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**USAID Commodity Specification
Super Cereal Plus
March 3, 2016**

USAID COMMODITY SPECIFICATION

SUPER CEREAL *PLUS*

FOR USE IN INTERNATIONAL FOOD ASSISTANCE PROGRAMS

Effective Date: March 3, 2016

SUPER CEREAL PLUS

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Part I COMMODITY SPECIFICATIONS

COMMODITIES

A. Product Purpose and Type

Super Cereal *Plus* is a product preferred for young children aged 6 months – 2 years. The product is to be used as a complement to breastfeeding. The product is NOT a breast-milk replacer.

Super Cereal *Plus* is prepared from heat treated corn and de-hulled soybeans, nonfat dry milk, refined soy bean oil, vitamins and minerals. If Super Cereal *Plus* is consumed as a porridge or gruel, it should be prepared by mixing an appropriate proportion of flour and clean water (i.e. 50g of Super Cereal *Plus* with 250 g of water) followed by a cooking time at simmering point from five to ten minutes.

B. Main Ingredients

1. **Super Cereal *Plus*** shall be manufactured from corn of the type No. 2 or better, according to the [U.S. Corn Inspection Handbook Chapter II](#) and de-hulled soy beans (minimum of 85 percent hull removal) 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:
 - a. **Corn:** Corn shall be tested for aflatoxin in accordance with procedures approved by Federal Grain Inspection Service (FGIS). If the aflatoxin test proves positive, a quantitative test shall be performed. If the result of the quantitative test exceeds 20 p.p.b., the corn shall not be used in the production of the commodity.
 - b. **Corn and Soybeans** must be stored under dry, ventilated and hygienic conditions. Only safe insecticides may be used for fumigation control. Where needed, fumigation must be performed by certified operators.
2. **Sugar** shall conform to [21 CFR 168](#) or Codex STAN 212-1999. To meet particle size specification 100 percent through a 1000 microns screen, 95 percent through a 600 microns screen.
3. **Nonfat Dry Milk (NDM)** specifications can be found at the USDA Commodity Requirements Document: [DDI2 Dried Dairy Ingredients](#). To meet particle size specification 100 percent through a 1000 microns screen, 95 percent through a 600 microns screen.
In the event that **Whey Protein Concentrate (WPC)** is substituted for the Nonfat Dry Milk, the DDI2 requirements for WPC will be applicable.
4. **Refined Soy Bean Oil** in conformance to the requirements as specified in the Commercial Item Descriptions (CID) for salad oils (vegetable), A-A-20091D, dated May 7, 2002, which is available

at <http://www.ams.usda.gov/AMSV1.0/getfile?dDocName=STELDEV3006232>.
Only refined-deodorized-bleached oils are acceptable.

C. Vitamins and Minerals

1. Micronutrient premixes shall be used at appropriate rates in such a way that the supplier should comply with the finished product nutritional requirements indicated in Tables 1 and 2 and 4.
2. Requirements of Potassium chloride and Tri-Calcium Phosphate are:
 - a. Must meet food chemical codex
 - b. Particle size for Potassium Chloride - Min 60 percent < 250 µm (microns).
 - c. Particle size for Tri-Calcium Phosphate min 95 percent <250 µm (microns).
 - d. TCP: compliant with food chemical codex, min 95 percent<250 micron, total aerobic viable count <1000 CFU/g, yeast<10 CFU/g, mold <100 CFU/g, and Enterobacteria negative in 1 g.
3. The composition of micronutrient premixes should be adjusted accordingly to meet the end product requirements in E. 4. One premix is preferred with all vitamins and minerals except for the TCP and Potassium chloride.
4. Micronutrient premixes must be delivered to the processor of Super Cereal Plus with a complete Certificate of Analysis as well as with a proof of purchase of premixes.
5. Micronutrient premixes must be stored in a dry, cool and clean place where the temperature is a maximum of 25°C.

D. Processing

1. Formula
 - a. **Super Cereal Plus** is manufactured according to the following formula:

Table 1: Super Cereal Plus- formula

No.	Ingredients	Percentage (by weight)
1	Corn (white or yellow)	58.17
2	De-hulled soybeans	20.00
3	Dried skim milk powder ¹	8.00
4	Sugar	9.00
5	Refined soy bean oil	3.00
6	Vitamin/Mineral Premix	0.40
7	Tri-Calcium Phosphate	1.16
8	Potassium chloride	0.27

¹ Whey protein concentrate (80 percent protein) can be used in place of skim milk powder at 5 percent of the total recipe. The amount of corn used should be adjusted to approximately 61 percent to meet 16 percent protein for the total product.

