BIOFORTIFIED CROPS ON MY PLATE

A National Biofortification Recipe Book

HarvestPlus
Better Crops • Better Nutrition

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Acronym

ABU	Ahmadu Bello University
AGRA	Alliance for Green Revolution in Africa
AKSU	Akwa Ibom State University
BMGF	Bill and Melinda Gates Foundation
CGIAR	Consultative Group on International Agricultural Research
CIAT	International Center of Tropical Agriculture
CIMMYT	International Maize & Wheat Improvement Center
CIP	International Potato Centre
FMARD	Federal Ministry of Agriculture & Rural Development
FMoH	Federal Ministry of Health
FSN	Food Safety & Nutrition
GMO	Genetically Modified Organism
HQVACF	High Quality Vitamin A Cassava Flour
ICRISAT	International Crops Research Institute for Semi-Arid Topics
IFPRI	International Food Policy Research Institute
IITA	International Institute of Tropical Agriculture
IRRI	International Rice Research Institute
JODED-F	Jessy Ojoma Drive for Environmental Development Foundation

KNADA	Kano State Ministry of Agriculture & Rural Development Authority
MNDC	Micro-nutrient Deficiency Control
NAERLS	National Agricultural Extension and Research Liaison Services
NARS	National Agricultural Research Systems
NRCRI	National Root Crops Research Institute
OAU	Obafemi Awolowo University
OSP	Orange Sweet Potato
OPV	Open Pollinated Variety
SAWEC	Senator Adeyemo Women Empowerment Co-Operative
SMEs	Small and Mid-Size Enterprise
TBSP	Table Spoon
TSP	Tea Spoon
UKAID	United Kingdom Aid
USAID	United States Agency for International Development
VAC	Vitamin A Cassava
VAM	Vitamin A Maize
β-Carotene	Beta Carotene

HarvestPlus

Our vision: A world free of hidden hunger where families, communities, and countries can reach their full potential.

Our mission: Empower partners worldwide to address hidden hunger by sustainably scaling up biofortification, as a nutrition response and livelihood benefit for rural and low-income communities.

Our Goal: By 2030, 1 billion people are regularly eating nutritious biofortified crops and foods, helping to achieve the Sustainable Development Goal (SDGs) of ending all forms of malnutrition.

Vitamin A Cassava

Vitamin A Maize

Vitamin A Orange Sweet Potato

Iron Beans

Zinc Rice

Iron Pearl Millet

Zinc Wheat

Zinc Maize

BIOFORTIFIED CROPS

Cassava is a climate-smart, adaptable crop that will grow on marginal soils and is able to withstand disease and drought. This makes cassava an important staple food for hundreds of millions of people around the world, especially among lower-income communities in Africa and Latin America.

Vitamin A deficiency is associated with significant illness and death from childhood infections, like diarrhea and measles, and is a preventable cause of childhood blindness. Cassava with higher levels of vitamin A has shown to improve the vitamin A status in children when consumed as processed foods.

HarvestPlus works with Bioversity/CIAT and IITA to support National Agricultural Research institutes (NARI) & other interested partners to breed, test, & release varieties of vitamin A cassava in countries where cassava is a key staple food.

VITAMIN A CASSAVA

Provides up to 100 percent of daily vitamin A needs for women of reproductive age and children when eaten regularly.

Varieties Released to Date

Africa: 19 Varieties
Latin America/Caribbean: 3 Varieties

Total Households Growing in Nigeria (2021)
> 2.6 Million

CGIAR Breeding Partner:

IITA Transforming African Agriculture

CIAT International Center for Tropical Agriculture

VITAMIN A MAIZE

HarvestPlus works with leaders in crop development and agriculture to unlock genetic variation in maize to develop Vitamin A maize. We use conventional breeding techniques to develop Vitamin A maize that can provide malnourished population groups with up to 50 percent of their daily Vitamin A needs; commonly grown varieties contain very small amounts of Vitamin A.

HarvestPlus, the global leader for developing and disseminating nutrient-enriched varieties of crops, works with partners to integrate Vitamin A maize (VAM) into local food systems. VAM is now a proven and effective intervention to address micro-nutrient deficiencies.

HarvestPlus works with the International Maize and Wheat Improvement Center (CIMMYT) and the International Institute of Tropical Agriculture (IITA) to support National Agricultural Research partners to breed, test, and release open-pollinated varieties (OPV) and hybrids of vitamin A maize in countries where maize is a key staple food.

Provides up to 50 percent of daily vitamin A needs for women of reproductive age and children when eaten regularly.

Varieties Released to Date

Africa: 65 Varieties
Latin America/Caribbean: 1 Variety

Total Households Growing in Nigeria (2021)
> 2.4 Million

CGIAR Breeding Partner:

