

Food Labeling & Marketing Provisions for

Vitamin A Maize and
Vitamin A Cassava in Nigeria



BROCHURE

Endorsement

In my capacity as the designated authority for the Federal Ministry of Agriculture and Rural Development, Akwa Ibom State, I confirm that the Brochure on Marketing and labeling of Vitamins A Maize and Vitamin A Cassava in Nigeria is a delightful guide full of important information for those who want to process, package or even enjoy the consumption of Vitamin A Maize and Vitamin A cassava. The document will support small-scale producers and processors through implementing adaptation activities to reduce hidden hunger adverse impacts of, and risks, posed by lack of vitamin, mostly among children and young adults in Nigeria.

Accordingly, I am pleased to endorse the brochure.

Dr. Uyobong Uko

Akwa Ibom State Coordinator
Federal Ministry of Agriculture and Rural
Development
Akwa Ibom State

Introduction

Over the past few decades, Vitamin A Deficiency (VAD) and related non-communicable chronic diseases (NCDs) have progressively increased in every age group and have become the major cause of death and disability in the Developing Regions (55% of all causes in 2016, according to WHO Global Health Estimates).

The growing problem of VAD is occurring in tandem with several nutritional deficits (e.g., low intake of iron, zinc, vitamin A, folate, and other micronutrients) that result from poverty and monotonous (non-diverse) diets and remain significant in some countries.

HarvestPlus improves nutrition and public health by developing and promoting Vitamin A enriched Maize (VAM) and Vitamin A Enriched Cassava (VAC) foods that are rich in vitamins



and minerals and providing global leadership on biofortification evidence and technology.

In Nigeria, VAM and VAC varieties (crops) are now available for use in food processing. They are healthy tasty foods that consumers want and need. VAC and VAM are available for food businesses at no additional cost but with added value for the consumers that stand out in the market.

VAM and VAC are conventionally bred to have higher amounts of micronutrients, and they can help provide essential vitamins and minerals to the diet. They are effective in reducing hidden hunger and are an integral component of food-based approaches to improve nutrition and food security, including dietary diversification, supplementation, and commercial fortification, amongst others.

This brochure is intended to assist food producers and sellers to accurately label and promote VAC and VAM foods. The contents are guided by the **National Food Drug Administration and Control (NAFDAC)**, Ref SI 67 of 2021 Food Fortification Regulations.



Objectives of the Brochure

1. To help value chain partners market and label VAM and VAC crops and foods.
2. As an information guide for those who want to process, package Vitamin A Maize and Vitamin A cassava.
3. To enhance compliance to national guidelines of businesses that sell and or processes VAM and VAC food products.
4. This brochure also aims at increasing the growth of VAM and VAC food sector enterprises in Nigeria by advancing product marketing, and labeling, processes, and business models through market research and linkages.



About Biofortification

Biofortification is the process of conventionally breeding food crops that are rich in micronutrients, such as vitamin A, zinc, and iron. These crops “biofortify” themselves by loading higher levels of minerals and vitamins in their seeds and roots while they are growing. When eaten, they can provide essential micronutrients to improve nutrition and public health.

In Nigeria, VAM and VAC crops released by HarvestPlus and partner organizations including IITA, are all from conventional breeding and not genetically modified.

The word biofortification relates more to the process and is used in technical, academic, and policy documents. It is not advisable to use the word biofortification with food businesses, food processors, retailers or consumers. When working with foods that are developed from conventional breeding, it is recommended the products Nutrient Enriched Crops and then specified by the crop name and nutrient, for example, Vitamin A Maize (VAM) and Vitamin A Casava (VAC).

Importance of VAM and VAC Food Facts Labels

VAM and VAC food Facts labels, provide nutritional information on the food we choose to eat and to feed others. Their importance stems from everyday people being able to make educated and informed choices for their health and tailor their options to fit their needs and desires.

Food labeling is one of the most essential components for the food industry to be able to inform the consumers. Beyond statutory and regulatory compliance, it allows people to determine, choose, and upkeep their dietary needs and health plans. Food labels, sometimes also referred to as nutrition facts labels can be defined as panels on the packaging of food containing information about the nutritional value of the food item among other pertinent details as outlined by NAFDAC and referenced relevant links.

Serving Size 2 cookies (29g)	
Servings Per Container About 12	
Amount Per Serving	
Calories 100	Calories from Fat 15
% Daily Value*	
Total Fat 1.5g	2%
Saturated Fat 0g	0%
Trans Fat 0g	
Polyunsaturated Fat 0.5g	
Monounsaturated Fat 0g	
Cholesterol 0mg	0%
Sodium 100mg	4%
Potassium 45mg	1%
Total Carbohydrate 21g	7%
Dietary Fiber 3g	12%
Sugars 12g	
Protein Less than 1g	
Vitamin A 0%	Vitamin C 0%
Calcium 0%	Iron 2%
*Percent Daily Values are based on a 2,000 calorie diet. Your daily values may be higher or lower depending on your calorie needs:	
	Calories: 2,000 2,500
Total Fat	Less than 65g 80g
Sat Fat	Less than 20g 25g
Cholesterol	Less than 300mg 300mg
Sodium	Less than 2,400mg 2,400mg
Potassium	3,500mg 3,500mg
Total Carbohydrate	300g 375g
Dietary Fiber	25g 30g
INGREDIENTS: WHOLE GRAIN WHEAT FLOUR, HIGH FRUCTOSE CORN SYRUP, SUGAR, BLUEBERRY PUREE, CORN SYRUP, APPLE POWDER, SOLUBLE CORN FIBER, SOYBEAN OIL, MODIFIED CORNSTARCH, OAT FIBER, MODIFIED TAPIOCA STARCH, PARTIALLY HYDROGENATED COTTONSEED OIL, RESISTANT CORN MALTODEXTRIN, CITRIC ACID, PECTIN, WHEY (FROM MILK), SALT, NATURAL FLAVOR, BAKING SODA, SODIUM CITRATE, SOY LECITHIN, SODIUM BENZOATE ADDED TO PRESERVE FRESHNESS, VANILLIN (ARTIFICIAL FLAVOR), ARTIFICIAL COLOR (RED 40, BLUE 1).	