- b. A percent mixture of 58.17 percent corn and 20 percent de-hulled soybeans will normally meet the nutritional specifications for protein (see nutritional value below).
- c. Soybeans have varying levels of protein and fat depending on origin. To ensure that the nutritional targets for protein and fat are met, the processor should check the fat and protein content of soy and if necessary make **adjustments** to the ratio of corn to soy in the formulation.

2. Methods of Processing

Super Cereal Plus, shall be processed under high temperature short time (HTST) heat treatment conditions, as field data suggest that 60 percent of users eat similar products, such as Corn Soy Powders, uncooked. Extruded pellets resulting from the HTST process shall then be milled to flour. The HTST extrusion process should permit improvements in the pre-gelatinization of starches and digestibility of proteins and in particular the de-activation of trypsin inhibitors in soy as indicated by the urease test. Other possible heat treatments include wet extrusion, dry extrusion or roasting. The addition of soybean oil is recommended to be carried out at the premixing stage of corn and soybeans before extrusion. The addition of Nonfat Dry Milk powder or whey protein concentrate and sugar should be carried out at the same time the vitamins and minerals are being added

Homogeneity of micronutrients

Theoretical calculations indicate that a mixing system with a [Coefficient of Variation](#) of 10 percent using iron as the indicator element will enable product to meet the above variation target with 95 percent, provided that all conditions of mixing are rigorously applied. If information is needed to conduct these calculations see the WFP handbook².

E. Product Specifications

- 1. Moisture Content: 7 percent maximum
- 2. Nutritional Value: it shall contain the following nutritional value per 100g dry matter:
 - a. Energy: 410 kcal minimum
 - b. Protein: 16.0 percent (N x 6.25) minimum
 - c. Fat: 9.0 percent minimum
 - d. Crude Fiber: 2.9 percent maximum
 - e. Ash: 4.2 percent maximum
- 3. Variation in Food Specifications
 - The variation of the final product with respect to contents of protein and fat

² WFP. 1998. [Food and Nutrition Handbook](#). Nutrition Works; Edited by Anne Callanan.

shall not exceed minus five percent of the specified value using standard analytical techniques. The moisture and crude fiber should not exceed five percent of the specified values. Products not meeting this requirement will be rejected.

4. Micronutrient

Super Cereal Plus must be fortified to provide the following target micronutrient supplement per 100g of finished product— Premixes should be adjusted to account for intrinsic properties of the components

Table 2: Micronutrient profile of finished product and chemical form per 100 grams		
Vitamin/Mineral	Target³	Chemical forms⁴
Vitamin A RE	3466 IU	Dry Vitamin A Palmitate 250 SN
Vitamin D ³	441.6 IU(11 µg)	Dry Vitamin D3 100 SD/S
Vitamin E TE	8.3 mg	Dry Vitamin E 50% CWS/S
Vitamin K1	30 µg	Dry Vitamin K1 5% SD
Vitamin B1	0.2 mg	Thiamine Mononitrate
Vitamin B2	1.4 mg	Vitamin B2 Universal Fine Powder
Vitamin B6	1 mg	Pyridoxine Hydrochloride
Vitamin C	90 mg	Ascorbic Acid
Pantothenic acid	1.6 mg	Calcium D-Pantothenate
Folic acid (as Dietary Folate Equivalents)	110 µg	Folic Acid 10% on Potato Malt -or- Folic Acid 10% on DiCalcium Phosphate ⁵
Niacin	8 mg	MG Niacinamide
Vitamin B12	2 µg	Vitamin B12 1% SD
Biotin	8.2 µg	Biotin 1%
Iodine	40 µg	Potassium Iodide 10% on Potato Malt - or- Potassium Iodide 1% on Calcium Sulfate ⁶
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 DE

³ Variable levels of micronutrients (i.e. iron, zinc, etc.) naturally present in corn and soya may lead to variable amount of micronutrients in finished product. Suppliers need to factor in their formulation intrinsic levels of micronutrients.

⁴ Alternative chemical forms will be considered but must be approved by the contracting officer.

