifies requirements, sampling, and test methods for Supplementary foods for the management of moderate acute malnutrition (MAM)/Fortified Processed Cereal Based Foods (Super cereal plus products) intended for persons from the age of 6 months up to 59 months.

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 2001.04, *Fumonisins B1 and B2 in corn and corn flakes. Liquid chromatography with immunoaffinity column cleanup*

AOAC 944.02, *Iron in flour, Spectrophotometric method*

AOAC 965.33, *Peroxide Value of Oils and Fats*

AOAC 984.27, *Calcium, Copper, Iron, Magnesium, Manganese, Phosphorus, Potassium, Sodium, and Zinc in infant formula. Inductively coupled plasma emission spectroscopic method*

AOAC 986.18, *Deoxynivalenol in wheat. Gas chromatographic method*

AOAC 992.04, *Vitamin A (retinol isomers) in milk and milk-based infant formula. Liquid chromatographic method*

AOAC 999.11, *Lead, Cadmium, Copper, Iron, and Zinc in Foods. Atomic absorption spectrophotometry after dry ashing*

CXC 1, *General Principles of Food Hygiene*

CXG 10, *Advisory list of mineral salts and vitamin compounds for use in foods for infants and children*

CXS 1, *General Standard for the Labelling of Prepackaged Foods*

CXS 193, *General Standard for Contaminants and Toxins in Food and Feed*

ISO 11085, *Cereals, cereals-based products and animal feeding stuffs — Determination of crude fat and total fat content by the Randall extraction method*

ISO 14902, *Animal feeding stuffs — Determination of trypsin inhibitor activity of soya products*

ISO 15141, *Cereals and cereal products — Determination of ochratoxin A — Part 1: High performance liquid chromatographic method with immunoaffinity column cleanup and fluorescence detection*

ISO 15151, *Milk, milk products, Infant formula and adult nutritionals — Determination of minerals and trace elements — Inductively coupled plasma atomic emission spectrometry (ICP-AES) method*
ISO 16050, *Foodstuffs — Determination of aflatoxin B1, and the total content of aflatoxins B1, B2, G1 and G2 in cereals, nuts and derived products — High-performance liquid chromatographic method*

ISO 16649-2, *Microbiology of food and animal feeding stuffs — Horizontal method for the enumeration of beta-glucuronidase-positive Escherichia coli — Part 2: Colony-count technique at 44 degrees C using 5-bromo-4-chloro-3-indolyl beta-D-glucuronide*

ISO 16958, *Milk, milk products, infant formula and adult nutritionals — Determination of fatty acids composition –Capillary gas chromatographic method*

ISO 20483, *Cereals and pulses — Determination of the nitrogen content and calculation of the crude protein content — Kjeldahl method*

ISO 20633, *Infant formula and adult nutritionals — Determination of vitamin E and vitamin A by normal phase high performance liquid chromatography*

ISO 20634, *Infant formula and adult nutritionals — Determination of vitamin B12 by reversed phase high performance liquid chromatography (RP-HPLC)*

ISO 20635, *Infant formula and adult nutritionals — Determination of vitamin C by (ultra) high performance liquid chromatography with ultraviolet detection ((U) HPLC-UV)*

ISO 20636, *Infant formula and adult nutritionals — Determination of vitamin D by liquid chromatography-mass spectrometry*

ISO 20639, *Infant formula and adult nutritionals — Determination of pantothenic acid by ultra high performance liquid chromatography and tandem mass spectrometry method (UHPLC-MS/MS*

ISO 21446, *Infant formula and adult nutritionals — Determination of trans and total (cis + trans) vitamin K1 content — Normal phase HPLC*

ISO 21470, *Infant formula and adult nutritionals — Simultaneous determination of total vitamins B1, B2, B3 and B6 — Enzymatic digestion and LC-MS/MS*

ISO 21527-2, *Microbiology of food and animal feeding stuffs — Horizontal method for the enumeration of yeasts and moulds — Part 2: Colony count technique in products with water activity less than or equal to 0,95*

