



Technical Specifications for the manufacture of:

## **SUPER CEREAL - CORN SOYA BLEND with SUGAR (1.5-2.0 kg Unit Packing)**

Commodity code: **MIXCSB050**

Version: **1, adopted 2020**

Replacing: **This is a first version**

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*The key highlights are:*

*-Super Cereal – CSB with sugar in 1.5-2.0 kg unit packing*

*-Revising total aflatoxin limit from 20 ppb to 10 ppb*

*-Packaging details*

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### **1. INTRODUCTION**

#### **1.1 Product purpose**

**SUPER CEREAL- Corn Soya Blend with Sugar** (hereafter called the product) is intended for children older than 5 years of age and adults.

#### **1.2 Product type**

The product is prepared from heat treated maize and whole soya beans, vitamins and minerals. The product is consumed as a porridge or gruel, it should be prepared by mixing an appropriate proportion of flour and clean water (i.e. 40g of the product with 250 g of water) followed by a boiling time at simmering point from five to ten minutes. The product shall not be consumed in dry powder form, without preparation and cooking.

#### **1.3 Standards and recommendations**

The manufacturer shall be registered under national food law as a manufacturer of supplementary foods for special dietary needs, or manufacturer of baby foods, or equivalent for either, as per country regulation. The product shall comply, in terms of raw materials, composition or manufacture, except when specified otherwise in this contract, with the following guidelines or standards of Codex Alimentarius.

- Guidelines on Formulated Supplementary Foods for Older Infants and Young Children, CAC/GL 08-1991 of the Codex Alimentarius.
- Codex standard for processed cereal-based foods for infants and young children. CODEX STAN 074-1981, Rev. 1-2006, of the Codex Alimentarius.
- Code of Hygienic Practice for Foods for Infants and Children CAC/RCP 66 - 2008 of the Codex Alimentarius.
- Recommended International Code of Practice: General Principles of Food Hygiene; CAC/RCP 1-1969 Rev 4 - 2003 including Annex "Hazard Analysis and Critical Control Point (HACCP) System and Guidelines for its application".
- General principles for addition of essential nutrients to foods: CAC/GL 09-1987 (amended 1989, 1991), of the Codex Alimentarius.
- General standard for contaminants and toxins in food and feed: CODEX STAN 193- 1995.

## 2. RAW MATERIALS

### 2.1 Main ingredients

The product shall be manufactured from maize and soybeans of good quality and shall comply with all relevant national food laws and standards. Requirements for the raw materials are:

#### **Maize**

- Conform to Codex STAN 153-1985.
- Be tested for aflatoxins (total, B1, Fumonisin)
- Be tested for Deoxynivalenol (DON)
- Be obtained from non-genetically modified varieties (*if required by the contract*).

#### **Soya beans**

- conform to Codex STAN 171-1989 (Rev.1-1995).
- be obtained from non-genetically modified varieties (*if required by the contract*).

#### **Sugar**

- conform to Codex STAN 212-1999.
- Sugar shall be milled to meet particle size i.e. 100% through a 1000 microns screen, 95% through a 600-micron screen.

**Note:** Maize and soya beans shall be free from the following toxic or noxious seeds and their metabolites in amounts 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.), and other seeds that are commonly recognized as harmful to health.

Maize and soya beans shall be stored under dry, ventilated and hygienic conditions. Only safe insecticides (i.e. phosphine) may be used for fumigation control. Where needed, fumigation shall be performed by certified operators. It shall be done as specified in the GAFTA Standard for Fumigation<sup>1</sup>.

### 2.2 Vitamins and minerals

Micronutrient premixes are used at the following rate per metric ton of finished product:

- 2.0 kg of vitamin premix (**FBF-V-13**).
- 12.3 kg of Dicalcium Phosphate Anhydrous.
- And 2.7 kg of Potassium chloride.

Requirements Potassium chloride and Dicalcium Phosphate Anhydrous are:

- Shall meet at least food chemical codex.
- Particle size for Potassium chloride min 100% < 600 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/g.

The composition of micronutrient premixes is presented in table 2.