^{5,7} Adequate dilution must be used in order to guarantee homogeneity

Table 2: Micronutrient profile of finished product and chemical form per 100 grams		
Vitamin/Mineral	Target ³	Chemical forms ⁴
Other minerals		
Potassium	140mg	Potassium Chloride (with anticaking agent), compliant with food chemical codex, min 90%<425 micron and min 60%<250 micron.
Calcium	362mg	Tri-Calcium Phosphate
Phosphorous	280 mg	

5. Finished Product Characteristics

- a. Particle size shall have a uniform fine texture with the following particle distribution:
 - (1) 95 percent must pass through a 600 micrometer sieve
 - (2) 100 percent must pass through a 1,000 micrometer sieve.
- b. Organoleptic: It shall have a pleasant smell and palatable taste.

6. Microbiology and Contaminants

Not to exceed the following levels of microbiological contamination in the finished product:

Table 3: Limit of microorganisms and Contaminants in Super Cereal Plus							
Microbiological Test	IC/SU	n	c	m	M	Report Unit	Ref. Methods
Mesophilic aerobic bacteria (cfu/g)	I/25	1	0	10,000	10,000	/g	ICC No 125 AACC 42-11
Coliforms (cfu/g)	I/25	1	0	10	10	/g	AOAC 2005.03
Salmonella (cfu/25g)	C/25	10	0	0	0	/250g	AACC 42-25B
Escherichia coli (cfu/g)	I/10	1	0	0	0	/g	AOAC 991.14
Staphylococcus aureus (cfu/g)	I/10	1	0	0	0	/g	AACC 42-30B
Bacillus cereus (cfu/g)				50	50	/g	AOAC 980.31
Yeasts and molds	I/25	1	0	100	100	/g	ICC No 146 AACC 42-50
Aflatoxin B1, B2, G1 and G2. (ppb)	I/25	1	0	20	20	/g	AACC 45-16
Melamine ⁷	0.15 ppm (<i>maximum</i>)					ISO/TS 15495 IDF/RM 230:2010 8	
Annotations:							

⁷ From Codex REPI2/CF recommended for Infant Liquid Formula. Both FDA and WHO/Codex recommend for general public a maximum limit of 2.5 ppm.

⁸ Other methods more appropriate for Super Cereal Plus can be used as long as there is evidence of accuracy and reproducibility

Table 3: Limit of microorganisms and Contaminants in Super Cereal Plus							
Microbiological Test	IC/SU	n	c	m	M	Report Unit	Ref. Methods
<p>IC: Whether the testing sample is individual (I) or composite (c) SU: Sample Units n: Number of sub-samples to be examined c: Number of acceptable sample units between m and M m: maximum of cfc of the organism per gram that are of no concern M: Maximum allowable number of microorganism (cfu) per gram in any one sub-sample. Any sub-sample with a number above M causes the rejection of the lot under consideration.</p>							

7. Additional Requirements

- a. 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.
- b. Shelf life: The product shall have a shelf life of 18 from date of manufacture when stored dry at ambient temperatures prevalent in the country of destination.
- c. Fit for human consumption guarantee, meaning all products utilized in SC plus should be [Generally Recognized As Safe \(GRAS\)](#) Approved.
- d. Suppliers shall have to check the quality of their products and guarantee that they are 'fit for human consumption'
- e. Peroxide value: Maximum 10 meq/kg fat.
- f. Dispersiveness: It shall be free from lumping or balling when mixed with water of ambient temperature.
- g. Consistency/Viscosity of porridge (Bostwick flow rate): Consistency value cooked: minimum 100 mm per 30 seconds at 45°C and at the proposed preparation dosage (i.e. 50g of product plus 250g water after cooking at simmering point for five minutes) using a wide mouth beaker⁹.
- h. Anti-nutrients: The urease index of Super Cereal Plus should be a maximum of 0.2 pH units.
- i. Additional safety parameters: Super Cereal Plus 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.
- j. Heavy metals: below levels specified in Codex Stan 193-1995, in particular Pb max 20 ppb and Cd max 100 ppb.