WHY LABEL VAC AND VAM FOOD PRODUCTS?

- Inform consumers about the advantages of the products
- Provide Information about the nutrition values of the products.
- Raise awareness of the importance of a healthy diet.

HOW TO LABEL VAC AND VAM FOOD PRODUCTS

When labeling VAM and VAC foods, the following steps should be considered:

It is prohibited for any person or group of persons to sell or advertise any food that is represented on the label to the general public as fortified with vitamins and minerals unless it is registered with National Food Drug Administration and Control (NAFDAC).

Identify which food category the product falls under. In some cases, this will be clear according to the food category name (for example, breakfast cereals; yogurts, bread, flour). In other cases, it may be necessary to reference the “included in the category” or “not included in category” columns, and/or check the customs tariff code number.

**Product
categorization**

Flour

**Vitamin A
fortified**



If the product is a food that has a protected designation of origin or a protected geographical indication or is a guaranteed traditional specialty, marketing may be permitted according to national context according to the National Food Drug Administration and Control (NAFDAC) National Food Fortification Regulation – 2021.

In regulating nutrition claims such as 'vitamin A fortified' it has come to be assumed that such claims mean that vitamin A-fortified foods can improve vitamin A status. For example, NAFDAC currently proposes that the criterion for the claim 'vitamin A fortified' means the amount of the vitamin present in the food is expressed on the label of the food.

How To Label Vitamin A

On the product label, it should be clearly stated that the food contains vitamins and in a specified quantity of the food.

Labeling vitamin A content on a product, the producer should ensure that the amount of the vitamin present in the food is expressed on the label of the food; and in the case of Vitamin A the amount of the Vitamin A present in the food is expressed on the label of the food in International Unit (I.U.) or in mg/kg.



Nutrition Facts		
Serving Size 1/8 cup (15g)		
Servings per container about 60		
Amount per Serving		
Calories 57	Calories from Fat 0.75	
% Daily Values*		
Total Fat <1g		0%
Saturated Fat 0g		0%
Cholesterol 0mg		0%
Sodium 0mg		0%
Total Carbohydrate 14g		5%
Dietary Fiber 1g		4%
Sugars 0.15g		
Protein 0.15g		0%
Vitamin A	0% • Vitamin C	1%
Calcium	2.7% • Iron	0.8%
*Percent Daily Values are based on a 2,000 calorie diet. Your Daily Values may be higher or lower depending on your calorie needs.		



Packaging

Pre-packaged food that contains vitamin A should be packaged and distributed in a container that will safeguard the hygienic, nutritional, organoleptic, and other qualities of the product and the container, including packaging material, shall be made of substances, which are safe and suitable for their intended use.



Labeling

Pre-packaged food fortified with vitamin and or mineral nutrients shall be labeled following the Pre-packaged Food, Water, and Ice Labelling Regulation 2019.

Name of the Food

The specific name of prepackaged VAC and VAM food should be presented in the Principal Display Panel (PDP) of the label and should indicate the true nature of the food.

Trademark

Where a pre-packaged VAC and VAM food product has a trademark displayed on the label, the trade mark should not be given a wrong impression of the nature, quality, or substance of the food item.



The Eye Logo

Any product that contains vitamin A with the value of 800 µg as stated on the second schedule of the Food Fortification Regulation 2021 should carry on their label a picture of an eye with A at the centre of the eye to indicate they are fortified with vitamin A.

Labeling information

A pre-packaged VAC and VAM food should not be described or presented on any label either by words, expressions, figures, pictorial, images or other devices which refer to or are suggestive either directly or indirectly, of any other product with which such food might be confused, or in such a manner as to lead the purchaser or consumer to suppose that the food is connected with such other product. No claims concerning medicinal (preventive, alleviative or curative) effects should be made in respect of the properties of VAM and VAC prepackaged food, unless where approval is issued from the Ministry of Health.