CIMMYT International Maize and Wheat Improvement Center

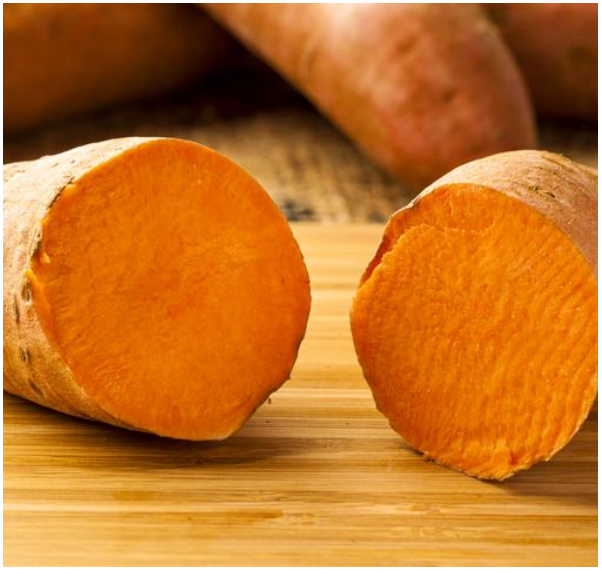
IITA Transforming African Agriculture

VITAMIN A ORANGE SWEET POTATO

Biofortified, orange sweet potato (OSP) is an extremely rich source of pro-vitamin A that has been proven to improve the vitamin A status of children, and to reduce the likelihood and duration of diarrhea. Children with vitamin A deficiency are at increased risk of severe morbidity from common childhood infections such as diarrheal diseases and measles. In cases of extreme deficiency, they can become blind. Sweet potatoes that are high in vitamin A can provide over 100% of daily Vitamin A needs of women and young children and contribute to a reduction in vitamin A deficiency in regions where daily sweet potato consumption is high.

HarvestPlus works in partnership with the International Potato Center (CIP) to support National Agricultural Research institutes to breed, test, and release varieties of vitamin A orange sweet potato in countries where sweet potato is a staple food.

HarvestPlus is supporting partners in Nigeria, Uganda, Brazil, Colombia, Guatemala, Haiti, Honduras, Nicaragua and Panama.



Provides up to 100 percent of daily vitamin A needs for women of reproductive age and children when eaten regularly.

Varieties Released to Date

Asia: 18 Varieties
Africa: 95 Varieties
Latin America/Caribbean: 15 Varieties

Total Households Growing (2021)
> 1.3 Million

CGIAR Breeding Partner:

CIP INTERNATIONAL POTATO CENTER

ZINC RICE

HarvestPlus experts in nutrition, crop development, and agriculture work with partners to unlock genetic variation in rice and develop zinc-rich varieties that can provide malnourished populations with over half of their daily zinc needs when eaten daily. Most currently-grown varieties of rice contain at least 33 percent less zinc compared to biofortified zinc varieties. In some countries, such as Bangladesh, newer varieties of biofortified rice contain 50 percent more zinc than standard varieties. HarvestPlus is part of the CGIAR global agricultural research partnership and leads a global effort to improve the nutritional value of staple crops.

HarvestPlus leverages its CGIAR partners' unrivaled scientific and practical knowledge, skills, and research capacities to respond to the global micronutrient deficiency crisis. In partnership with the International Rice Research Institute (IRRI), several other world leading rice experts, and National Agricultural Research Systems (NARS), we develop and disseminate zinc rich varieties of rice.

Provides up to 70 percent of daily zinc needs for women of reproductive age and children when eaten regularly.

Varieties Released to Date

Asia: 11 Varieties
Countries: Bangladesh, India, Indonesia
Latin America/Caribbean: 4 Varieties
Countries: Bolivia, El Salvador

Total Households Growing (2021)
> 2.4 million

CGIAR Breeding Partner:

IRRI International Rice Research Institute
CIAT International Center for Tropical Agriculture

IRON PEARL MILLET

Pearl millet is a staple cereal crop for around 90 million people in arid and semi-arid tropical regions of Asia and Africa. Iron deficiency, which is widely prevalent in Asia and Africa, impairs children's physical growth, mental development, and learning capacity. Anemia is often induced by iron deficiency, and when severe it can increase women's risk of dying in childbirth. Pearl millet with elevated iron levels has been shown to improve iron status, cognitive performance, and improve physical activity and reverse iron deficiency among adolescent school children who consumed iron pearl millet flat bread twice daily.

HarvestPlus works in partnership with ICRISAT to support National Agricultural Research partners and interested seed companies to breed, test, & release open-pollinated varieties (OPV) & hybrids of iron pearl millet in countries where pearl millet is a staple food. To date, 2 OPVs & 9 hybrids of pearl millet have been released in India & Niger.

We are currently supporting partners in India, and in Benin, Burkina Faso, Ghana, Mali, Niger, Nigeria, Senegal, Togo and Uganda in Africa.

Provides up to 80 percent of daily iron needs for women of reproductive age and children when eaten regularly.

Varieties Released to Date

Asia: 11 Varieties
Countries: India
Africa: 1 Variety
Countries: Niger

Total Households Growing (2021)
> 74,000 households

CGIAR Breeding Partner:

ICRISAT
INTERNATIONAL CROPS RESEARCH

ZINC WHEAT

HarvestPlus experts in nutrition, crop development, and agriculture work with partners to unlock genetic variation in wheat and develop zinc-rich varieties that can provide malnourished populations with up to half of their daily zinc needs when eaten regularly. Currently-grown varieties of wheat contain small amounts of zinc compared to zinc-rich wheat.

HarvestPlus is part of the CGIAR agricultural research network and leads a global effort to improve the nutritional value of staple crops. HarvestPlus leverages its CGIAR partners' unrivaled knowledge, skills, and research capacities to respond to the global micronutrient deficiency crisis. In partnership with the International Maize and Wheat Improvement Center (CIMMYT) and national agricultural research systems (NARS), we develop and disseminate zinc-rich varieties of wheat. Whole-grain zinc wheat flour provides more zinc than highly refined wheat flour. For populations with low zinc status, eating whole-grain wheat flour can help ensure optimal intake of zinc.

Provides up to 50 percent of daily zinc needs for women of reproductive age and children when eaten regularly.

