PRODUCT SPECIFICATION SHEET

Supercereal (CSB+) 10% sugar/BAG-25kg

Version no: 4.1
Material No: S0000294
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1. General Description

Super cereal CSB+ is a fortified Corn Soy blend with added sugar that is processed and packed in 25 kg sachet. Super cereal CSB+ is used to prepare a formulated supplementary food in the form of a porridge or gruel that is suitable for adults and children over 3 years. Super cereal CSB+ consists of heat treated maize and soybeans, sugar, vitamins, and minerals.

2. Intended Use

For use during emergencies and as food aid for food insecure populations. Super cereal contributes to preventing undernutrition including wasting, micronutrient deficiencies and stunting.

3. Target population

Adults and children over 3 years of age.

4. Technical Specifications

The product is manufactured according to below formula:

Extruded Maize (Corn) and Whole Soyabean*: 88.3 % by weight
Sugar: 10%
Vitamin and Mineral premix: 0.20%
Dicalcium phosphate anhydrous or Tricalcium Phosphate**: 1.23%
Potassium chloride: 0.27%

**Maize to soybeans ratio - max 73% maize: min 24% soya beans. Suppliers shall monitor the quality of incoming materials to determine the right ratio that meets the nutritional requirements of the final product. Thermal processing technology applied shall be sufficient to pregelatinize starch of cereals and inactivate antinutritional factors.*
***Micronutrient Premix shall be mixed with extruded product, not directly with maize (corn) and soybean.*
****When tricalcium phosphate is utilized, the inclusion rate shall be approximately 1.16%.*

Nutritional value per 100 g. dry finished product

Energy: 380 kcal/1, 590 kJ minimum
Protein: 14.0 % (N x 6.25) minimum

Fat: 6.0 % minimum

Ash: 4.1 % maximum

Moisture: 7.0% maximum

Vitamin Content Per 100 g dry finished product

Vitamin A (RE): 800-1,250 µg

Vitamin D: 8-24 µg

Vitamin E (α-TE): 8 mg min

Vitamin K: 20 µg min

Thiamin: 0.4 mg min

Riboflavin: 1.6 mg min

Vitamin B6: 0.8 mg min

Vitamin C: 60 mg min

Pantothenic acid: 2 mg min

Folate (DFE): 160 µg min

Niacin: 10 mg min

Vitamin B12: 2 µg min

Biotin: 8 µg min

Mineral Content Per 100 g dry finished product

Sodium: 270 mg max

Iodine: 40-140 µg

Iron: 9-15.7 mg

Zinc: 8-14 mg

Potassium: 580-970 mg

Calcium: 340-550 mg

Phosphorus: 400-560 mg

Premix Composition (Addition Quantity/100 g of final product, +/-10%)

Vitamin A: 3460 IU (as dry Vitamin A Palmitate 250 Cold Water Dispersible Stabilized)

Vitamin D3: 441.6 IU (as Dry Vitamin D3 100 Water Dispersible Stabilized)

Vitamin E: TE 8.3 mg (as dry Vitamin E Acetate 50% Water Dispersible)

Vitamin K1: 30 µg (as dry Vitamin K1 5% Water Dispersible)

Vitamin B1: 0.2 mg (as Thiamine mononitrate)

Vitamin B2: 1.4 mg (as Riboflavin fine powder)

Vitamin B6: 1 mg (as Pyridoxine hydrochloride)

Vitamin C: 90 mg (as Ascorbic acid)

Pantothenic acid: 1.6 mg (as Calcium D Panthotenate)

Folate (DFE): 110 µg (as Folic acid*)

Niacin: 8 mg (as Niacinamide)

Vitamin B12: 2 µg (as Vitamin B12 0.1% or 1% Spray Dried)

Biotin: 8.2 µg (as Biotin 1%)

Iodine: 40 µg (as Potassium Iodide*)

Iron(a): 4 mg (as Ferrous fumarate fine powder)

Iron(b): 2.5 mg (as Iron-sodium EDTA)

Zinc: 5 mg (as Zinc Sulphate Monohydrate)

** Adequate dilution must be used in order to guarantee premix homogeneity*

Other minerals

Potassium: 140 mg (as Potassium Chloride with 0.5% silicon dioxide as anticaking agent, compliant with Food Chemical Codex, min 90%<425 micron and min 60%<250 micron)

Calcium: 362 mg (Dicalcium Phosphate Anhydrous or Tricalcium Phosphate*)

Phosphorus: 280 mg (calcium and phosphorus as Dicalcium Phosphate Anhydrous*)

*Comply with Food Chemical Codex, min 95%<250-micron, total aerobic viable count <1000 CFU/g, yeast<10 CFU/g, mould <100 CFU/g, and enterobacteria negative in 1 g.)