ISO 23305, Fortified milk powders, infant formula and adult nutritionals — Determination of total biotin by liquid chromatography coupled with immunoaffinity column clean-up extraction

ISO 24333, *Cereals and cereal products — Sampling*

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

ISO 5498, *Agricultural food products — Determination of crude fibre content — General method*

ISO 5506, *Soya bean products — Determination of urease activity*

ISO 5985, *Animal feeding stuffs — Determination of ash insoluble in hydrochloric acid*

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 6888-1, *Microbiology of the food chain — Horizontal method for the enumeration of coagulase-positive staphylococci (Staphylococcus aureus and other species) — Part 1: Method using Baird-Parker agar medium*

ISO 712, *Cereals and cereal products — Determination of moisture content — Reference method*

ISO 7932, *Microbiology of food and animal feeding stuffs — Horizontal method for the enumeration of presumptive Bacillus cereus — Colony-count technique at 30 degrees C*

ISO 7937*, Microbiology of food and animal feeding stuffs — Horizontal method for the enumeration of Clostridium perfringens — Colony-count technique*

ISO 9648, *Sorghum — Determination of tannin content*

3 Terms & definitions

For the purpose of this African Standard, the following definition shall apply:

3.1
processed cereal based food
food product prepared primarily from one or more milled cereals

3.2
fortification
practice of deliberately adding micronutrient(s) that is vitamins and minerals (including trace elements) in a food, so as to improve the nutritional quality of the food supply and provide a public health benefit with minimal risk to health

3.3
micronutrient
natural or synthesized vitamin, mineral or a trace element that is essential for normal growth, development and maintenance of life and of which a deficiency will be detrimental to health

3.4
supplementary food
specially formulated foods, in ready-to-eat, pre-cooked or uncooked form, which are modified in their energy density, protein, fat or micronutrient composition to help meet the nutritional requirements of specific populations.

Note to entry Supplementary foods are not intended to be the only source of nutrients and are different from complementary foods, in that the latter are intended for progressive adaptation of infants of 6 months of age and older to the food of the family. They are also different from food supplements, which refer to vitamin and mineral supplements in unit dose forms such as capsules, tablets, powders or solutions, where national jurisdictions regulate these products as food.

3.5
moderate acute malnutrition (MAM)
moderate acute malnutrition in children is defined as weight-for-height between -3 and -2 Z-scores of the median of the WHO child growth standards or by mid upper arm circumference (MUAC) 11.5 cm - <12.5cm without oedema.

3.6
extraneous matter
organic matter originating from food plants and/or their products other than the designated product

3.7
foreign matter
organic and inorganic materials (such as sand, soil, glass) other than extraneous matter in the designated product

3.8
free sugar
Include monosaccharides and disaccharides added to foods and beverages by the manufacturer, cook or consumer, and sugars naturally present in honey, syrups, fruit juices and fruit juice concentrates.

4 Requirements

4.1 Raw materials

4.1.1 Supplementary foods for the management of moderate acute malnutrition (MAM)/Fortified Processed Cereal Based Foods (Super cereal plus products) shall be prepared primarily from one or more milled cereal/pulses/legumes products complying with the relevant African Standards.

4.1.2 Vitamins and minerals shall be used in accordance with CXG 10.

4.2 Optional ingredients

The optional ingredients used shall comply with relevant African standards. They include but are not limited to the following:

a) starchy roots;

b) oilseed flours and oilseed protein products;

c) fats and oils excluding partially hydrogenated fats and oils;

d) milk and other dairy products; and

e) carbohydrates: free sugar shall not exceed 20% of total energy; fructose and glucose shall not be used. Plant starch, lactose, maltodextrin and sucrose are the preferred carbohydrates. Only precooked and/or gelatinized starches may be added. Honey shall not be used due to the risk of infant botulism from *Clostridium botulinum*.

4.3 General requirements

Supplementary foods for the management of moderate acute malnutrition (MAM)/Fortified Processed Cereal Based Foods (Super cereal plus products) shall be:

a) free from live insects;

b) free from extraneous and foreign matter;

c) free from rancid and objectionable flavour; and

d) free from objectionable odour.