Varieties Released to Date

Asia: 19 Varieties
Countries: Pakistan, India, & Bangladesh

Latin America/Caribbean: 3 Varieties
Countries: Bolivia, Brazil and Mexico

Total Households Growing (2021)
> 2.2 million

CGIAR Breeding Partner:

CIMMYT
International Maize and Wheat Improvement Center

ZINC MAIZE

HarvestPlus is breeding high-yielding varieties and hybrids of biofortified maize with higher levels of zinc to combat zinc deficiency. Maize open-pollinated varieties (OPV) and hybrids that are bred to be high in zinc can provide up to 70 percent of daily zinc needs and contribute to a reduction in zinc deficiency in regions where daily maize consumption is high.

HarvestPlus works in partnership with the International Maize and Wheat Improvement Center (CIMMYT) and the International Institute of Tropical Agriculture (IITA) to support National Agricultural Research partners and interested seed companies to breed, test, and release OPV's and hybrids of zinc maize in countries where maize is a key staple food. We are currently supporting partners in Nigeria, Colombia, El Salvador, Guatemala, Haiti, Honduras, Mexico, Nicaragua and Panama in Latin America and Africa.

Provides up to 70 percent of daily zinc needs for women of reproductive age and children when eaten regularly.

Varieties Released to Date

Latin America/Caribbean: 11 Varieties

Countries: Colombia, El Salvador, Honduras, Guatemala, Nicaragua

Total Households Growing (2021)
> 95,000

CGIAR Breeding Partner:

CIMMYT International Maize and Wheat Improvement Center

IITA Transforming African Agriculture

IRON BEANS

Beans have always been a good natural source of iron. But now, thanks to an innovative approach to the age-old process of natural crop breeding, the concentration of iron in beans can be boosted, making them even more nutritious.

At HarvestPlus, we work with world leaders in crop development and agriculture to unlock beans' genetic variation for iron from within global gene bank collections. We use Non-Genetically Modified Organism, conventional breeding techniques to develop beans with up to 90 percent more iron than standard varieties.

HarvestPlus, the global delivery organization for biofortified varieties, also works with partners to integrate these new beans into local food systems.

This is now a proven and effective intervention to reduce micro-nutrient deficiencies, especially for iron.

Provides up to 80 percent of daily zinc needs for women of reproductive age and children when eaten regularly.

Varieties Released to Date

Africa: 42 varieties
Countries: Burundi, DR Congo, Rwanda

Latin America/Caribbean: 23 Varieties
Countries: Bolivia, Brazil, Colombia, El Salvador, Guatemala, Honduras, Nicaragua, Panama

Total Households Growing (2021)
> 3 million

CGIAR Breeding Partner:
CIAT
International Center for Tropical Agriculture

ABOUT THE BOOK

Purpose

Non-biofortified cassava, maize, and sweet potatoes are among the major consumed staple foods in Nigeria. These foods are chief among sources of energy-giving staples foods, but they are low in important micro-nutrients like vitamin A, which is of public health significance in Nigeria. Apart from being important staple foods and a source of energy, they provide income for millions of people in rural and urban areas in Nigeria and West Africa in general.

With the introduction and adoption of biofortified cassava, maize, and orange sweet potatoes varieties in Nigeria however, people are shifting focus from these crops as being good sources of carbohydrates alone to finding new uses for them as more nutritious food options because they increase the content of vitamin A in their diet. In addition, many small &

medium scale entrepreneurs (SMEs) are using them as income sources. This recipe book, Biofortified crops on my plate is an integral part of HarvestPlus & partners' efforts to reach the plates of everyone with tasty and nutritious recipes prepared using biofortified crops as main ingredients. The book offers 50 recipes for you to choose from in order to harness better nutrition.

Development of the recipes

This book is a collection of nourishing food products prepared using vitamin A cassava, vitamin A maize, and Orange-fleshed sweet potatoes. They have been developed to meet the nutrition of all family members and to diversify options for the use of vitamin A biofortified crops. The recipes contain biofortified crops (as the main ingredients) combined with other food sources to ensure the intake of more nutrients other than vitamin A and carbohydrates when consumed. They have been formulated with the goal to consume foods with a variety of nutrients, making it possible to improve nutrient intake, especially of key nutrients like vitamin A, iron, zinc, and fat.

Users of the recipe book

The information in this book has been made easy to understand and provides practical recipe-by-recipe tips to ensure that users can seamlessly incorporate biofortified vitamin A food crops into their diets for the best quality dish all the time. Mothers, caregivers, cooks, food processors, bakers, teachers, and students will enjoy using it for household and commercial purposes. It is equally a good resource material for researchers, development workers in the agriculture for the health sector, agricultural value chain developers, extension agents as well as health workers and policymakers in their effort to reduce malnutrition and poverty. Specifically, it is a training manual for facilitators and promoters of biofortification.

Organization of the contents of the book

"BIOFORTIFIED CROPS ON MY PLATE" is organized into 2 main Parts:

PART A: READY-TO-EAT FOODS FROM BIOFORTIFIED CROPS

Section 1: Vitamin A cassava recipes – presented as Traditional Household meals, Snacks & confectioneries, and Innovative food products

Section 2: Vitamin A maize recipes presented as Traditional Household meals, Snacks & confectioneries, and Innovative food products

Section 3: Orange-flesh sweet potato recipes -presented as Traditional Household meals, Snacks & confectioneries, and Innovative food products

PART B: IMMEDIATE POST-HARVEST FOOD PRODUCTS FROM BIOFORTIFIED CROPS

Section 1: Vitamin A Cassava – Products, Flow charts & Post-Harvest Guidelines

Section 2: Vitamin A Maize – Products, Flow charts & Post-Harvest Guidelines

Section 3: Orange Sweet Potatoes – Products, Flow charts & Post-Harvest Guidelines

Biofortified Crops on My Plate

Forward

"Let food be thy medicine". Decades ago, the founding father of biofortification, Dr. Howarth Bouis, set out to find a solution to the hidden hunger caused by the deficiency of essential vitamins and minerals, a solution whereby plants could do the work of providing natural and essential nutrition to young children, women, and their families.