Carrier: Corn maltodextrin

Note: Variable levels of micronutrients (i.e., iron, zinc, etc.) naturally present in maize and soy may lead to variable amounts of micronutrients in finished product.

Characteristics of the finished blend:

It shall be of a uniform fine texture with the following particle distribution:

95% shall pass through a 600-micron sieve.
100% shall pass through a 1000-micron sieve.

Organoleptic characteristics

It shall have a pleasant smell and palatable taste, suitable for young children. Taste deviations such as an off taste or a bitter taste from rancidity making the product unsuitable or unusable by the final consumer are not acceptable.

It shall have a uniform fine texture with the particle size as specified in the specification. The product shall be homogeneous in color and free from agglomeration. It shall be free from lumping or balling when mixed with water of ambient temperature.

Additional Product Specifications

Peroxide value: max 10.0 meq/kg fat.

Cooking time:

It shall be suitable for young children and adults after a cooking at simmering point for a minimum of five minutes and a maximum of ten minutes.

Consistency / Viscosity of porridge:

Consistency of porridge should be suitable for feeding children 3 years and adults. The thickness of the porridge should be soft and easily spoonable once prepared. https://horizon.documentation.ird.fr/exl-doc/pleins_textes/pleins_textes_7/b_fdi_59-60/010026563.pdf

Anti-nutrients

The urease index of Super cereal with 10% sugar should be lower than 0.2 pH units.

Shelf-life and stability

Unless stated otherwise in the LTA, the Super cereal must have a minimum 12-month shelf-life (preferably 18 months shelf life) when stored in ambient temperature, in a dry place and hygienic conditions. The supplier should conduct shelf-life studies to confirm shelf-life as per Interagency stability study requirements for nutritional products (unicef.org).

Standards

The raw materials, processing and manufacturing, testing, packaging and labelling of the product shall be in strict compliance with the specifications set forth herein, and with the latest edition of the following standards/guidelines.

Codex Texts can be found in the following webpages:

Standards: https://www.fao.org/fao-who-codexalimentarius/codex-texts/list-standards/tr/;
- Codes of practice: https://www.fao.org/fao-who-codexalimentarius/codex-texts/codes-of-practice/en/;
- Guidelines: https://www.fao.org/fao-who-codexalimentarius/codex-texts/guidelines/tr/;
- Maximum Residue Limits (MRLs) and Extraneous Maximum Residue Limits (EMRLs) for pesticides: https://www.fao.org/fao-who-codexalimentarius/codex-texts/dbs/pestres/en/;
- Additionally, Guidelines of International Commission on Microbiological Specifications for Foods can be found here: https://www.icmsf.org/publications/books/

Applicable Standards

- Codex general standard for contaminants and toxins in food and feed (CXS 193-1995)
- Codex general principles of food hygiene (CXC 1-1969)
- Codex maximum residue limits (MRLs) and codex extraneous maximum residue limits (EMRL) for pesticides
- Recommended methods of sampling for the determination of pesticide residues for compliance with MLR (CXG 33-1999)
- Codex general standard for food additives (CXG 192-1995)
- Code of practice on food allergen management for food business operators (CXC 80-2020)
- Codex general guidelines on claims (CXG 1-1979)
- Codex general standard for the labelling of prepackaged foods (CXS 1-1985)
- Codex guideline on nutrition labelling (CXG 2-1985)
- Codex code of hygienic practice for low-moisture foods (CXC 75-2015)
- Recommendations from joint FAO/WHO expert meeting on tropane alkaloids, 2020
- Codex general standard for the labelling of and claims for pre-packaged foods for special dietary uses (CXS 146-1985)

5. Processing

5.1 Raw materials

Super cereal with 10% sugar shall be manufactured from fresh maize grain and soybeans of good quality, free from foreign materials, substances hazardous to health, excessive moisture, insect damage and fungal contamination and shall comply with the latest version of Codex Alimentarius and applicable national food laws and standards.

Soybeans

Soybean shall be free from the following toxic or noxious seeds, toxic plants or their metabolites in amount which may represent a hazard to human health: Crotalaria (*Crotalaria spp.*), Corn cockle (*Agrostemma githago* L.), Castor bean (*Ricinus communis* L.), Jimson weed (*Datura* spp.), Mexican Prickly Poppy (*Argemone mexicana*) and other seeds that are commonly recognized as harmful to health. Soybeans shall be tested for tropane alkaloids for every shipment received, according to EU 2015/976 EUR-Lex - 32015H0976 - EN - EUR-Lex (europa.eu).

