



**Technical Specifications for the manufacture of:**

## **SUPER CEREAL**

### **CORN SOYA BLEND with SUGAR**

Specification reference: **SUPER CEREAL- Corn Soya Blend with Sugar**

Version: **1.0**

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#### **1. INTRODUCTION**

##### **1.1 Product purpose**

**SUPER CEREAL- Corn Soya Blend with Sugar** is a product for adults and children over than 6 months.

##### **1.2 Product type**

**SUPER CEREAL- Corn Soya Blend with Sugar** is prepared from heat treated maize and soya beans, sugar, vitamins and minerals. If **SUPER CEREAL- Corn Soya Blend with Sugar** 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 **SUPER CEREAL- Corn Soya Blend with Sugar** with 250 g of water) followed by a cooking time at simmering point from five to ten minutes.

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

**SUPER CEREAL- Corn Soya Blend with Sugar** shall comply, in terms of raw materials, composition or manufacture, except when specified otherwise in the 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.
- 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.

## 2. RAW MATERIALS

### 2.1 Main ingredients

**SUPER CEREAL- Corn Soya Blend with Sugar** shall be manufactured from fresh maize grain and soy beans of good quality, free from foreign materials, substances hazardous to health, excessive moisture, insect damage and fungal contamination 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 aflatoxin (recommended method AACC 45-05 or AOAC 26.049 / 1984).
- 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*).

Maize and soya beans 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.

### 2.2. Sugar

Refined sugar shall conform to Codex STAN 212-1999. Sugar must be milled to meet particle specification: 100% through a 1000 microns screen, 95% through a 600 micron screen.

### 2.3 Vitamins and minerals

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

- 2 kg of vitamin premix (**FBF-V-10**).
- 8.0 kg of [Ca(H<sub>2</sub>PO<sub>4</sub>)<sub>2</sub>. H<sub>2</sub>O (Mono Calcium Phosphate)].
- And 7.6 kg of KCl (Potassium chloride).

Requirements for KCl and Ca(H<sub>2</sub>PO<sub>4</sub>)<sub>2</sub>. H<sub>2</sub>O are:

- Must meet at least food chemical codex (FCC).
- Particle size for KCl min 60% < 250 µm (microns).
- Particle size for Ca(H<sub>2</sub>PO<sub>4</sub>)<sub>2</sub>. H<sub>2</sub>O min 95% <250 µm (microns).

The composition of micronutrient premixes premix is presented in product specification.

Complete micronutrient premixes must be purchased from a WFP approved supplier: BASF (Stern Vitamin), DSM, Fortitech, Nicholas Piramal, Hexagon Nutrition or their authorized dealers and GAIN premix facility. Addresses of premix suppliers are on <http://foodquality.wfp.org>

Micronutrient premixes must be delivered to the processor of **SUPER CEREAL- Corn Soya Blend with Sugar** with a complete Certificate of Analysis as well as with a Proof of purchase of premixes. The two documents must be presented with other documents for payment.

Micronutrient premixes must be stored in a dry, cool and clean place.

### 3. PROCESSING

#### 3.1 Formula

**SUPER CEREAL- Corn Soya Blend with Sugar** is manufactured according to the following formula:

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

N <sup>o</sup>	Ingredients	Percentage (by weight)
1	Corn (maize white or yellow)	64.24
2	Whole soya beans	24
3	Sugar	10
4	Vitamin/Mineral <b>FBF-V-10</b>	0.20
5	Ca(H <sub>2</sub> PO <sub>4</sub> ) <sub>2</sub> . H <sub>2</sub> O (mono calcium phosphate)	0.80
6	KCl (potassium chloride)	0.76

To ensure that the nutritional targets for protein and fat are met, the processor should check the fat and protein content of soya and if necessary make **adjustments** to the ratio of maize to soya in the formulation.

#### 3.2 Method of processing

**SUPER CEREAL- Corn Soya Blend with Sugar** shall be processed as a partially pre-cooked food under conditions which permit improvements in the digestibility of starches and 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 or roasting.