Complete micronutrient premixes shall be purchased from GAIN Premix Facility or any of the GAIN approved suppliers, a complete list is at the following link: <http://gpf.gainhealth.org/suppliers/current-suppliers>

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<sup>1</sup>[https://www.gafta.com/write/MediaUploads/Trade%20Assurance/Gafta\\_Standard\\_for\\_Fumigation\\_WEB.PDF](https://www.gafta.com/write/MediaUploads/Trade%20Assurance/Gafta_Standard_for_Fumigation_WEB.PDF)

Micronutrient premixes shall be delivered to the processor of the product with a complete Certificate of Analysis as well as with a Proof of purchase of premixes. The two documents shall be presented with other documents for payment.

Micronutrient premixes shall be stored in a dry, cool and hygienic place. Storage of vitamin and mineral premix should be as per MSDS/storage recommendation from the premix supplier, normally < 25 °C.

### 2.3 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. The guidelines for this calculation is shown at <http://foodqualityandsafety.wfp.org/coefficient-of-variation-calculator>

## 3. PROCESSING

### 3.1 Formula

The product is manufactured according to the following formula:

Table 1: **SUPER CEREAL- Corn Soya Blend with sugar formula**

Nº	Ingredients	Percentage (by weight)
1	Maize	64.30
2	Whole soya beans	24.00
3	Sugar	10.00
4	Vitamin/Mineral <b>FBF-V-13</b>	0.20
5	Dicalcium Phosphate anhydrous	1.23
6	Potassium chloride	0.27

Premix is mixed with extruded product, not directly with maize and soybeans. Soybeans have varying levels of protein and fat depending on origin. To ensure that the nutritional targets of finished product are fully met, the processor should check the quality of incoming materials i.e. fat and protein contents of soya and if necessary, adjust the ratio of maize to soya in the formulation. All formulation adjustments shall be documented and reported to WFP.

### 3.2 Method of processing

The product shall be processed as a partially pre-cooked food under conditions which permit improvements in the pre-gelatinization of starches, digestibility of proteins and in particular the de-activation of trypsin inhibitors in soya as indicated by the urease test. Preferred heat treatments include wet extrusion, dry extrusion and drum drying.

**Note:** Roasting is not acceptable.

### 3.3 Food safety and risk assessment at manufacturing premises

For compliance with Codex standards the processor shall be able to demonstrate by principle and practice the adoption, implementation and recording of:

- Good Manufacturing Practice
- Hazard Analysis Critical Control Point program

In this context an appointed WFP staff/ WFP appointed Inspector / Quality Surveyor is entitled to visit the factory without prior notice during any period when WFP product is being manufactured to check that the production is done as per contract specification.

The Inspector / Quality Surveyor may request to see:

- **Records** (i.e. names of people in charge of the process and quality control, temperatures of the process, mixing times / net contents, cleaning schedules, CCP monitoring, traceability etc.).
- **Procedures** (e.g. cleaning, personnel hygiene, risk assessment and HACCP, environmental monitoring programme, sampling & analysis, product release and control of non-conformance etc.).
- **Instructions** (e.g. process instructions, cleaning instructions, zoning instructions etc.).
- The **quality manual** for the process or factory.
- Conditions in the factory (process rooms, warehouses, laboratories, cloakrooms, factory grounds, utility rooms, etc.)

#### **4. PRODUCT SPECIFICATIONS**

##### **4.1 General requirements**

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

Finished product shall have a pleasant smell and palatable taste. It shall have a uniform fine texture with the following particle distribution:

- 95% shall pass through a 600 microns sieve.
- 100% shall pass through a 1,000 microns sieve.

Energy requirement of finished product should be minimum 380 kcal/100g flour.

##### **4.2 Additional requirements**

###### **4.2.1 Consistency**

Flow rate (Bostwick test) of 15% dry matter porridge should be minimum 55 mm per 30 sec at 45°C and at the proposed preparation dosage (i.e. 40g of product plus 250g water after a boiling at simmering point for five minutes).

###### **4.2.2 Dispersiveness**

It shall be free from lumping or balling when mixed with water of ambient temperature.

##### **4.3 Specific requirements**

The product shall be fortified to provide the following net micro nutrient **supplement** per 100g of finished product specified in table 2.

It shall also comply with other requirements specified in table 5.

##### **4.4 Contaminants**

###### **4.4.1 Toxic or noxious seeds and their metabolites**

The product 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.

###### **4.4.2 Heavy metals**

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

#### 4.4.3 Pesticide residues

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

#### 4.4.4 Mycotoxins

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

Maximum level of Deoxynivalenol (DON) is 1.0 mg/kg (on dry matter basis).