In Nigeria, and around the world, plants have been at work for almost two decades and over 300 biofortified varieties of the most important staple crops like maize, rice, wheat, cassava, beans, and orange sweet potato are available to prepare delicious and healthier foods. These nutrient-enriched staple foods are reaching the plates of millions of families in abundance, and more are constantly on the way to help meet people's nutritional needs, while also satisfying farmers' preferences and every cook's culinary demands.

Scientific evidence has shown that by using biofortification to naturally add vitamin A, iron, and zinc into these familiar staple foods the health of women and children can be significantly improved. When biofortified crops are eaten daily in regular amounts, dietary deficiencies can be ameliorated, children can fall ill less frequently and learn more at school, and women's breast milk can provide more nutrients to their babies.

Surely, the science underpinning the benefits of these foods would come to naught if consumers didn't eat them. This recipe book is more than a cookbook; it is a tool for better nutrition made up of a collection of practical, community-friendly, and traditional foods well-known to Nigerian mothers and cooks, cleverly adapted for the natural addition of more essential nutrients.

Biofortified Crops on My Plate is the result of notable dedication by HarvestPlus staff and their partners to standardizing delicious traditional dishes, making colorful desserts, and creating health-promoting new delicacies like orange sweet potato juice! Through collaboration with local partners and farmers and the entrepreneurship of small and medium business owners, these recipes will now land on the plates of families across the country.

It is not long ago that I was fortunate to participate in the wonderfully unifying and educational Nigerian Nutritious Food Fair, an event the authors of this book were instrumental in putting together. Thousands of people attended from all over the country: big and small businessmen and -women, housewives, farmers, activists, Nollywood celebrities, students, and scientists. They paraded around the grounds where many of the dishes included in this book were first being rolled out thanks to human ingenuity and bold innovation. In this sense, this book pays tribute to all these people – from the scientists who have been developing biofortified crops to the daring souls that have set up shops selling foods that Nigerians enjoy, but which are now biofortified.

As the chief nutritionist at HarvestPlus, I congratulate the authors of Biofortified Crops on My Plate on helping to bring more nutrition into homes and sincerely hope that this initiative and others like it will continue to mainstream biofortified varieties of staple crops into the food supply, taking us one step closer to eliminating micronutrient malnutrition in Nigeria and beyond.

Dr. Erick Boy
Chief Nutritionist, HarvestPlus

ACKNOWLEDGMENT

"BIOFORTIFIED CROPS ON MY PLATE" is the culmination of inputs from several institutional partners in the public and private sectors as well as from individuals (researchers, chefs, caterers, nutritionists, extension workers, households, and industrial processors). These individuals and groups participated in the development, modification, and commercialization of new food products produced using vitamin A cassava, vitamin A maize, and Orange-flesh sweet potatoes. They have also contributed to perfecting the processing techniques of these biofortified crops. Thanks to you all.

We appreciate all our dedicated partners for the success of this book. We sincerely recognize and thank the representatives of the Federal Ministry of Agriculture & Rural Development (FMARD) and the Department of Food Safety & Nutrition (FSN), for your commitment to promoting nutritious food options and contributing to the vitamin A intake of families, including women and children, is invaluable. Also, we would like to extend our appreciation to African Union Development Agency - AUDA-NEPAD, the Nutrition Division and the Micronutrient Deficiency Control (MNDC) of the Federal Ministry of Health (FMoH), Abuja for providing national recognition to biofortification in Nigeria. Your partnership and contribution are one of the reasons this important book is in our hands today.

Our donors include the Bill & Melinda Gates Foundation, the United Kingdom Foreign, Commonwealth and Development Office, U.S. Agency for International Development (USAID), John D. and Catherine T. MacArthur Foundation, Global Alliance for Improved Nutrition (GAIN), and Alliance for A Green Revolution in Africa (AGRA). This book is a product of their continued support.

We appreciate everyone who contributed to writing, editing, reviewing, and completing this recipe book. The list is long, but we sincerely recognize the contributions of the HarvestPlus Nutrition team and members of the Communication unit in the Washington, office, the Nigeria HarvestPlus family, and all other staff members who have been sources of inspiration to us during the development of the book.

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PART A: READY-TO-EAT FOODS FROM BIOFORTIFIED CROPS

This section contains the ingredients and step-wise procedure for preparing vitamin A cassava, vitamin A maize and OFSP into ready-to-eat forms. These are household & commercial foods and snacks whose preparation and cooking are done mostly at home or restaurants using regular kitchen utensils. In this part of the book, you will find:

- Required ingredients and preparation methods for 59 biofortified foods.
- Important tips on nutrition and what to do to get perfect dishes and snacks every time.

PART A, SECTION I

Traditional Household meals, snack and confectioneries, innovative products from Vitamin A cassava

EBA

Eba from vitamin A garri is a yellow moldable cooked dough often eaten with vegetable soup/sauce. It is naturally yellow without the addition of palm oil, due to the presence of beta-carotene, which provides vitamin A when consumed. When freshly processed, vitamin A garri used to prepare Eba contains up to 1,500 micro-grams of beta-carotene/100g. This can deliver up to 30% of an adult's daily vitamin A need.