⁹ See WFP Bostwick procedures flow chart:
http://documents.wfp.org/stellent/groups/public/documents/manual_guide_proced/wfp258795.pdf

F. Storing: Super Cereal Plus must be stored under dry, ventilated and hygienic conditions.

G. Analytical requirements for finished product

Table 4: List of analytical requirements			
No.	Analyses/ tests	Target	Reference methods¹⁰
Main composition			
1	Moisture	7 % (<i>maximum</i>)	ISO 712: 2009
2	Protein	16% (N x 6.25) (<i>minimum</i>)	AOAC 981.10; ISO 20483:2006
3	Fat	9 % (<i>minimum</i>)	AOAC 954.02; ISO 11085:2008
4	Crude Fiber	2.9 % (<i>maximum</i>)	AOAC 992.16; AOAC 985.29 AOAC 962.09
5.	Ash	4.2% (<i>maximum</i>)	ISO 2171:2007; AOAC 923.03
Chemical and physical characteristics of Finished Product			
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	<ul style="list-style-type: none"> • 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	Viscosity (Bostwick flow rate)	Min 100mm /30s (17% dry matter porridge)	Mouquet & Treche, 2006 or WFP SOP ¹¹
Vitamins			
11	Vitamin A (range includes <i>premix and intrinsic</i>)	2770-4160 IU/ 100g	AOAC 992.04; AACC 86-03
Minerals⁹			
12	Iron (finished product)	9.6 – 14.4 mg/100g	AOAC 944.02; AACC 40-41B
13	Calcium	440-660 mg/ 100g	AOAC 984.27
14	Potassium	700-1050/100g	AOAC 984.27
Mycotoxins			
15	Aflatoxin (total)	10 ppb (total of B1, B2, G1, G2), (<i>maximum</i>)	AACC 45-16

¹⁰ Or equivalent

¹¹ http://documents.wfp.org/stellent/groups/public/documents/manual_guide_proced/wfp258795.pdf

Table 4: List of analytical requirements			
No.	Analyses/ tests	Target	Reference methods¹⁰
Microorganisms			
16	Mesophilic aerobic bacteria	10,000 cfu per g (<i>Maximum</i>)	ICC No 125; AACC 42-11
17	Coliforms	10 cfu/ g (<i>Maximum</i>)	AOAC 2005.03
18	Salmonella	0 cfu/ 25g	AACC 42-25B
19	E. coli	0 cfu/ g	AOAC 991.14
20	Staphylococcus aureus	0 cfu/ g	AACC 42-30B
21	Bacillus cereus ¹²	50 cfu per g (<i>Maximum</i>)	AOAC 980.31
22	Yeasts and molds	100 cfu per g (<i>maximum</i>)	ICC No 146; AACC 42-50

QUALITY ASSURANCE

- A. The contractor and/or FGIS shall perform the product monitoring, testing, food safety and quality analysis to ensure that the product meets the commodity specifications. The results shall be evidenced by a Certificate of Analysis (COA) by supplier and/or FGIS. Copies of the original COA must be submitted as part of the invoice package. The COA shall provide the results of all tests specified. If quality discounts are provided in the contract, and the product to be delivered by the contractor falls within the quality discount table, those factors shall be identified by an asterisk on the copies of the COA.
- B. Contractors shall notify the Government immediately of lots that fail to meet contract requirements.
- C. Unless otherwise specified, test methods for the finished product, and any ingredients therein, shall be those of the AOAC INTERNATIONAL, the American Association of Cereal Chemists (AACC), or the American Oil Chemists' Society (AOCS), as applicable and in effect on the date of issuance of the solicitation, or in accordance with methods that give equivalent results.

Part 2 CONTAINER AND PACKAGING REQUIREMENTS

Section 2.1 GENERAL

This part provides the container specifications and packaging materials requirements used under this contract.

Section 2.2 CONTAINERS AND MATERIALS

- A. All containers and packaging materials shall be constructed to meet the requirements of the Food and Drug Administration (FDA) for

¹² Certain load of Bacillus cereus is known to cause bacteraemia in immunocompromised patients as well as symptoms such as vomiting and diarrhea (WHO Report: http://www.who.int/water_sanitation_health/dwq/fulltext.pdf)

safe contact with the packaged product. The contractor shall obtain and maintain documentation from the container or packaging material manufacturer to verify that the containers and packaging materials used in this contract were in compliance with the Government’s regulatory requirements for safe contact with food products as required in the Master Solicitation, Part 3, Section A, Number 3.