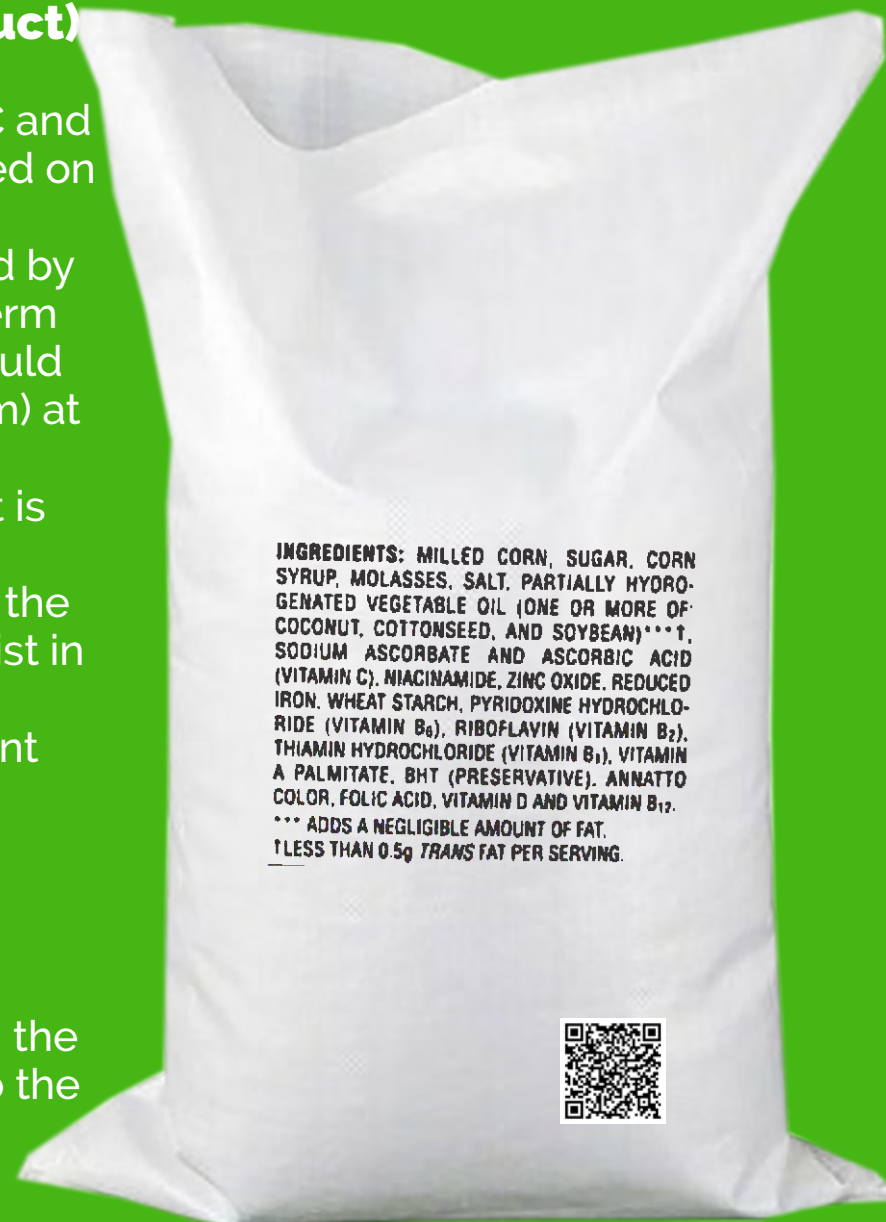
List of Ingredients (Where Additional Ingredient is Added to Prepackaged VAC and VAM Product)

Except for single-ingredient foods such as 100% VAC and VAM products, a list of ingredients should be declared on the Label of VAC and VAM pre-packaged food.

The list of ingredients should be headed or preceded by an appropriate title that consists of or includes the term "Ingredients". All ingredients used in the product should be listed in descending order of ingoing weight (m/m) at the time of the manufacture of the food.

Where an ingredient of a VAC and VAM food product is itself the product of two or more ingredients, such a compound ingredient should be declared as such in the list of ingredients and should be accompanied by a list in brackets of its ingredients in descending order of proportion by mass and where a compound ingredient for which a name has been established in a Codex standard constitutes less than 5% of the food, the ingredients other than food additives which serve a technological function in the finished product need not be declared.

Notwithstanding the provisions of these Regulations, the amount of vitamin and/or mineral nutrients added to the specific quantity of the food shall be declared in the metric system of measurement on the product.