INGREDIENTS

- 4 cups Vitamin A garri
- 6 cups hot boiling water (1 cup = 250ml)

Note: Set additional 2 cups of water aside to achieve softer consistency.

TIPS

- Use Vitamin A garri with bright attractive color
- Use boiling water, not just hot water and cook on a source of heat for 60 seconds after adding boiling water (if you are making less quantity of garri).

PREPARATION

1. Boil water
2. Pour garri gradually into boiling water, and stir continuously with a wooden ladle (until a dough of desirable texture is formed)
3. Cook and continue stirring with a wooden ladle for 2 minutes until a homogeneous yellow-colored dough is obtained.
4. Add a little quantity of hot water to the dough (if you like a softer texture)
5. Scoop into the plate and serve with your choice of soup/sauce

SERVING	COOK TIME	DIFFICULTY	PREPARATION
4 Wraps	1 Minutes	Easy	5 Minutes

YELLOW FUFU MEAL

Cooked Yellow fufu prepared using fermented vitamin A cassava mash or odorless fufu flour is a convenient way to enjoy this local dish anytime. Fufu from the moist mash and from the flour is prepared in similar ways, differing in only a few steps. In addition, they look, taste, and feel the same. It depends on your preference. Cooked yellow fufu meal is eaten with vegetable sauces or soups. It is attractive because of its natural yellow color and if properly processed is odorless. This product is unique in terms of color and vitamin A and retains about 90% of the beta-carotene present in the fresh roots.

INGREDIENTS

- 100g vitamin A fufu mash
- 3 cups water (1 cup = 250ml)

TIPS

- When mixing the mash in step 2, use as little water as possible to avoid getting a watery paste
- Continue cooking until a homogeneous yellow colored, moldable dough is obtained.
- Ensure that your cooked fufu has a consistency that is neither too soft nor too hard
- Add more water if texture is too stiff while stirring
- Fufu could be pounded on turned in a pot directly

PREPARATION

1. Put vitamin A fufu mash into a bowl.
2. Mix well with some water pouring a little at a time and mixing after each action until there are no more lumps
3. Pour the mixed paste into a pot.
4. Place the pot on a heat source, and allow it to stand for about 1 minute
5. Stir/turn continuously with a wooden ladle until a smooth and lump-free paste is obtained.
6. Add little water (3/4 cup), cover, and cook for about 5 minutes with low heat
7. Continue cooking and stirring again until you get an even, moldable and non-sticky dough. Alternatively, put the dough in a mortar and pound it with a pestle.
8. Dish and serve with your choice of soup/ sauce

SERVING	COOK TIME	DIFFICULTY	PREPARATION
4 Wraps	20 Minutes	Easy	6 Minutes

YELLOW FUFU MEAL – ODORLESS FUFU FLOUR

INGREDIENTS

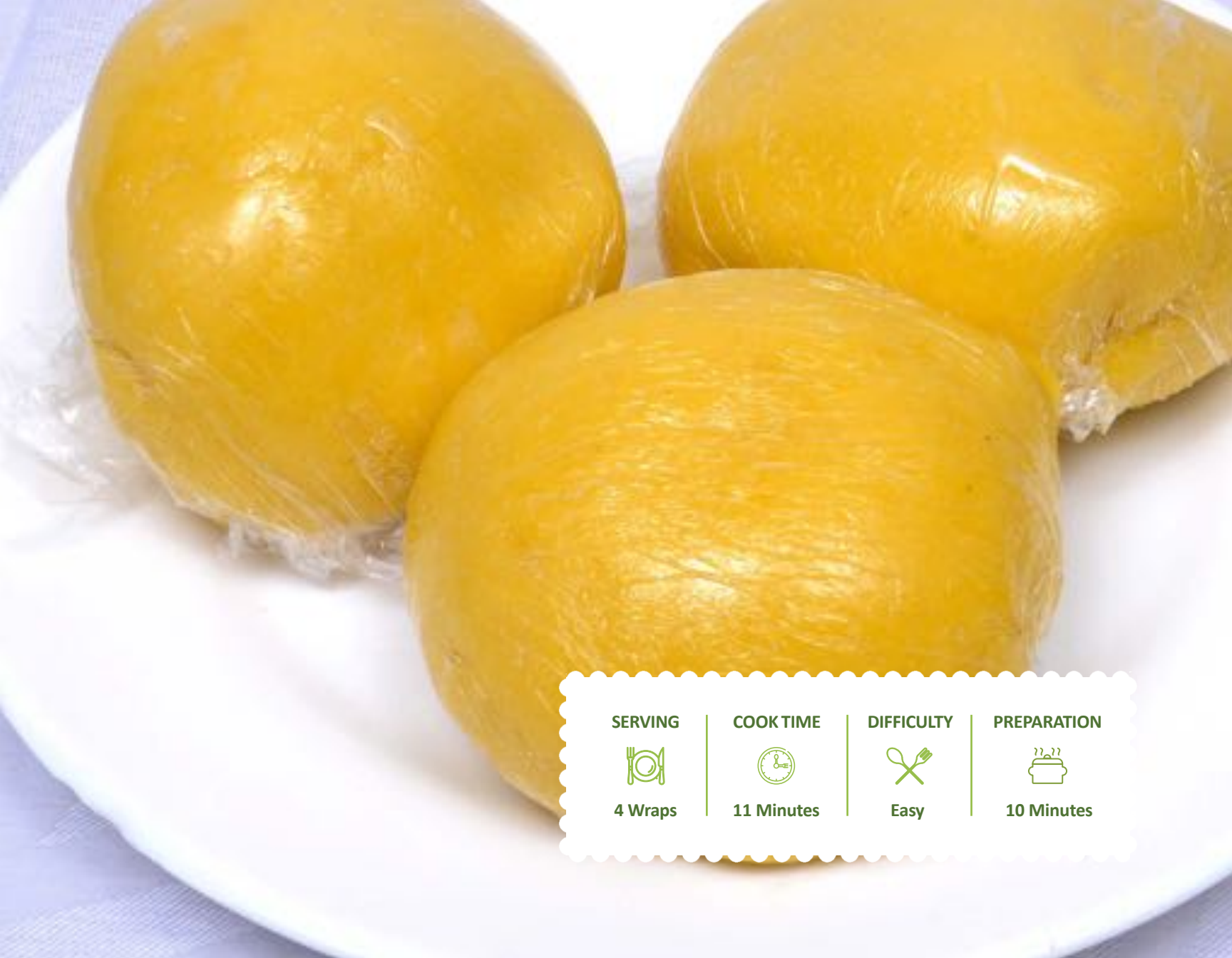
- 4 (336g) level cups of odorless vitamin A fufu flour
- 3 cups water