- B. The primary packaging shall consist of a plastic foil with a metalized layer such as: PE60/Met polyester 12. The bag may be re-closable with a zipper closure. The characteristics of the 12 Metalized layer will be:

Specification	12 Metalized	Method
Specific Weight	1.4 g/cm ³	
Thickness base film	12.0 microns	
Specification	12 Metalized	Method
Yield	59.5 m ² /kg	
Tensile Strength at break	21.0 kg/mm ²	ASTM D882
Elongation at break	100%	ASTM D882
Shrinkage	2.0%	ASTM D1204
Shrinkage (150°C 30')	0.2%	ASTM D1204
Optical Density	2.2	
Permeability O ₂ (38 °C - 45%RH)	1.5 cc/m ² /24h	ASTM D1484
Permeability Vapour (38 °C -90%RH)	1.5 cc/m ² /24h	ASTM E96
Melting Point	260°C	

- C. Questions concerning the containers and materials should be directed to:
 USDA/FSA/DACO
 Room 5755 – South Bldg, STOP 0551
 1400 Independence Avenue SW
 Washington, DC 20250-0551
 ATTN: Packaging
- D. If the contractor purchases packaging and container ingredients from a foreign country and/or the package and container is manufactured in a foreign country, the package and container SHALL NOT display country of origin labeling. Phrases similar, but not limited to “Made in [Name of Foreign Country.]” or “Product of [Name of Foreign Country.]” are strictly prohibited.

Section 2.3 PACKAGING

Super Cereal Plus shall be packed in new uniform strong plastic bags, such as polypropylene, and fit for export and multiple handlings. All bags have separate plastic

inner lining of 75 microns thickness. Woven Polypropylene outer bags must have a heat cut mouth to prevent fibrillation and have a sewn single fold bottom.

- A. 1.5 kilograms of product shall be packed per bag, or any other agreed upon pre-determined net weight with the contractor. The bags should be new uniform multilayer bags that are heat sealed, fit for export and multiple handling. The use of recycled materials is not required if performance or food safety is jeopardized.

PP-PE Bags:

Bag size specification: 50 cm x 75 cm.

Bag tare weight: 110 grams target.

Bags made of woven polypropylene should be food grade treated, with ultraviolet treatment.

Bag construction should be strong enough to withstand harsh handling conditions.

- B. The outer packaging shall consist of a shipping carton, an example construction of which is below:

Carton boxes

for export #350BC (42-26-42-26-42 with WPA (water proof adhesive) to be constructed directly with U.S. standard carton erector.

Section 2.4 MARKING

A. 1.5 kg Bags

The 1.5 kg bags (or any other agreed upon pre-determined net weight with the contractor) shall have the following markings:

- Name of the Product: Super Cereal Plus
 - USAID Logo
 - Ingredients: Corn, Soya, Sugar, Milk ingredients, Vegetable oil, Minerals and Vitamins
 - Net content: 1.5 kg
 - Code for supplier:
 - Batch/Lot number:
 - Best used before: 18 months after production date
 - Storage instructions: Store closed bag in cool, dry and hygienic place
- Additional marking as per contractual agreement. For instance, the artwork/design can allow for continuous random printing, as long as traceability information is not compromised.

B. Cartons, PP-PE Bags

The PP-PE Bags/Cartons shall have the following markings:

- Name of the Product: Super Cereal Plus
 - USAID Logo
 - Gift From the American People
- Additional marking as per contractual agreement.

Exhibit A Markings

fold

fold

fold

fold

Nutrition Facts	
Per 100 g dry product	
Energy (kcal)	XX
Protein (g)	XX
Fat (g)	XX
Crude Fiber (g)	XX
Vitamins Per 100 g dry product	
Vitamin A (mcg)	XX
Thiamin (mg)	XX
Riboflavin (mg)	XX
Niacin (mg)	XX
Pantothenic Acid (mg)	XX
Vitamin B6 (mg)	XX
Folic Acid (mcg)	XX
Vitamin B12 (mg)	XX
Vitamin C (mg)	XX
Vitamin D (mg)	
Vitamin E (mg)	
Vitamin K (mg)	XX
	XX
Minerals	
Iron (mg)	XX
Zinc (mg)	XX
Iodine (mg)	XX
Potassium (mg)	
Phosphorus (mg)	
Calcium (mg)	

SUPER CEREAL plus

Corn Soya Blend
Special Formula for Infants and Young Children
6 months and above

XX KG Net


Contract #:
Lot #:
Production date: XXX
Best before date: XXX



Ingredients:

Storage Instructions: Store the closed bag in a cool, dry and hygienic place

Preparation instructions:
Dosage: One cup cereal and four cups water



294

200

137

fold

fold

fold

fold