#### 4.4.5 Other contaminants

The product shall be free from other contaminants in amounts which may represent a hazard to health.

Table 2: Micronutrient rate and chemical form

	Target/100g flour	Form
<b>Vitamin/Mineral premix FBF-V-13</b>		
Vitamin A	3460 IU	Dry Vitamin A Palmitate 250 Cold Water Dispersible Stabilized
Vitamin D3	441.6 IU	Dry Vitamin D3 100 Water Dispersible Stabilized
Vitamin E TE	8.3 mg	Dry Vitamin E Acetate 50% Water Dispersible
Vitamin K1	30 µg	Dry Vitamin K1 5% Water Dispersible
Vitamin B1	0.2 mg	Thiamine mononitrate
Vitamin B2	1.4 mg	Vitamin B2 fine powder
Vitamin B6	1 mg	Pyridoxine hydrochloride
Vitamin C	90 mg	Ascorbic acid
Pantothenic acid	1.6 mg	Calcium D Panthotenate
Folate, (DFE)	110 µg	Folic acid*
Niacin	8 mg	Niacinamide
Vitamin B12	2 µg	Vitamin B12 0.1% or 1% Spray Dried
Biotin	8.2 µg	Biotin 1%
Iodine	40 µg	Potassium Iodide*
Iron (a)	4 mg	Ferrous fumarate fine powder
Iron (b)	2.5 mg	Iron-sodium EDTA
Zinc	5 mg	Zinc Sulphate Monohydrate
Carrier		Corn maltodextrin
		* Adequate dilution shall be used in order to guarantee premix homogeneity
<b>Other minerals</b>		
Potassium	140 mg	Potassium Chloride with 0.5% silicon dioxide as anticaking agent, compliant with food chemical codex, min 100% <600 micron
Calcium	362 mg	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.
Phosphorous	280 mg	

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

## 4.5 Hygiene

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.

When tested by appropriate methods of sampling and examination, the products:

- shall be free from any foreign matter/bodies, control through appropriate measures like sieves, metal detector/X-ray detector on final product;
- shall be free from micro-organisms in amounts which may represent a hazard to health;
- shall be free from insects, its parts or its wiggler, parasites and rodents' excreta which may represent a hazard to health; and
- shall not contain any substance originating from micro-organisms or any other poisonous or deleterious substance such as anti-nutritional factors, heavy metals or pesticide residues, in amounts which may represent a hazard to health.
- Air meeting product after extrusion needs to be filtered, preferably using HEPA Filtration. Filtration effectiveness should be validated for microbiological clearance. High risk areas need to have positive air flow and dust filtration is mandatory.

## 4.6 Shelf life

The product covered by the provision of this specification shall retain above qualities for at least 18 months from date of manufacture when stored dry at ambient temperatures prevalent in the country of destination. The supplier should conduct their own shelf life studies to confirm shelf-life claims for the labelling. The shelf life studies should comply with WFP requirements. Any major change in production processes, suppliers, ingredients should be addressed in the change management protocol and a clear definition of triggers new shelf-life study should be included.

## 4.7 Fit for human consumption guarantee

Suppliers shall have to check the quality of their products and guarantee that the product is '**fit for human consumption**'.

## 5. PACKAGING

### 5.1 General requirements

The product covered by the provision of this specification shall be packed in appropriate packaging which safeguard the hygienic, nutritional, technological, and organoleptic qualities of the product. The packaging shall be made of substances which are safe and suitable for their intended use.

*Note:* Packaging requirement can also be agreed as per contractual requirements.

### 5.2 Product net weight

- 1.5 – 2.0 kg Net weight and follow contract requirement for specified net weight,
- Weight and quantity tolerance shall meet The International Organization of Legal Metrology International Recommendation OIML R 87<sup>2</sup>.