4.4 Specific requirements

4.4.1 Supplementary foods for the management of moderate acute malnutrition (MAM) in infants and children 6-59 months of age/Fortified Processed Cereal Based Foods (Super cereal plus products) shall comply with specific requirements given in Table 1 when tested in accordance with test methods specified therein.

Table 1 — Specific requirements for Supplementary foods for the management of moderate acute malnutrition (MAM) in infants and children 6-59 months of age/Fortified Processed Cereal Based Foods (Super cereal plus products)

S/N	Parameter	Requirement	Test method
i.	Energy density (on dry weight basis), kcal/100 g, min.	400	EAS 803
ii.	Fat content[a], % m/m	9 - 18	ISO 11085
iii.	Protein, % m/m	8 - 22	ISO 20483
iv.	Acid insoluble ash, % (on dry matter basis) by mass, max.	0.4	ISO 5985
v.	Moisture content[b], %, by mass, max.	7.0	ISO 712
vi.	Dietary fibre, % (on a dry basis) by mass, max.	5	ISO 5498
vii.	Vitamin A, µg RE /100 g flour	800 - 1200	AOAC 992.04
viii.	Iron, mg/100 g flour	7.2 - 15	AOAC 944.02
ix.	Calcium, mg/100 g flour	420 - 660	AOAC 984.27
x.	Potassium, mg/100 g flour	650 – 1 050	AOAC 984.27

[a] If the lipid content exceeds 3.3 g/100 kcal (29.7 % energy), the amount of:

- linoleic acid (in the form of triglycerides) shall not be less than 300 mg/100 kcal and shall not exceed 1200 mg/100 kcal;
- the amount of lauric acid shall not exceed 15 % of the total lipid content; and
- the amount of myristic acid shall not exceed 15 % of the total lipid content when tested in accordance with ISO 16958.

[b] The moisture content applies to dried form of products.

4.4.2 Additional requirements on product nutritional composition are provided in Annex A.

5 Food additives

Only the food additives approved for use in products for infants and young children in CXS 192 may be used.

6 Hygiene

6.1 Supplementary foods for the management of moderate acute malnutrition (MAM)/Fortified Processed Cereal Based Foods (Super cereal plus products) shall be produced, prepared and handled in accordance with CXC 1.

6.2 The product shall comply with microbiological limits given in Table 2 when tested in accordance with test methods specified therein.

Table 2 — Microbiological limits for Supplementary foods for the management of moderate acute malnutrition (MAM)/Fortified Processed Cereal Based Foods (Super cereal plus products)

S/N	Microorganism	Limit	Test method
i.	Coliforms, CFU/g	<10	ISO 4832
ii.	*Salmonella spp* in 25 g	Absent	ISO 6579-1
iii.	*Escherichia coli,* CFU/g	<10	ISO 16649-2
iv.	*Staphylococcus aureus,* CFU/g	<10	ISO 6888-1
v.	*Bacillus cereus,* CFU/g, max.	50	ISO 7932
vi.	Yeasts and moulds, CFU/g, max.	10^2	ISO 21527-2

7 Contaminants

7.1 Heavy metals

The product shall comply with the maximum limits for heavy metals given in Table 3 when tested in accordance with the test methods specified therein.

Table 3 — Heavy metal limits for Supplementary foods for the management of moderate acute malnutrition (MAM)/Fortified Processed Cereal Based Foods (Super cereal plus products)

S/N	Heavy metal	Maximum limit mg/kg	Test method
i.	Lead	0.2	AOAC 999.11
ii.	Cadmium	0.1	

7.2 Anti-nutritional factors

7.2.1 If soya flour is used as a component of the product,

a) urease activity shall not exceed 0.3 mg N/g/min when tested in accordance with ISO 5506; and

b) trypsin inhibitor activity shall not exceed 5 mg/g when tested in accordance with ISO 14902

7.2.2 If sorghum flour is used as a component of the product, the tannin content shall not exceed 0.3 % by mass on a dry matter basis when tested in accordance with ISO 9648.