Maize (Corn)

-Conform to Codex STAN 153-1985.
-Suppliers shall test aflatoxins (total, B1), Deoxynivalenol (DON) and Fumonisins
- Maize (corn) shall be free from the following toxic or noxious seeds, toxic plants or their metabolites in amount which may represent a hazard to human health. Crotalaria (*Crotalaria* spp.), Corn cockle (*Agrostemma githago* L.), Castor bean (*Ricinus communis* L.), Jimson weed

(*Datura* spp.), Mexican Prickly Poppy (*Argemone mexicana*) and other seeds that are commonly recognized as harmful to health.

Maize and soybeans must be stored under dry, ventilated and hygienic conditions. Only safe insecticides (i.e., phosphine) may be used for fumigation control. Where needed, fumigation must be performed by certified operators.

Sugar

Conform to Codex STAN 212-1999. To meet particle size specification: 100% through a 1mm screen, 95% through a 600-micron screen.

Vitamins and minerals

The mineral and vitamin premix must not be produced by the Super cereal manufacturer itself and should be supplied only from a validated supplier of premix.

Micronutrient premixes are used at the following rate per metric ton of finished product:
-2.0 kg of vitamin premix
-12.3 kg of Dicalcium Phosphate Anhydrous.
-2.7 kg of Potassium Chloride.
Requirements for Potassium Chloride and Dicalcium Phosphate Anhydrous:
-Must meet at least Food Chemical Codex.
-Particle size for Potassium Chloride: min 60% < 250 µm (microns).
-Dicalcium Phosphate Anhydrous: compliant with Food Chemical Codex, min 95%<250 micron, total aerobic viable count <1000 CFU/g, yeast<10 CFU/g, mould <100 CFU/g, and enterobacteria negative in 1 g
- Must be purchased from GAIN approved suppliers (http://gpf.gainhealth.org)
- Micronutrient premixes must be delivered with a complete Certificate of Analysis (CoA)

It is recommended that micronutrient premixes be stored in a dry, cool, and clean place where the temperature is a maximum of 25 degrees Celsius. Care must be taken during manufacturing to ensure these storage requirements are maintained and that any unused portion of the micronutrient powder is protected from air, light, heat, and moisture.

An Example of Premix Composition (Addition Quantity/100 g of final product, +/-10%)

Vitamin A: 3460 IU (as dry Vitamin A Palmitate 250 Cold Water Dispersible Stabilized)

Vitamin D3: 441.6 IU (as Dry Vitamin D3 100 Water Dispersible Stabilized)

Vitamin E: TE 8.3 mg (as dry Vitamin E Acetate 50% Water Dispersible)

Vitamin K1: 30 µg (as dry Vitamin K1 5% Water Dispersible)

Vitamin B1: 0.2 mg (as Thiamine mononitrate)

Vitamin B2: 1.4 mg (as Riboflavin fine powder)

Vitamin B6: 1 mg (as Pyridoxine hydrochloride)

Vitamin C: 90 mg (as Ascorbic acid)

Pantothenic acid: 1.6 mg (as Calcium D Panthotenate)

Folate (DFE): 110 µg (as Folic acid*)

Niacin: 8 mg (as Niacinamide)

Vitamin B12: 2 µg (as Vitamin B12 0.1% or 1% Spray Dried)

Biotin: 8.2 µg (as Biotin 1%)

Iodine: 40 µg (as Potassium Iodide*)

Iron(a): 4 mg (as Ferrous fumarate fine powder)

Iron(b): 2.5 mg (as Iron-sodium EDTA)

Zinc: 5 mg (as Zinc Sulphate Monohydrate)

** Adequate dilution must be used in order to guarantee premix homogeneity*

Other minerals

Potassium: 140 mg (as Potassium Chloride with 0.5% silicon dioxide as anticaking agent, compliant with food chemical Codex, min 90%<425 micron and min 60%<250 micron)

Calcium: 362 mg (Dicalcium Phosphate Anhydrous or Tricalcium Phosphate*)

Phosphorus: 280 mg (calcium and phosphorus as Dicalcium Phosphate Anhydrous*)

*Compliant with food chemical codex, min 95%<250-micron, total aerobic viable count <1000 CFU/g, yeast<10 CFU/g, mould <100 CFU/g, and enterobacteria negative in 1 g.)

Carrier: Corn maltodextrin

Note: Variable levels of micronutrients (i.e.., iron, zinc, etc.) naturally present in maize and soy may lead to variable amounts of micronutrients in finished product.