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<sup>2</sup> OIML R 78 Quantity of commodity in pre-packages [https://www.oiml.org/en/files/pdf\\_r/r087-e04.pdf](https://www.oiml.org/en/files/pdf_r/r087-e04.pdf), latest edition to be followed

### 5.3 Primary packaging

Sachets shall be:

- Food grade materials compliant with the last amendments of national regulations in the country of production (if not existing: compliance with EU or FDA legislations requested).
- Optimized shape to avoid space loss in the sachets and in the cartons
- Properly sealed with no leakages (test example: ASTM F2338 – 09, ASTM D3078 – 02 or equivalent)
- The sachets shall be placed in an appropriate way in the carton box during the packing process to avoid packaging damage
- The laminate shall include a barrier layer to highly reduce permeability of oxygen and water vapour. The minimum requirements<sup>3</sup> are:
  - WVTR < 1.5 g/m<sup>2</sup>.day (38°C/90% RH) (ASTM F1249-06 or equivalent)
  - OTR < 5 cc/m<sup>2</sup>.day (23°C/0% RH) (ASTM D-3985 or equivalent)
- Reverse printing is highly recommended

Typically, a laminate composed of “(polyolefin or polyester) \* + metallized (polyolefin or polyester) \* ” - typical thickness: 70-90 microns - or equivalent can be used.

\*e.g. PE, PET, PP

- Nitrogen flushing should be applied during the filling of the powder in sachets. The residual limit of oxygen (O<sub>2</sub>) should be maximum 2%.

### 5.4 Secondary packaging

The product shall be packed in cartons suitable for the humanitarian supply chain.

It is under supplier responsibility to select a packaging material that will resist to multiple handling and up to 2 meters stacking.

Cartons shall be:

- New, manufactured from well-constructed double walled corrugated board
- With an edge crush resistance of 60ECT = 60 lbs/in eq 11 kN/m (ISO 3037) and a specific weight of 700 to 1000 grams per square meter
- fully filled for maximum strength and dimensions adjusted to the load
- The fluting shall be vertical, supporting the load
- The carton should be plain brown
- No stapling will be accepted
- firmly closed (top and bottom)

Unless otherwise specified in the contract, two percent (2%) empty, marked cartons (included in the price) shall be sent with the lot.

### 5.5 Stuffing in Containers and other transport vehicles

Use of desiccant is mandatory in each container to absorb moisture and condensation during shipment to preserve the commodity and packaging performance.

The following table provides a guideline on the quantity to be used;

Table 3: Guideline on the quantity to be used for calcium chloride-based desiccants:

Estimated days in container	20 ft container	40 ft container
15-59 days	9.00 kg	17.50 kg
60-89 days	11.25 kg	22.50 kg
90-120 days	13.50 kg	25.00 kg

Better alternative material can be used upon agreement with WFP.

- Empty containers/vehicles shall be clean, pest free and free of damage, odours and previous cargo remains. Ventilation holes shall remain clear and unsealed.

<sup>3</sup> Suppliers shall submit packaging Certificate of Analysis indicating WVTR and OTR compliance to WFP with other documents for payment.

If pallets are used inside containers: it is highly recommended to have 3 first bottom layers placed as column stacking, the rest can be interlocked (cross-stacking) for load stability. Pallet shall be wrapped in a suitable manner (locked to the pallet, enough containment force) and the cartons should be banded when necessary. The cartons shall be secured to pallets in order to prevent any damage to the contents or packaging during shipment. Pallet used should be strong enough to support the charge during transportation. Pallets shall be stackable (minimum double stock) without damage to the cartons during shipment. Also, kraft paper shall be adhered to all internal sides, door, and floor of container. Kraft paper also need to be placed on the top of packaging.

If no pallets are used inside container: dunnage (of strong sheets such as carton, plywood...) should be placed inside each container at every three layers of cartons to provide the required stacking strength. In addition, protecting material like air bag, carton, polystyrene, can be used. Also, kraft paper shall be adhered to all internal sides, door, and floor of container. Kraft paper also need to be placed on the top of packaging.

## 6. MARKING

The labelling of the product covered by the provision of this specification shall comply with CODEX STAN 1-1985 The following information should be available on bags and carton:

Table 4: Generic marking requirements

Description	Bags	Cartons
Product name	<b>SUPER CEREAL - Corn Soya Blend with Sugar</b>	
Net weight	1.5 kg to 2.0 kg or <i>as per contract</i>	<i>as per contract</i>
Ingredient list*	XX <sup>4</sup> ; (including allergens <sup>5</sup> )	--
Production date (dd/mm/yyyy)	XX	
Best Before End (mm/yyyy)	XX	
Batch/lot number**	XX	
Manufactured by: Name & address	XX	
Supplied by: Name and address***	XX	
Country of Origin	Product of XX	
Storage instruction	"Store under dry, ventilated and hygienic conditions and away from direct sunlight"	Keep dry; Keep away from heat; Stack limitation; Side up Picto
Other requirements	Not for Sale	
Preparation instructions	[pictorial of opening the bag] [pictorial of blending with water] [pictorial of cooking] [pictorial of feeding to adult] [pictorial of closing the bag]	--
Donor and WFP logo	as per contractual requirement	
Additional marking	as per contractual requirement	