7.2.3 If cassava is used as a component of the product, the total hydrocyanic acid content shall not exceed 2 mg/kg, when tested in accordance with…...

7.3 Mycotoxins

The product shall not exceed mycotoxins limits given in Table 4 when tested in accordance with test methods specified therein

Table 4 — Mycotoxin limits for Supplementary foods for the management of moderate acute malnutrition (MAM)/Fortified Processed Cereal Based Foods (Super cereal plus products)

S/N	Parameter	Limit	Test method
i.	Total aflatoxins, µg/kg	5	ISO 16050
ii.	Aflatoxin B_1, µg/kg	3	
iii.	Fumonisin, µg/kg	2 000	AOAC 2001.04
iv.	Ochratoxin A, µg/kg	5	ISO 15141-1
v.	Deoxynivalenol (DON), µg/kg	200	AOAC 986.18

8 Packaging

8.1 The product shall be packaged in food grade material which will safeguard the hygienic and product quality attributes.

8.2 Each package shall be securely closed and easily re-closable during use where applicable.

9 Labelling

In addition to the requirements given in ARS 56 and CXG 2, each package shall be legibly and indelibly labelled with the following:

a) name of the product as “Supplementary food”, “Fortified processed cereal/legume/pulse based food for children from 6-59 months with MAM”

b) brand name as super cereal plus product (optional)

c) statement “suitable for person with moderate acute malnutrition for the age of 6 months to 59 months”; and

d) Instructions for use

10 Sampling

Sampling shall be done in accordance with the ISO 24333.

Annex A
(normative)

Additional requirements on product composition

Table A.1 lists the recommended vitamins and minerals that shall be used Supplementary foods for the management of moderate acute malnutrition (MAM) in infants and children 6-59 months of age/Fortified Processed Cereal Based Foods (Super cereal plus products)

Table A.1 — Additional requirements on product composition

S/N	Vitamins and minerals	Product micronutrient content per 100 g	Test method
i.	Vitamin D, µg	8 – 24	ISO 20636
i.	Vitamin E, mg (Alpha-Tocopherol), min.	8	ISO 20633
i.	Vitamin C mg, min.	60	ISO 20635
v.	Vitamin B_1 (Thiamine), mg, min.	0.4	ISO 21470
v.	Vitamin B_2 (Riboflavin) mg, min.	1.6	
i.	Vitamin B_3 (Niacin) mg NE, min.	10	
i.	Vitamin $B_{6,}$ mg, min.	0.8	
i.	Folate DFE, µg, min.	160	ISO 20634
x.	Vitamin $B_{12,}$ µg, min.	2	
x.	Biotin, µg, min.	8	ISO 23305
i.	Pantothenic acid mg, min.	2	ISO 20639
i.	Vitamin K, µg, min.	20	ISO 21446
i.	Copper, mg	0.4 - 1.4	ISO 15151
v.	Iodine, µg	60 - 140	
v.	Magnesium, mg, min.	112	
i.	Selenium, µg	13 - 90	
i.	Added Manganese, mg	0.4 - 0.8	
i.	Sodium content, mg, max.	270	
x.	Total zinc, mg	8 - 14	

Bibliography

[1] WHO. Technical note: *Supplementary foods for the management of moderate acute malnutrition in infants and children 6–59 months of age*. Geneva, World Health Organization, 2012.

[2] EAS 1126: 2024 Supplementary foods for the management of moderate acute malnutrition (MAM) — Specification

[3] FAO/WHO (2004) *Reference nutrient intake or INL 98 from FAO/WHO Vitamins and Mineral requirements in Human Nutrition.* 2nd Edition. (for all micronutrients except copper, manganese and phosphorus)

[4] CXS 74-2010, *Guidelines on Performance Criteria and Validation of Methods for Detection, Identification and Quantification of Specific DNA Sequences and Specific Proteins in Foods*

[5] ECSA, *Manual of methods for determining micronutrients in fortified foods;* www.a2zproject.org/-2zorg/pdf/Manual_Foods.pdf