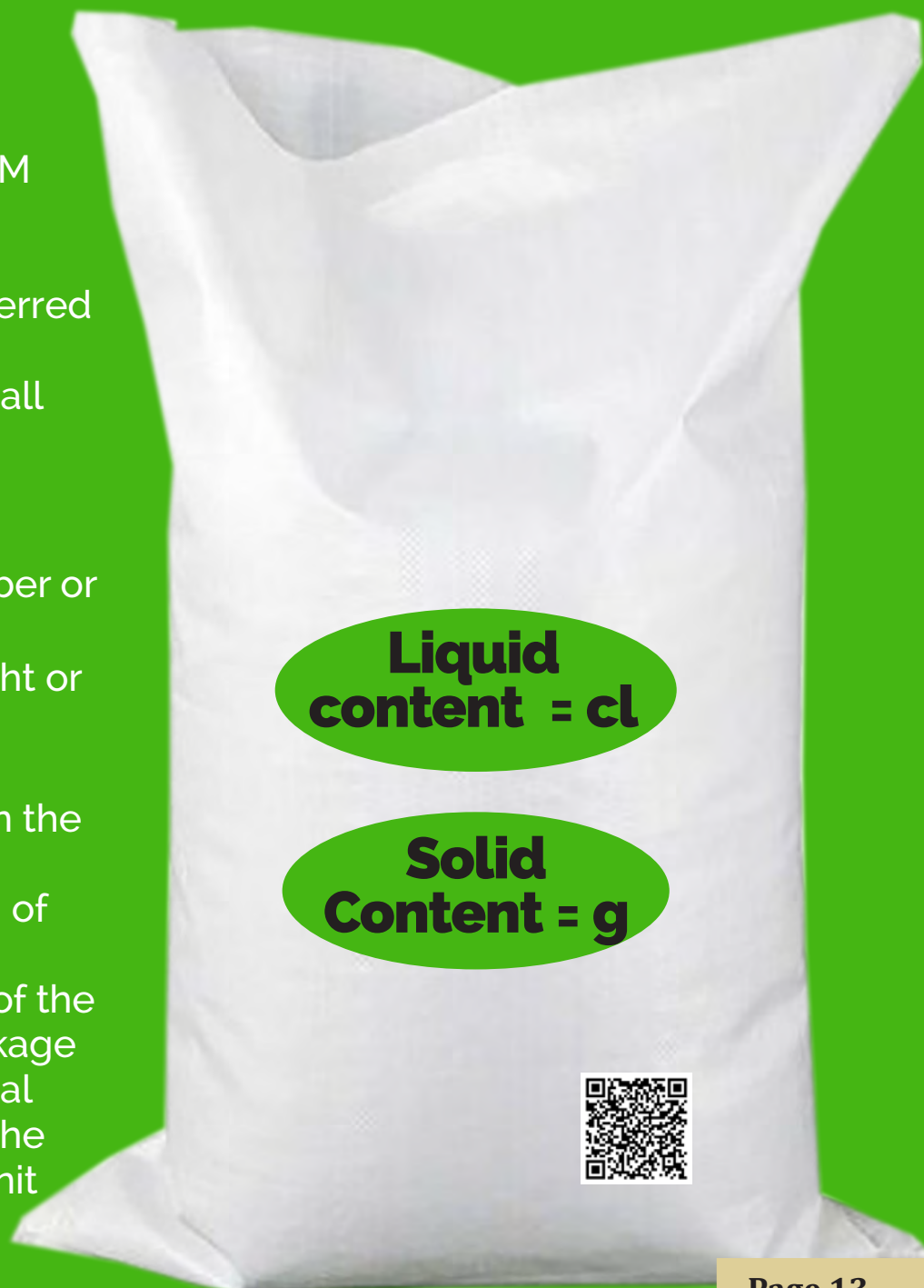


Net Content of VAC/ VAM Pre-Packaged Food

The average net content of VAC and VAM pre-packaged food items should be declared in the metric system or International System of units (herein referred to as S.I. units). The declaration of the average net content of the food item shall be made in the following manner:

1. Liquid food/water in volume;
2. Solid food/ice by weight and number or count (where applicable);
3. Semi-solid or viscous food by weight or volume.

Any VAC and VAM food pre-packaged in the liquid form normally discarded before consumption should carry a declaration of the drained weight of the food item. For multi-unit retail packages, a statement of the number of contents on the outside package shall include the number of the individual units, the net content of each unit, and the total quantity of contents of the multi-unit package.



Name, Address and Contact Information of the VAC and VAM Manufacturer and Distributor

The name and address of the manufacturer, packer, re-packer, distributor, importer, exporter or vendor of a pre-packaged food should be declared on the label and where the product is imported, the name and address of the manufacturer and the Certificate of Registration holder/distributor should be declared on the product label. Where a manufacturer has a plant in many cities and/or towns, the corporate head office would suffice provided every food package has a code/mark to identify the processing plant where it is manufactured, however, where the VAC and VAM pre-packaged food is not manufactured by the person or company whose name appears on the label, the name should be qualified by "Manufactured for" or "Packed for " or similar expression

Name:.....

Address:.....

packaged for:.....

NAFDAC No.



Clear, Prominent Statements

Any statement required to appear on the label of VAC and VAM pre-packaged food item should be clear, prominent and legible to the consumer and be of contrasting colour to that of the background. The statement of the identity of the product should be presented in bold type on the principal display and should be of a size reasonably related to the most prominent printed matter on such panel and should be in line generally parallel to the base on which the package rests as it is designed to be displayed

Date Marking

For any pre-packaged food, the day, month and year should be specified and legibly displayed on the label. When food must be consumed before a certain date to ensure its safety and quality the "Use-by Date" or "Expiration Date" should be declared.

Where a "Use-by Date" or "Expiration Date" is not required, the "Best-Before Date" or "Best Quality Before Date" should be declared and the date should be introduced by appropriate words "Best Before" or "Best quality before"



"Use By", "Expiration date" depending on the nature of the product.

The day and year should be declared by un-coded numbers with the year to be denoted by 2 or 4 digits and the month declared in letters or characters or numbers. Where the day is denoted with one or two digits, and where only numbers are used to declare the date or where the year is expressed as only two digits, the sequence of the day, month, year should be given by appropriate abbreviations accompanying the date mark as (DD/MM/YYYY or YYYY/DD/MM)

Storage Conditions

The required storage conditions should be specified on the label.

Batch Number

The batch number should be indicated on the label of VAC and VAM pre-packaged food products.



Storage information:
e.g. Store in a cool dry place

Product Batch No:
XXX XXX XXX XXX



Registration Number

VAC and VAM pre-packaged food should bear the NAFDAC Registration number issued by the Agency and properly displaced on the label.
(see page 35 on how to register)

Nutritional Information

Nutritional claims for VAC and VAM should be justified expressly on the label and shall be mandatory for any pre-packaged food for which a nutrition claim is made by the manufacturer. Nutritional Information or nutritional facts per 100 gm or 100ml or per serving of the product should be given on the label containing the amount of any other nutrient for which a nutrition or health claim is made wherever, the numerical information on vitamins and minerals is declared, it shall be expressed in metric units. Where the nutrition declaration is made per serving, the amount in gram (g) or milliliter (ml) should be included for reference beside the serving measure, provided that the food claimed to be enriched with vitamins include the quantity of such added nutrients is displayed on the label



Nutrition Facts		
Serving Size 1/8 cup (15g)		
Servings per container about 60		
Amount per Serving		
Calories 57	Calories from Fat 0.75	
% Daily Values*		
Total Fat <1g		0%
Saturated Fat 0g		0%
Cholesterol 0mg		0%
Sodium 0mg		0%
Total Carbohydrate 14g		5%
Dietary Fiber 1g		4%
Sugars 0.15g		
Protein 0.15g		0%
Vitamin A	0% • Vitamin C	1%
Calcium	2.7% • Iron	0.8%
*Percent Daily Values are based on a 2,000 calorie diet. Your Daily Values may be higher or lower depending on your calorie needs.		

NAFDAC Reg. No
XXX XXX XXX



Using a Logo

HarvestPlus have developed a logo that can be licensed for use in the marketing and promotion of food products and businesses. This logo does not constitute a health or nutrition claim.