\*=Maize, Whole Soya Beans, Sugar, Minerals and Vitamins

\*\*= supplier need to clearly describe the batch/lot size for the traceability of the product

\*\*\*=if different from the manufacturer

Templates for artwork available on: <https://foodqualityandsafety.wfp.org/specifications>

## 7. STORING

The product shall be stored under dry, ventilated and hygienic conditions.

<sup>4</sup> All XX shall be provided by the manufacturer.

<sup>5</sup> Allergen labelling guidelines: All ingredients considered allergens as per EU Regulation 1169/2011 – Annex II -shall be labelled in bold letters in the ingredient list. The supplier is responsible for creating and maintaining an updated list of allergens present in the manufacturing facility. All products manufactured in that facility shall be labelled with the entire list of allergens identified in that facility, either as ingredients or as cross-contamination.



## 8. ANALYTICAL REQUIREMENTS

Additional tests may be defined in case further quality assessment is required. The following analytical plans are currently utilized by WFP and shared only for suppliers' information. Suppliers should follow its own food safety and quality management plan. Additionally, WFP reserves the rights to change these plans at any time.

Table 5: List of compulsory tests and reference methods

No	Tests	Requirements	Reference method (or equivalent validated methods)
1	Moisture	Max. 7.0%	ISO 712: 2009
2	Protein	Min. 14.0 g/100g flour (N x 6.25)	ISO 20483 AOAC 992.23 EN ISO 16634-2:2016
3	Fat	Min. 6.0 g/100g flour	ISO 11085
4	Crude fibre	Max. 3.8 g/100g flour	ISO 5498 AOAC 962.09
5	Total ash	Max. 4.1 g/100g flour	ISO 2171 / AOAC 923.03
6	Peroxide value	Max. 10.0 meq/kg fat	AOAC 965.33
7	Urease index	Max. 0.20 pH units	AOCS Ba 9-58 (1997)
8	Particle size	- 95% shall pass through a 600 microns sieve. - 100% shall pass through a 1,000 microns sieve	
9	Organoleptic (smell, taste, color)	Pleasant smell and palatable taste, typical color	Sensorial inspection
10	Consistency (Bostwick flow rate)	Min. 55mm /30s for 15% dry matter porridge	WFP's SOP <a href="http://foodqualityandsafety.wfp.org">http://foodqualityandsafety.wfp.org</a>
11	Vitamin A	2770-4160 IU/100g flour	AOAC 992.04
12	Iron	9.6-14.4 mg/100g flour	AOAC 944.02
13	Calcium	350-520 mg/100g flour	AOAC 984.27
14	Potassium	610-910 mg/100g flour	AOAC 984.27
15	Aflatoxin (total)	Max. 10 ppb (total of B1, B2, G1, G2)	ISO 16050 / EN 12955
16	Deoxynivalenol (DON)	Max. 1.0 mg/kg (on dry matter basis)	EN 15891:2010
17	Mesophyllic aerobic bacteria	< 100,000 cfu/g flour	ISO 4833-1:2013 ICC No 125 AACC 42-11.01
18	Coliforms	< 100 cfu/g flour	ISO 4832:2006 AOAC 2005.03 AACC 45-15.02
19	Salmonella	0 cfu/25g flour	ISO6579-1:2017 AACC 42-25.03
20	Escherichia Coli	< 10 cfu/g flour	AOAC 991.14 ISO 16649-2:2001
21	Staphylococcus aureus	< 10 cfu/g flour	EN ISO 6888-2:2004 AACC 42-30.04
22	Bacillus cereus	< 50 cfu/g flour	AOAC 980.31 ISO 7932:2004
23	Yeasts and moulds	< 1,000 cfu/g flour	ISO 21527-2:2008 ICC No 146 AACC 42-50.02
24	GMO (only if required)	Negative (< 0.9% of GMO material)	ISO 21569 ISO 24276