5.2 Homogeneity of micronutrients

Theoretical calculations indicate that a mixing system with a Coefficient of Variation of 10% using iron as the indicator element, will enable product to meet the above variation target on 95%, provided that all conditions of mixing are rigorously applied. To conduct these calculations, see:

- The guidelines for calculating CV: https://docs.wfp.org/api/documents/WFP-0000145319/download/

- The CV calculator: https://docs.wfp.org/api/documents/WFP-0000145318/download/

5.3 Processing

Super cereal shall be processed as a partially pre-cooked food under conditions which permit

improvements in the pregelatinizing of starches, and in particular the de-activation of trypsin inhibitors in soya as indicated by the urease test. The purpose of this process is to improve the digestibility of starches and proteins. Preferred heat treatments include wet extrusion, dry extrusion, drum drying and roasting. These thermal treatments must be validated regarding the adequate reduction of antinutritional factors and microbial load. The Soybeans must be cleaned and dehulled.

6. Food Safety and Quality management

It is recommended that the products covered by the provisions of this standard be prepared and handled in accordance with the appropriate sections of the Recommended International Code of Practice – General Principles of Food Hygiene (CAC/RCP 1-1969), and other Codes of Practice recommended by the Codex Alimentarius Commission which are relevant to these products. The product should comply with any microbiological criteria established in accordance with the Principles for the Establishment and application of microbiological Criteria for Foods (CAC/GL 21-1997)

Supercereal with 10% sugar shall not contain any harmful substances originating from microorganisms, or any other poisonous or deleterious substances like anti-nutrient factors, pesticides, heavy metals, or pesticide residues, in amounts which may represent a hazard to health.

These measures shall consider the specific nature of the products concerned and the specific population group for which they are intended.

The product shall comply strictly with *Codex General Standard for Contaminants and Toxins in Food and Feed (CXS 193-1995)*, *Codex Maximum Residue Limits (MRLs) and Codex Extraneous Maximum Residue Limits (EMRLs) for Pesticides*, *Codex Maximum Residue Limits (MRLs) for Residues of Veterinary Drugs in foods (CX/MRL 2-2021)* and *Guidelines of International Commission on Microbiological Specifications for Foods.*

Acceptable microbial limits

Total plate count: Max 10,000 cfu/g
Total coliform bacteria: Max 100 cfu/g
Escherichia coli: <10 cfu/g
Salmonella: Absent in 25g
Staphylococcus aureus: <10 cfu/ g
Bacillus cereus: Max 50 cfu/g
Yeasts and moulds: Max 1000 cfu/g

Mycotoxins

Aflatoxin (Total of B1, B2, G1, G2): 10 ppb max
Aflatoxin B1: 5 ppb max
Deoxynivalenol (DON): 1.0 mg/kg max

7. Packaging

Packaging

Super cereal must be packed in such a material that ensures the safety, quality and required shelf life of the product. The packaging material used shall be food grade and should not impart and migrate any toxic substance or undesirable odor or flavor in the product. The packaging material shall be robust enough to withstand different types of handlings and transport while protecting the product throughout its shelf life.

Packet weight: 25 kg, - *Weight and quantity tolerance must meet The International Organization of Legal Metrology International Recommendation OIML R 87*

Material composition:

Super cereal shall preferably be packed in a uniform strong polypropylene bag of a net content of 25 kg, fit for export and multiple handling with an inner and outer layer.

Inner lining: Polypropylene 75-100 microns, density of 92 gsm, weight 83-95g
Outer bag: Bag size: 50-55 cm X 75-90 cm, density of approx. and 80 per sq. and tare 75-110 g each. The bag must have a heat cut mouth to prevent fibrillation and have sewn single folder bottom. Bags made of woven PP are to be given special food grade “ultraviolet treatment. The inner liner should be heat sealed and outer bags double stitched.

Drop test; 1.2 m (butt dropping) and 1.60m twice on each flat face (flat dropping) (ref.: EN 277, ISO 7965-2 or equivalent)

8. Labelling

Primary Packaging

Super cereal shall be labelled in an appropriate language or as stated in purchase order.

The below shall be stated in the primary label:

-Name of the product

- Target group: “Special formula for children older than 3 years of age and adults”

- Net weight

- Ingredient list: List of ingredients in descending order, Minerals and Vitamins to be indicated including allergens must be written in bold. If there is a possibility of traces of allergens, the following phrase must be use “May contain...”

- Nutrient table

- Production date: DD/MM/YYYY

- Best Before End: MM/YYYY

- Batch/lot number

- Manufactured by: Name and address

Manufactured in: XX

- Storage instructions: “Store under dry and hygienic conditions and away from direct sunlight. After opening, keep the sachet tightly closed.”