#### 3.3 Processing guidelines

General process guidelines are provided in WFP handbook: Fortified Blended Food – Good Manufacturing Practice and HACCP Principles; available on <http://foodquality.wfp.org>

#### 3.4 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 WFP handbook: Fortified Blended Food- Good Manufacturing Practice and HACCP Principles and fortification guide on <http://foodquality.wfp.org>

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

For compliance with Codex standards the processor must 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 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 GMP and HACCP systems are in place. 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 / quantity, cleaning schedules, etc).
- **Procedures** (e.g. cleaning, personnel hygiene, HACCP, sampling and analysis).
- **Instructions** (e.g. process instructions, cleaning instructions).
- The **quality manual** for the process or factory.

The manufacturer must be **registered under national food law** as a processor of foods for human consumption.

## 4. PRODUCT SPECIFICATIONS

**4.1 Moisture content** 10 % maximum

**4.2 Nutritional value:** it shall contain the following nutritional value per 100 g dry matter:

- Energy 380 kcal minimum
- Protein 14.0 % (N x 6.25) minimum
- Fat 6.0 % minimum
- Crude fibre 5.0 % maximum

### 4.3 Micronutrient

**SUPER CEREAL- Corn Soya Blend with Sugar** must be fortified to provide the following net micro nutrient **supplement** per 100g of finished product:

*Table 2: Micronutrient rate and chemical form*

	Target	Chemical forms
<b>Vitamin/Mineral FBF-V-10</b>		
Vitamin A	1,664 IU	Dry vitamin A palmitate 250 s.n
Thiamine	0.128 mg	Thiamine mononitrate
Riboflavin	0.448 mg	Riboflavin
Niacin	4.8 mg	Nicotinamide
Pantothenic acid	6.7 mg	Calcium d-pantothenate
Vitamin B6	1.7 mg	Pyridoxine hydrochloride
Folate	60 mcg	Folic acid
Vitamin B12	2 mcg	Vitamin B12 – 0.1% spray dried
Vitamin C	100 mg	Ascorbic acid
Vitamin D	4 mcg	Dry vitamin D3 100 CWS
Vitamin E	8.3 mg	Vitamin E 50% CWS
Vitamin K	100 mcg	vitamin K1 5% CWS
Iron (a)	4 mg	Ferrous fumarate
Iron (b)	2.5 mg	Iron-sodium EDTA
Zinc	5 mg	Zinc oxide
Iodine	40 mcg	Potassium iodate (KIO <sub>3</sub> )
Carrier	qs	Malto dextrin
<b>Other minerals</b>		
Potassium	400 mg	Potassium chloride (KCl)
Phosphorus	200 mg	Mono calcium phosphate Ca(H <sub>2</sub> PO <sub>4</sub> ) <sub>2</sub> . H <sub>2</sub> O
+ Calcium	130 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.

#### 4.4 Flour characteristics

##### *Particle size*

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

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

**Organoleptic:** it shall have a pleasant smell and palatable taste.

#### 4.5 Microbiology

Microbiological contamination of **SUPER CEREAL- Corn Soya Blend with Sugar** shall not to exceed the following levels:

*Table 3: Limit of microorganisms in SUPER CEREAL- Corn Soya Blend with Sugar*

<b>Microorganisms</b>	<b>Maximum levels</b>
Mesophyllic aerobic bacteria	100,000 cfu per g
Coliforms	100 cfu per g
Salmonella	0 cfu per 25g
Escherichia Coli	<10 cfu per g
Staphylococcus	<10 cfu per g
Bacillus cereus	50 cfu per g
Yeasts and moulds	1,000 cfu per g

#### 4.6 Contaminants

**SUPER CEREAL- Corn Soya Blend with Sugar** shall be free from objectionable matter; not contain any substances originating from micro-organisms or any other poisonous or deleterious substances such as anti-nutritional factors, heavy metals or pesticide residues, in amounts which may represent a hazard to health.

- Permitted level of total aflatoxin: 20 ppb (B1, B2, G1, G2).
- Heavy metals: below levels specified in Codex Stan 193-1995, in particular Pb max 20 ppb and Cd max 100 ppb.

#### 4.7 Shelf life

It shall retain above qualities for at least 12 months from date of manufacture when stored dry at ambient temperatures prevalent in the country of destination.