Please contact HarvestPlus j.walton@cgiar.org if you would like to use this logo



CONDITIONS FOR CLAIMS

Claims	Condition on Food
Source of (Vitamin and Mineral)	At least 5% of NRV per 100g/100ml or per serving
Good Source of (Vitamin and Mineral)	At least 15% of NRV per 100g (solids) or 7.5% of NRV per 100ml (liquids)
Excellent Source of (Vitamin/Mineral)	At least 30% of NRV per 100g or 100ml solids and liquids) (at least 2 times the

What is the Difference Between Vitamin A and Beta Carotene

Vitamin A (retinol) is a lipid-soluble vitamin and is required by the body for better eyesight, fresh skin, and healthy teeth. It is also important for lung health, bone strength, and immune strength. It is stored in the liver and fat tissue for longer times. Vitamin A is released from the liver in the presence of zinc.

The human body converts beta carotene into vitamin A (retinol) – beta carotene is a precursor of vitamin A. Beta carotene in itself is not an essential nutrient, but vitamin A is.

How to Calculate the Levels of Vitamin A

Vitamin A content is specified in RE (retinol equivalent). The recommended daily allowance of vitamin A is 800 micrograms/RE for adults and 400 micrograms/RE for children below 10 years. In settings where vitamin A deficiency is a public

health problem (prevalence of night blindness is 1% or higher in children 24–59 months of age or where the prevalence of vitamin A deficiency (serum retinol 0.70 µmol/l or lower) is 20% or higher in infants and children 6–59 months of age), high-dose vitamin A supplementation is recommended in infants and children 6–59 months of age.

To determine the levels of Vit A content in your product make use of accredited laboratories capable of carrying out carotenoid content levels.

The following Retinol Equivalents (RE) ratio conversion factor can be used: Retinol equivalents (RE), ratio 1:6:12. Interpreted as:

1 µg retinol = 6 µg - carotene

1 µg retinol = 12 µg - carotene and - cryptoxanthin

Ref: Lewis, J. 2019. Codex nutrient reference values. Rome. FAO and WHO.

1 µg retinol	= 1 RE
1 µg β carotene	= 0.167 µg RE
1 µg other pro-vitamin A carotenoids	= 0.084 µg RE
values as µg:	
1 IU retinol	= 0.3 µg retinol
1 IU β-carotene	= 0.6 µg β-carotene
1 IU retinol	= 3 IU β-carotene

Suggested vitamin A supplementation scheme for infants children 6–59 months of age		
Target group	Infants 6 –11 months of age (including HIV+)	Children 12 –59 months of age (including HIV+)
Dose	100 000 IU (30 mg RE) vitamin A	200 000 IU (60 mg RE) vitamin A

HOW TO ANALYSE THE PRODUCT

Nutrient	unit	RDA	15%
Vitamin A	(µg)	800	120

As a rule, 15 % of the recommended allowance from the table above supplied by 100 g or 100 ml or per package if the package contains only a single portion should be taken into consideration in deciding what constitutes a significant amount.

NUTRITIONAL INFORMATION

Energy	1368Kj/100g	16.5% RDA	2736kj/200g	33% RDA
Nutrient	Per 100g	%NRV/100g	Per 200g serving	%NRV/200g
Total Fat	1.2g	1.7	2.4g	3.4
Saturates	0.2g	1	0.4g	2
Protein	6.6g	13	13.2g	26
carbohydrates	74g	28	148g	56
Sugars	1.9g	2	3.8g	4
Salts	1.8mg	< 1	3.6mg	1
Fibre	3.7g	20.5	7.4g	41
VITAMINS				
Vit A	61.3µg	7.6	122.6µg	15.2
Vit B1 (Thiamine)	0.3mg	27	0.6mg	54
Vit B2 (Riboflavin)	0.2mg	14	0.4mg	28
Vitamin B3 (Niacin)	3.0mg	19	6.0mg	38
Vitamin B6	0.4mg	30	0.8mg	60
Vitamin B9 (Folic)	130µg	32	2600µg	64
Vitamin B12 (Cobalamin)	1.5 µg	62	1.5 µg	62
MINERALS				
Iron	3.7mg	26	7.4mg	52
Zinc	4mg	36	8mg	72

MANDATORY MICRONUTRIENT REQUIREMENT FOR WHEAT FLOUR, COMPOSITE FLOUR, MAIZE FLOUR, WHEAT SEMOLINA AND WHOLE MAIZE MEAL

Vitamin A	Dry vitamin A palmitate 250 CWS/SN/CWD	2.0mg/kg
Vitamin B9	Folic acid Food grade	2.6mg/kg
Vitamin B12	0.1% CWS/SN/CWD	0.02 mg/kg
Iron	NaFeEDTA (anhydrous in line with FCC)	40.0mg/kg
Vitamin B2	Riboflavin Fine power	5.0mg/kg
Zinc	Zinc oxide	50.0mg/kg
Vitamin B1	Thiamine Mononitrate	6.0mg/kg
Vitamin B3	Niacinamide	45.0mg/kg
Vitamin B6	Pyridoxine Hydrochloride	6.0mg/kg

Other Ways to Talk to Consumers About Biofortification

Corporate Communications: When the finished food does not have sufficient amounts of a nutrient to make a claim, it is possible to advertise the use of VAM and VAC ingredients in other ways.

For example:

Access to Nutrition Index. Food businesses, as part of the Access to Nutrition Index, have

reported their involvement with biofortification in the 2018 index.
www.accesstonutrition.org/resources/2018-atni-report.

Corporate Social Responsibility Reporting.

Food businesses can communicate their involvement and support for biofortification on business reporting and corporate social responsibility
 Supporting smallholder farmers and social responsibility claims.

