



Technical Specifications for the manufacture of:

SUPER CEREAL

CORN SOYA CHICKPEAS BLEND *for Ethiopia*

Specification reference: **Corn Soya Chickpeas Blend *for Ethiopia***

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Developed: **Van Hoan NGUYEN, OSPFQ-WFP**

Reviewed: **Shane PRIGGE, OSPFQ-WFP**

Approved: **Shane PRIGGE, OSPFQ-WFP**

1. INTRODUCTION

1.1 Product purpose

Corn Soya Chickpeas Blend is a product for adults and children over than 6 months.

1.2 Product type

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

1.3 Standards and recommendations

Corn Soya Chickpeas Blend 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

Corn Soya Chickpeas Blend shall be manufactured from fresh maize grain, soy beans and chickpeas 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.
- 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*).

Chickpeas

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

Maize, soya beans and chickpeas 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 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:

- 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.

The composition of micronutrient premixes 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://foodqualityandsafety.wfp.org>

Micronutrient premixes must be delivered to the processor of **SUPER CEREAL- Corn Soya Blend** 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

Corn Soya Chickpeas Blend is manufactured according to the following formula:

Table 1: Corn Soya Chickpeas Blend formula

N ^o	Ingredients	Percentage (<i>by weight</i>)
1	Corn (maize white or yellow)	74.30
2	Whole soya beans	12.0
3	Chickpeas	12.0
4	Vitamin/Mineral FBF-V-13	0.20
5	Dicalcium Phosphate Anhydrous	1.23
6	Potassium chloride	0.27

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

Corn Soya Chickpeas Blend 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://foodqualityandsafety.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://foodqualityandsafety.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 10.0 % 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 4.2 % maximum
- Ash 3.9 % maximum

4.3 Micronutrient

Corn Soya Chickpeas Blend must be fortified to provide the following net micro nutrient **supplement** per 100g of finished product:

Table 2: Micronutrient rate and chemical form

	Target/100g finished product	Form
Vitamin/Mineral premix FBF-V-13		
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
<i>Carrier</i>		Corn maltodextrin
		* Adequate dilution must be used in order to guarantee premix homogeneity
Other minerals		
Potassium	140 mg	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, 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.

4.4 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 **Corn Soya Chickpeas Blend** shall not to exceed the following levels:

Table 3: Limit of microorganisms in Corn Soya Chickpeas Blend

Microorganisms	Maximum levels
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

Corn Soya Chickpeas Blend 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 Fit for human consumption guarantee

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

4.9 Additional Requirements

Peroxide value: max 10 meq/kg fat.

Consistency 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 a boiling at simmering point for five minutes).

Anti-nutrients: The urease index of **SUPER CEREAL- Corn Soya Blend** should be maximum 0.20 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 boiling at simmering point for a minimum of five minutes and a maximum of ten minutes.

5. PACKAGING

Corn Soya Chickpeas Blend 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

Corn Soya Chickpeas Blend 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 method (Or equivalent)
Main composition			
1	Moisture	10.0 % (<i>maximum</i>)	ISO 712: 2009
2	Protein	14.0% (N x 6.25) (<i>minimum</i>)	AOAC 981.10 ISO 20483:2006
3	Fat	6.0 % (<i>minimum</i>)	AOAC 954.02 ISO 11085:2008
4	Crude fibre	4.2 % (<i>maximum</i>)	AOAC 962.09
5	Ash	3.9 % (<i>maximum</i>)	ISO 2171:2007
Chemico-physical characteristics of flour			
6	Peroxide value	10 meq/kg fat, (<i>maximum</i>)	AOAC 965.33
7	Urease index	0.20 pH units (<i>maximum</i>)	AOCS Ba 9-58 (1997)
8	Particle size	- 95% must pass through a 600 microns sieve. - 100% must pass through a 1,000 microns sieve	
9	Organoleptic (smell, taste, color)	Pleasant smell and palatable taste, typical color	
10	Consistency (Bostwick flow rate)	Min 55mm /30s for 15% dry matter porridge	WFP's SOP http://foodqualityandsafety.wfp.org
Vitamins			
11	Vitamin A	2780-4160 IU per 100g	AOAC 992.04 AACC 86-03
Minerals			
12	Iron	8.9-13.4 mg per 100g	AOAC 944.02
13	Calcium	330-500 mg per 100g	AOAC 984.27
14	Potassium	540-810 mg per 100g	AOAC 984.27
Mycotoxins			
15	Aflatoxin (total)	20 ppb (total of B1, B2, G1, G2) (<i>maximum</i>)	AACC 45-16
Microorganisms			
16	Mesophyllic aerobic bacteria	100,000 cfu per g (<i>maximum</i>)	ICC No 125 AACC 42-11
17	Coliforms	100 cfu per g (<i>maximum</i>)	AOAC 2005.03
18	Salmonella	0 cfu per 25g	AACC 42-25B
19	Escherichia Coli	<10 cfu per g	AOAC 991.14
20	Staphylococcus aureus	<10 cfu per g	AACC 42-30B
21	Bacillus cereus	50 cfu per g (<i>maximum</i>)	AOAC 980.31
22	Yeasts and moulds	1,000 cfu per g (<i>maximum</i>)	ICC No 146 AACC 42-50
23	GMO (<i>only if required</i>)	Negative (< 0.9% of GMO material)	