TIPS

- When mixing in Step 2, aim for a paste that is not watery to ensure that your fufu comes out firm at the end
- Continue cooking until a homogeneous yellow-colored, moldable dough is formed.
- Use a cup of similar size for measuring flour and water
- While stirring, if the texture is too stiff, add more water to achieve the desired texture

PREPARATION

1. Measure odorless vitamin A fufu flour into a bowl.
2. Mix the flour with some water until you get a smooth thick paste. Allow the mixture to sit for about 5 minutes.
3. Then, pour into a pot and place on the heat source (low heat) for about 1 minute before stirring starts
4. Continue stirring as the paste is cooking to avoid the formation of lumps until a stiff dough is obtained. Add about ¾ cup of water to further soften the dough
5. Add some water (about ¼ cup), cover, and cook for about 5 minutes under low heat
6. Stir again for another 5 minutes, until you get an evenly cooked paste that is moldable and non-sticky.
7. Dish and serve with your choice of soup/sauce



SERVING	COOK TIME	DIFFICULTY	PREPARATION
4 Wraps	11 Minutes	Easy	10 Minutes

YELLOW LAFUN MEAL

Yellow Lafun meal is the biofortified form of the popular white cassava “Swallow” consumed in Nigeria. When made with vitamin A cassava, it has this attractive yellow color that makes it more appealing to regular consumers of the white amala’. It is energy-giving, but equally packed with lots of fiber and some vitamin A.

INGREDIENTS

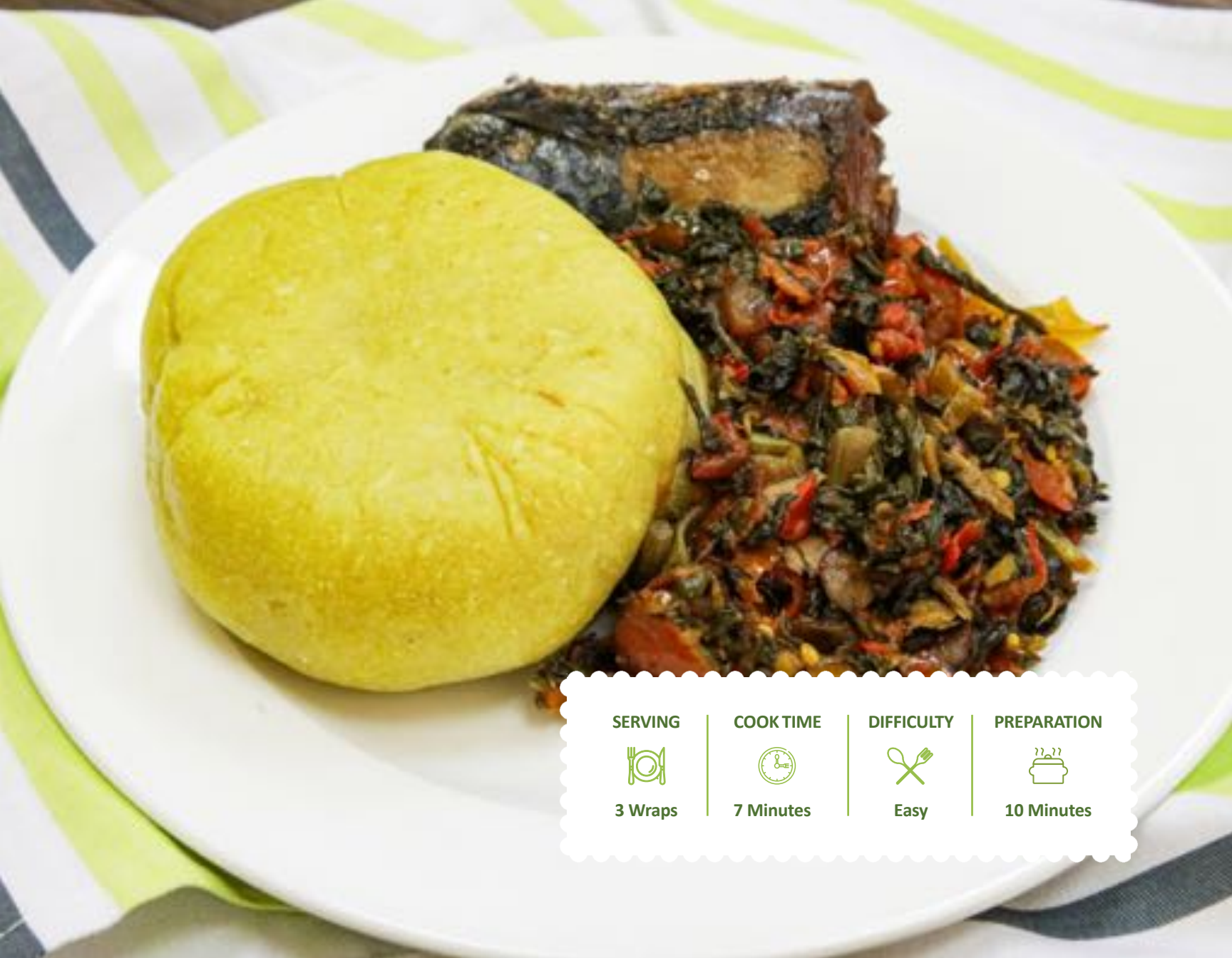
- 2 leveled cups lafun flour
- 4 cups water