It is possible to inform consumers about the support of the HarvestPlus Program. There are several other examples of success such as the Fair Trade scheme or the Unilever smallholder farmers interventions that exist on the market. Euromonitor Passport recently published a report on the “World Market for Ethical Labels” which highlights consumer interest and opportunities in this area. Rural Maize Consumption is Mostly in Form of Low-Cost End Products Purchased by Rural Households Small-scale and rural processing absorb ~25% of produced maize, holding the greatest potential for scaling up VAM and VAC consumption in Nigeria

- Post-harvest, maize is aggregated and sold to small and mostly rural processors for the production of affordable household foods
- Key distributors are informal retail outlets such as street kiosks, open markets, and stores
- Key products are affordable household meals like pap, tuwo massara, and boiled or roasted maize which fit within the purchasing power of rural dwellers. These products consume ~25% of maize produced in Nigeria

- Customer segments are mostly rural households and a few urban dwellers
- Processors are driven by the profitability of finished products, especially as these household meals are highly demanded in rural locations across Nigeria
- Availability of VAM and VAC is critical to scaling up processing, in turn ensuring availability of associated end products
- Increased awareness will likely drive market demand, incentivizing more VAM and VAC processing across Nigeria



Health Claims for VAC and VAM Products

Vitamin A Maize is a source of provitamin A carotenoids that include beta-cryptoxanthin, alpha, and beta-carotene, also known as precursors of vitamin A essential to prevent diet-related chronic disease in the human body. https://doi.org/10.1007/978-1-62703-203-2_17

Health claims should be based on current relevant scientific evidence and the level of proof must be sufficient to substantiate that type of claim and the relationship to health.

When it has been established if a product can make a nutritional claim, either source of or high in it is then possible to talk to the consumer about the benefits of vitamin A. This is called making a functional health claim.

It is possible to make health claims about vitamin A based on the generally accepted, scientific function of vitamin A in the body.

Here are the functions of vitamin A

- "Vitamin A contributes to normal iron metabolism"
- "Vitamin A contributes to the maintenance of normal mucous membranes"
- "Vitamin A contributes to the maintenance of normal skin"
- "Vitamin A contributes to the maintenance of normal vision"
- "Vitamin A contributes to the normal function of the immune system"
- "Vitamin A has a role in the process of cell specialization"

To be more consumer-friendly, it is recommended to state the following benefits

1. Vitamin A helps to absorb iron
2. Vitamin A helps keep skin healthy
3. Vitamin A helps keep eyes and vision healthy
4. Vitamin A contributes to a healthy immune function

<https://www.nhs.uk/conditions/vitamins-and-minerals/vitamin-a/>

When talking about VAC and VAM it is important to inform the consumer that the food is a natural source of vitamin A.

Programs and Interventions VAC and VAM Processors can Leverage in Nigeria

Programme id	Programme Title	Programme Language	Programme Type	Program Location
26247	Nutrition International - Nigeria - Maternal Nutrition Program	English	Community/sub-national	Nigeria
25753	Nutrition International - Nigeria	English	Community/sub-national	Nigeria
23964	MNP in Benue State Nigeria	English	Community/sub-national	
14674	GAIN Large-scale Food Fortification Program	English	National	Nigeria
9451	Infant and Young Child Nutrition (IYCN) Project	English	Multi-national	Nigeria

Other programs are:

Infant and Young Child Nutrition (IYCN) Project - Counselling on nutritional support&care for people living with HIV - Pregnant/lactating women with HIV/AIDS (PLWHA)

Infant and Young Child Nutrition (IYCN) Project - Management of severe acute malnutrition - Preschool-age children (Pre-SAC)

Infant and Young Child Nutrition (IYCN) Project - Preventive malaria treatment - Women of reproductive age (WRA)

Maternal, infant and young child nutrition programmes

Maternal, infant and young child nutrition programmes - Infants (up to 1 year of age)

Maternal, infant and young child nutrition

programmes - Infants and young children
MNP in Benue State Nigeria - Multiple micronutrient powder (point-of-use fortification) - Infants and young children
Nutrition International - Nigeria - Maternal Nutrition Program - Iron and folic acid supplementation - Pregnant women (PW)
Nutrition International - Nigeria - Maternal Nutrition Program - Nutrition counselling - Pregnant women (PW)
Nutrition International - Nigeria - Vitamin A supplementation
School Feeding Programme
Processing Conditions for Fufu and Garri Products from Biofortified (yellow) and local (white) varieties.

PROCESSING CONDITION FOR FUFU AND GARRI PRODUCTS FROM BIOFORTIFIED (YELLOW) AND LOCAL (WHITE) VARIETIES.

Product		Fufu			Garri (for Eba)			
Variety		TMS 01/1368	TMS 01/1371	TME 419	TMS 01/1368	TMS 01/1371	TME 419	TME 419 + RPO
Abbreviation		BP-F1	BP-F2	C-F	BP-G1	BP-G2	C-G	FP
Biofortified		YES	YES	NO	YES	YES	NO	NO
Fortified		NO	NO	NO	NO	NO	NO	YES
Weight	Initial ^a	50.4	50.1	50.5	50.1	50.1	50.6	50.2
	Final ^b	13.3	11.8	21.3	5.4	5.4	8.7	9.3
T (oc)		25.6	25.8	25.1	25.8	25.1	26.1	25
pH		4.8	4.3	5.1	4.0	4.0	4.0	4.0
Processing time (h)	Peeling	0.92	1.33	1.13	0.82	1.55	1.3	0.83
	Washing	0.30	0.22	0.22	0.15	0.28	0.23	0.3
	Size reducing	0.13	0.15	0.13	-	-	-	-
	Piece soaking	44.65	44.65	44.65	-	-	-	-
	Washing	0.10	0.10	0.10	-	-	-	-
	Grating	0.03	0.07	0.07	0.05	0.08	0.08	0.07
	Mash fermenting ^c	22.88	23.05	23.12	44.30	44.18	44.08	44.52
	Sieving	0.75	0.82	0.73	-	-	-	-
	Pressing ^d	3.92	3.92	3.92	5.03	5.03	5.03	5.03
	Sifting	-	-	-	0.03	0.02	0.07	0.02
	Roasting	-	-	-	0.73	0.77	1.03	0.70
	Sieving	-	-	-	0.08	0.10	0.10	0.10

Each Process was conducted in one batch. 50kg of roots were used to produce fufu and garri. Process was conducted at the IITA processing plant.