- Other requirements: "Not for sale or exchange", “Do not litter” logo, "Breastfeeding” logo,

-"It is strongly recommended to start breastfeeding immediately after birth, exclusively breastfeed during the first 6 months and continue until at least 24 months",

-"Consume in addition to family food", "The product shall be consumed cooked, as a porridge or gruel. Feed this porridge to your baby 1- 3 times per day, using a clean spoon. Only prepare sufficient quantity for one meal moment and consume all of the prepared food shortly after preparation. The product shall not be consumed uncooked."

-"Consultation with a health-worker is recommended for assessing child’s development needs."

- Preparation instructions, including pictograms of the following: dosage requirement, Do not mix with hot water, Opening the bag, Mixing with water, cooking, Feeding to child, Closing the bag.
- Use of UNICEF logo on products is subject to prior approval

9. Analytical requirements

The manufacturer should conduct a complete analysis of the finished product to verify that the finished product is manufactured in a homogeneous and consistent content. ALL parameters included in this specification sheet should be tested at least once a year.

Analytical CoA Requirements per Batch

A Certificate of Analysis (CoA) should be issued and forwarded prior to each shipment or order collection for each batch provided. This certificate must mention the laboratory name, methods of analysis, laboratory variability ranges for each nutrient, specifications, and targets for all the criteria below, to be applied to the finished product after primary packaging or anytime thereafter up to the point when the primary packaging is opened. The batch cannot be released if there is a failure to meet the following criteria:

List of compulsory tests and reference method for statements and CoA requirements per batch: (Reference method cited should be the latest version and can be equivalent

Analytical Requirements for each Certificate of Analysis per 100g:

Organoleptic characteristics (texture, appearance, Smell, taste): Pleasant smell and palatable taste, typical color (Organoleptic evaluation)
Particle size: 95% must pass through a 600 microns sieve and 100% must pass through 1,000 microns sieve.

Moisture: Max. 7.0% (ISO 712: 2009, ISO 20483; AOAC 992.23 EN ISO 16634-2:2016)
Protein: Min. 14.0 g AOAC 981.10
Fat: Min. 6.0 g (AOAC 954.02, ISO 11085)
Crude fibre: Max. 3.8 g (AOAC 962.09, ISO 5498)
Total ash: Max. 4.1 g (ISO 2171:2007, AOAC 923.03)
Peroxide value: Max. 10.0 meq/kg fat (AOAC 965.33)
Urease index: Max. 0.20 pH units (AOCS Ba 9-58 (1997)
Tropane alkaloids (hyoscyamine + scopolamine) max 30 ppb

Vitamin A (RE): 900-1250µg (AOAC 992.04)
Iron: 9.0-15.7 mg (AOAC 944.02)
Calcium: 340-550 mg (AOAC 984.27)
Potassium: 580-970 mg (AOAC 984.27)

Aflatoxin (B1+B2+G1+G2): Max. 10 ppb (AOAC 972.26, ISO 7932:2004)
Aflatoxin B1: Max 5 ppb (ISO 16050; EN 12955)
Deoxynivalenol (DON) Max. 1.0 mg/kg (EN 15891:2010)

Total plate count < 100,000 cfu/g (ICC No 125, ISO 4833-1:2013; AACC 42-11.01)
Total Coliform bacteria: < 100 cfu/g (AOAC 2005.03; ISO 4832:2006; AACC 45-15.02)
Salmonella: Absence in 25g (AACC 42-25B, ISO 6579-1:2017; AACC 42-25.03)
Escherichia Coli: < 10 cfu/g (AOAC 991.14, ISO 16649-2:2001)
Staphylococcus aureus: < 10 cfu/g (AACC 42-30B; EN ISO 6888-2:2004; AACC 42-30.04)
Bacillus cereus: < 50 cfu/g (AOAC 980.31, ISO 7932:2004)
Yeasts and moulds :< 1,000 cfu/g (ICC No 146, ISO 21527-2:2008; AACC 42-50.02)

GMO (only if required) Negative (< 0.9% of GMO material)

Useful Resources

1. Contaminants Reference Table
2. Stability study template for Nutritional Products
3. Interagency Requirements for stability study
4. Interagency Specialised Food Manufacturer Quality Questionnaire.
5. Interagency Specialised food Product Questionnaire
6. Technical Requirements for Nutritional Products
7. docs.wfp.org/api/documents/WFP-0000153256/download/

FOR MORE INFORMATION

CPHHQ-SD- Nutrition Supplies |sd.nutritionsupplies@unicef.org

Technical resources for nutrition products | UNICEF Supply Division