#### 4.8 Additional Requirements

**Peroxide value:** max 10 meq/kg fat.

**Consistency / Viscosity of 15% dry matter porridge** (Bostwick test): min 55 mm per 30 sec at 45°C and at the proposed preparation dosage (i.e. 40g of product plus 250g water after cooking at simmering point for five minutes).

**Anti-nutrients:** The urease index of **SUPER CEREAL- Corn Soya Blend with Sugar** should be between 0.01 and 0.2 pH units.

**Dispersiveness:** it shall be free from lumping or balling when mixed with water of ambient temperature.

**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.

## 5. PACKAGING

**SUPER CEREAL- Corn Soya Blend with Sugar** must be packed in new uniform strong polypropylene bags of a net content of 25 kg, fit for export and multiple handing. All bags have separate plastic inner lining of 75 microns. Polypropylene bags, the outer bag must have a heat cut mouth to prevent fibrillation and have sewn single folder bottom. Bag specification: size 50 cm x 75 cm in dimensions, tare about 110g each. Bags made of woven PP are to be given special food grade “ultraviolet” treatment. Construction of fabric must be solid to sustain harsh handling. The inner liner should be heat-sealed and outer bags double stitched.

Two (2%) percent marked bags (included in the price) must be sent with the lot.

## 6. MARKING

- Name and logo of the product: available on <http://foodquality.wfp.org>
- Net content: 25kg.
- Name and address of the supplier (including country of origin).
- Production date.
- Additional marking as per contractual agreement.

## 7. STORING

**SUPER CEREAL- Corn Soya Blend with Sugar** must be stored under dry, ventilated and hygienic conditions.

## 8. ANALYTICAL REQUIREMENTS

Table 4: List of compulsory tests and reference methods

No	Analyses/tests	Recommended level	Reference methods
<b>Main composition</b>			
1	Moisture	10 % ( <i>maximum</i> )	ISO 712-2009
2	Protein	14% (N x 6.25) ( <i>minimum</i> )	AOAC 981.10 ISO 20483:2006
3	Fat	6 % ( <i>minimum</i> )	AOAC 954.02 ISO 11085:2008
4	Crude Fibre	5 % ( <i>maximum</i> )	AOAC 992.16 AOAC 985.29
<b>Chemico-physical characteristics of flour</b>			
5	Peroxide value	10 meq/kg fat, ( <i>maximum</i> )	AOAC 965.33
6	Urease index	0.01-0.20 pH units	AOCS Ba 9-58 (1997)
7	Particle size	- 95% must pass through a 600 microns sieve - 100% must pass through a 1,000 microns sieve	
8	Organoleptic (smell, taste, color)	Pleasant smell and palatable taste, typical color	
9	Viscosity (Bostwick flow rate)	Min 55 mm/30s (15% dry matter porridge)	Mouquet & Treche, 2006
<b>Vitamins</b>			
10	Vitamin A ( <i>from premix only</i> )	1664 IU	AOAC 992.04 AACC 86-03
<b>Minerals</b>			
11	Iron ( <i>from premix only</i> )	6.5 mg	AOAC 944.02 AACC 40-41B
12	Calcium ( <i>from premix only</i> )	130 mg	AOAC 984.27
13	Potassium ( <i>from premix only</i> )	400 mg	AOAC 984.27
<b>Mycotoxins</b>			
14	Aflatoxin (total)	20 ppb (total of B1, B2, G1, G2), ( <i>maximum</i> )	AACC 45-16
<b>Microorganisms</b>			
15	Mesophyllic aerobic bacteria	100,000 cfu per g ( <i>maximum</i> )	ICC No 125 AACC 42-11
16	Coliforms	100 cfu per g ( <i>maximum</i> )	AOAC 2005.03
17	Salmonella	0 cfu per 25g	AACC 42-25B
18	E. coli	<10 cfu per g	AOAC 991.14
19	Staphylococcus	<10 cfu per g	AACC 42-30B
20	Bacillus cereus	50 cfu per g ( <i>maximum</i> )	AOAC 980.31
21	Yeasts and moulds	1,000 cfu per g ( <i>maximum</i> )	ICC No 146 AACC 42-50
22	GMO ( <i>Only if required</i> )	Negative	

\* Or equivalent