TIPS

- You might need to adjust water to cassava flour ratio due to the method used to process lafun cassava flour
- Ensure that the water is boiling and steaming while stirring in the flour as this helps the lafun flour to cook
- Avoid running out of enough flour as this may leave you with an unpleasant textured lafun

PREPARATION

1. Sieve lafun flour
2. Bring water to a boil in a pot
3. Turn off the heat and add the lafun flour gradually to the water while stirring in the flour with a wooden ladle.
4. Keep adding the flour and stirring vigorously until a soft firm dough is formed.
5. Put the pot in a convenient place (preferably on the floor) and use a ladle to mix the paste using both hands preferably until a smooth dough is obtained.
6. Add more flour if the texture is too soft and continue turning till a smooth lump-free dough is formed.
7. Dish the cooked lafun and serve with your choice of soup



SERVING	COOK TIME	DIFFICULTY	PREPARATION
3 Wraps	7 Minutes	Easy	10 Minutes

ABACHA

Vitamin A abacha made from shredded yellow root (Pro-Vitamin A) cassava variety is more attractive and also contains more vitamin A than the conventional white type. The recipe is prepared to be taken as a snack, but can also be cooked as a main meal when combined with protein sources, condiments, and palm oil. This delicious product stands out for its simple but unique taste that excites every taste bud. You can never go wrong making Abacha from vitamin A cassava.

INGREDIENTS

- 1 small size vitamin A cassava root
- Water (enough to cover the roots in the pot)
- 2 cups sliced coconut/roasted groundnuts/ roasted fish

PREPARATION

1. Peel and wash cassava roots.
2. Cut roots horizontally into smaller sizes (of about 3 each; depending on the size of the cassava root).
3. Put in a pot and pour water, allowing the water to cover the cut roots.
4. Put on the heat source and per-boil for about 20 minutes.
5. Remove from the heat source and allow draining and cooling.
6. Slice into the desired shape, ensuring that you remove the stringy middle portion. The slices should not be too thin or thick.
7. Soak overnight to ferment.
8. Wash off, pour into a sieve, and drain. Washing should continue until the roots are no longer slimy. Your Abacha is ready.
9. Serve Abacha with sliced coconut/groundnuts/roasted fish.

SERVING	COOK TIME	DIFFICULTY	PREPARATION
4 Portions	20 Minutes	Easy	40 Minutes

AFRICAN SALAD

African salad is a full-style vitamin A Abacha. It is a simple abacha prepared as a full meal by including assorted vegetables, fish, leaves, and various seasonings. These condiments add flavor, color, more nutrition, and most of all, that unique traditional taste of home. Use the ingredients as you like and as you have the capacity to. Food lovers will always come back to this recipe repeatedly.

INGREDIENTS

- ¼ (62mls) cups of water
- 5 cups (700g) Vitamin A Abacha - plain style
- 2 cups (125g) ugba or ukpaka (Oil bean seed)
- 1 cup (250ml) palm oil and Boiling water
- 3 ½ table spoons powdered potash
- 100g Ponmo, cooked and sliced (cow skin)
- 1 large onion, chopped & Sliced utazi leaves
- 1 medium onion sliced (for garnishing)
- 6 garden eggs (diced for garnishing)
- Chopped garden egg leaves
- Salt and dry pepper (to taste)
- 4 table spoons ground crayfish
- ½ tbsp of ground ehuru (Calabash nutmeg)
- 1 tbsp of locust beans (ogiri or iru) (optional)

PREPARATION

1. Rinse the ugba with warm water.
2. Roast the ehuru on fire and pound/ blend into a powder
3. Dissolve the potash in water and sieve out the water. Stir the potash water with the palm oil to form a yellowish paste.
4. Place on the heat source and add the ground ehuru, pepper, crayfish, and seasoning.
5. Stir, then add crushed stock cubes, diced onions & ugba. Take it off the heat. Add meat/ fish/pomo.
6. Add the abacha and mix, allowing the ingredients to blend.
7. Add sliced utazi and salt to taste.
8. Garnish with chopped garden egg leaves and sliced onions.

TIPS

You may choose some or all of these ingredients according to what you can afford. You can also vary the quantities according to your choice

SERVING	COOK TIME	DIFFICULTY	PREPARATION
6 Persons	15 Minutes	Mid-Level	45 Minutes


AFRICAN SALAD

VITAMIN A CASSAVA

In the class of Snacks & Confectioneries

COMBOBITE

Combobite is a crunchy snack made from a combination of vitamin A cassava flour and cowpea in a ratio of 5:1. You can make it into many shapes – (for example flakes or strips) depending on the blade of the extruder. Alternatively, improvised extruders e.g., cake decorators or strainers can be used to dispense the paste while frying. This snack contributes to the intake of protein and iron because 100g of it contains about 4-5g of protein and 8mg of iron.