^a Unpeeled roots

^b Pressed mash for Fufu or sieved Garri

^c Mash fermenting for Garri or Fufu

^d Using manual press for Fufu & hydraulic press for Garri

<http://doi.org/10.1371/journal.pone.0203421.t001>

Do's and Don'ts for Labelling VAC and VAM

DO	DON'T
Be truthful	Don't over sell the benefits
Talk about maintaining health	Talk about disease prevention or cures
Talk about being healthy and healthy diets	Scare the consumer
Use the commodity name	Use the word VAM and VAC
Use the term "natural source of vitamin A"	Make a nutrition or health claim if there is not enough vitamin A in the finished food to hit 15% of the Recommended Daily Amount
Talk about the benefits to farmers for buying the product	
Make benefits applicable to the buyer – i.e. Mums, children, teenagers, the elderly	

Marketing Strategies for VAM/VAC

Tailoring the Message — Farmers, food companies and consumers have their preferences; it is important to identify these preferences and design messages for each of them based on their preferences.

Using Narratives— Communication delivered in the form of a story, testimonial, or entertainment education. Entertainment education either face-to-face or mediated is often used to promote Agricultural innovations. In such cases, resource

persons are brought on in Agricultural programs on radio or TV to discuss innovation. It is effective in product sensitization and awareness creation. It aims to provide information while selling a product or subtly promoting a brand. This kind of communication is called infomercials. Clinical demonstration of the nutrient composition of VAM and VAC products over non-VAM and VAC, packaged and broadcast on television can be compelling in strategy to convince consumers. This form of narrative is often used in the field of medicine.

Preserving the Vitamins during Packaging

Vitamin A degrades over time, it is sensitive to light and certain oxidizing agents, such as oxygen, and over time the levels decrease.

The chemical stability of the vitamin or mineral, as well as the processing method, determines the outcome of the finished product. Vitamin A can be preserved if the following takes place

1. Correct storage in temperature-controlled environment
2. Exposing the food to lower temperatures and times during processing (but ensure to reach temperatures required to kill bacteria when appropriate)

3. Storing the finished food in packaging that eliminates light (avoid windows)

4. Temperature-controlled storage of the finished food

To combat losses during processing, formulators might add an increased amount to their products. "Adding and protecting the functional ingredient or leveraging ingredients to stop degradation reactions are all recommended to protect the Nutrition Facts panel.

Retention of Pro-Vitamin A Content in Products from New Biofortified Cassava Varieties



Retention of carotenoids is still a challenge during the processing of fresh yellow cassava roots into commonly consumed products mainly due to the sensitive nature of carotenoids to light, heat and physical handling. Thus, the retention of total carotenoids is

usually dependent on the prevalent processing method and the variety being used. The former is difficult to control especially in large-scale processing which is common in SSA.

Biofortification of cassava varieties presents a viable and promising intervention for tackling vitamin A deficiencies in disease-burdened populations of sub-Saharan Africa. A study carried out by IITA provides evidence that retention of β -carotene in biofortified cassava is not only dependent on genotype, but also the processing method. While this study proves that short fermentation can result in improved retention of β -carotene content, further studies may be needed to ascertain the effect of a short fermentation period on the organoleptic properties of gari and its dough since the increased time of fermentation has been established to increase the desired sourness in gari made from the white variety.

This study also highlights a challenge in providing substantial pro-vitamin A content across age groups when considering locally practiced processing methods, which result in products with lowered retention. This can, however, be managed by nutrition education targeted at improving dietary diversity. Also, since further breeding of varieties with higher -carotene content is ongoing, it is expected that these efforts can provide varieties with higher pVA content which will result in an increased contribution of pro-vitamin A to usual nutrient intake. <https://www.mdpi.com/2304-8158/8/5/177/pdf>.

Industrial Human Consumption is Mostly Through Packaged Foods Purchased by Urban Households and Institutions

Industrial processing for human consumption currently absorbs ~15% of produced maize, presenting a viable pathway to scaling up VAM and VAC consumption in Nigeria

Key products and customer segments

- Industrial, human maize products are mostly household foods including cereals and beverages –these consume ~15% of maize produced in Nigeria. Some processors also

produce packaged affordable maize meals such as pap

- Customer segments for industrial, human maize products are urban and peri-urban households, corporate centers and offices, schools, restaurants, hotels and eateries across Nigeria
- Post-harvest, maize is aggregated and sold to small and medium-scale processors and FMCG companies for the production of packaged foods
- Key distributors are restaurants and retail outlets including open markets, stores, and supermarkets spread out across Nigeria
- Processors are driven by profit margins for finished products, especially as they are mostly targeted at urban areas with both a higher appreciation for packaged goods and willingness to pay
- Availability of VAM and VAC is critical to scaling up processing, in turn ensuring availability of VAM end products
- Increased awareness will likely drive market demand, incentivizing more VAM and VAC processing across Nigeria

Increasing Health Consciousness is Driving the Consumption of Products Such as VAM and VAC Flour, Cereal, etc.

- The potential for consumption of VAM and VAC processed products is high in Nigeria. Maize consumption in Nigeria is 22 kg/person/year. More than 10% of Nigeria's maize production is consumed by the industrial sector for the production of beer, malt drinks, maize flakes, etc. The survey showed that about 20% of the households consume maize as flour and green. Nigeria's MY2019/20 wheat consumption is projected at 5.26 million metric tons, a 4% increase over the previous year.
- Processed products, in general, have considerable potential in Nigeria:





convenience and time savings is a trend due to the growing presence of women working outside the home

- More, evidence shows that customers are increasingly health-conscious. A study in urban Nigeria showed that:
 - 80% of customers read nutritional information before purchase, and
 - 75% agreed that nutritional information on labels influence their purchase decisions
- This consciousness translates into demand for healthier foods, including VAM and VAC

- Large processors recognize that brand loyalty is high among Nigerians. 70% of consumers say they are brand loyal versus 59% in Africa, as a whole. Once a consumer is converted to the product, they become a regular buyer. Processors recognize this as a driver for VAM and VAC products
- Interventions related to awareness and labeling/certification will have the most impact on this pathway. Consumers in this channel trust that large producers will provide required nutrient levels/healthy foods products and are willing to pay a little more for improved nutrition. They will deliberately choose nutritional products such as VAM and VAC flour or cereal

Insufficient Vitamin A Content and Low Awareness are Key Barriers to Industrial Human Consumption of VAM and VAC
Loss of nutritional value during large scale industrial processing is a significant barrier, meaning that nutritional benefits are lost in the process

- VAM and VAC are currently more suited for small-and medium-scale processing



- Estimates show that between 2008 and 2020, there is a \$40 billion growth opportunity in food and consumer goods in Nigeria
- 11 to 18% of urban households have purchasing power and annual incomes over \$10,000. Nigerian households with incomes of more than \$5,000 a year will increase from a current 20 percent of the population to 27% by 2020, putting them within the target customer base of formal retail chain
- Increased demand for foods offering as their Vitamin A concentration are not high enough for processing by large FMCG companies. Some large processors require Vitamin A concentration levels as high as 20 ug/g due to the potential for loss of nutrients during processing. This requirement, which applies only to large-scale processors, is significantly higher than current concentration levels of ~10 ug/g in PVA maize
- Consequently, large FMCG companies are reluctant to replace non-biofortified maize. Due to current large-scale

processing techniques with the potential for loss of nutrients, large FMCG companies are hesitant to substitute non-biofortified maize with higher-priced VAM and VAC

- Low awareness of the nutritional benefits of VAM and VAC limits downstream demand, disincentivizing industrial processing into end products
- In locations with limited or no awareness of / demand for biofortified foods, industrial processors are unwilling to pay a premium for VAM and VAC. Farmers and processors have noted this unwillingness and attributed it to an overall lack of awareness of the nutritional benefits of biofortified foods

“We cannot pay a premium for VAM if the Vitamin A concentration does not match our minimum threshold, because some of the content will be lost during processing. It takes a lot of years to increase Vitamin A levels in maize. If suppliers meet our quality and nutrient specification, we can look to replace the regular maize” -FMCG company in Lagos



HOW TO OBTAIN SUPPORT SERVICES AND REGISTER WITH NATIONAL AGENCY FOR FOOD & DRUG ADMINISTRATION & CONTROL (NAFDAC)

The National Agency for Food and Drug Administration and Control Act Cap NI Laws of the Federation of Nigeria (LFN) 2004 empowers NAFDAC to regulate and control the manufacture, importation, exportation, distribution, advertisement, sale and use of Food. The Office responsible for offering support to food and food related services providers is the Food Safety and Applied Nutrition Directorate (FSAN) which supports food safety programmes by ensuring food facilities adhere to good manufacturing practice (GMP) that can sustain quality food product that is safe for human consumption. FSAN is headed by Mr Sherif Alaba Olagunju

Contact FSAN
1st Floor, NAFDAC HQ, Plot 2032, Olusegun Obasanjo Way, Zone 7, Wuse-Abuja
+234-435555333
fsan@nafdac.gov.ng

Further information regarding NAFDAC could be found here <https://www.nafdac.gov.ng/>

NAFDAC REGISTRATION PROCESS

NAFDAC uses NAPAMS PORTAL for registration.

NAPAMS is an e-registration and data capture system that provides an online electronic medium for the application for products registration with NAFDAC and the data capture of all existing and current products approved by NAFDAC.

1. Sign up or Register

Do you have an account? If not, kindly sign up or register using this link

https://registration.nafdac.gov.ng/App_Application/ApplicantRegister.aspx

2. Sign in or Login

Access the portal by signing or login in with a registered account

3. Complete Application

Application must be duly completed.

4. Make Payment

Make appropriate payment for processing an application.

5. Application Processing

After completed application, the next phase is to process the application.

6. Obtain Certificate

The final stage of processing an application is obtaining a certificate.

Conclusion

The development of labeling and marketing of VAM and VAC foods brochures for producing, processing, and marketing VAC and VAM will ease the identification of the product by both the rural and urban consumers while ensuring High-Quality Assurance (HQA).

Adequate awareness-raising and demand creation on VAM and VAC foods will be pursued by HarvestPlus and El-Kanis & Partners by producing messages on the production, processing, nutrition, health benefits and outlets for distribution in local languages through print and audio-visual media in Nigeria.

Acknowledgments

This Project was funded by International Food Research Policy Institute.

Nutrient enriched crops such as vitamin A cassava and vitamin a maize are released and available in Nigeria and are now ready to scale up, however, stakeholders have revealed that the biggest barriers to scale the products is marketing , labeling and ability to distinguish the products from standard varieties. Over 200 million Nigeria population, mostly children have always remain the target beneficiary of harvestplus program.

The document was developed by El-Kanis and Partners on behalf of HarvestPlus/GAIN.

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SOURCES

National Food Drug Administration
and Control (NAFDAC) Nigeria
Food Fortification Regulation
document 2021

CODEX

Commercialization assessment:
PVA Maize in Nigeria
mercialization
assessment: PVA Maize in Nigeria