INGREDIENTS

- 5 cups leveled cups of High Quality VAC flour
- 1 leveled cup either brown or white beans
- 1 medium sized Onions
- 5 large pieces of cayenne pepper (bawa)
- 10 medium size of scotch bonnet pepper (rodo)
- Salt (To taste)
- Vegetable oil (adequate for deep frying)
- 750 ml to 1 litre of water (or as required to get a firm paste)

Note: You will need 5 measures of vitamin A cassava flour for every measure of dry beans used.

PREPARATION

1. De-haul beans, add onions, and grind into a smooth paste. (You can add peppers and other protein sources as desired e.g crayfish at this point if you desire)
2. Sieve high quality Vitamin A cassava flour
3. Mix bean paste and water to get a slurry.
4. Add salt and mix in the vitamin A cassava flour to get a firm paste
5. Fill the extruder with the paste. Select the extruder blade that you desire.
6. Heat up the oil in the frying pot. Extrude paste into it and fry for about 8 minutes or until a light golden color is obtained
7. Scoop from oil, strain, and cool.
8. Repeat steps 6 and 7 until all the paste is fried
9. Serve as a snack or package and store for future use or for sale

SERVING	COOK TIME	DIFFICULTY	PREPARATION
300g	20 Minutes	Mid-Level	40 Minutes

QUEEN CAKES & CELEBRATION CAKES

This cake recipe is similar to that of celebration cakes. It is made wholly from High Quality Vitamin A Cassava Flour (HQVACF) and no other type of flour. It is gluten-free and thus a healthier option. It is often taken as a snack but can also be complemented with protein or fiber-rich food like fruit juice, yogurt, or even milk.

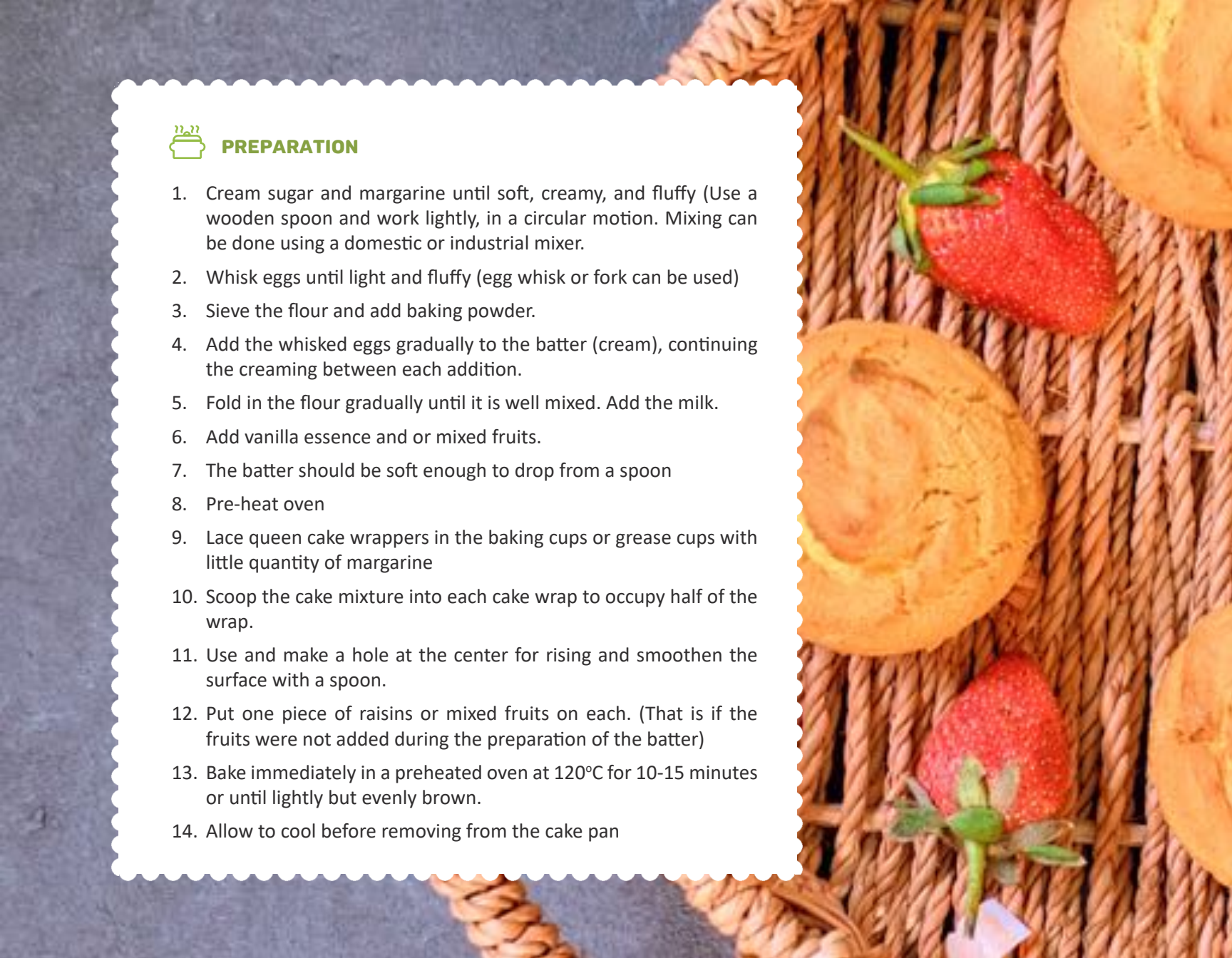
INGREDIENTS

- 2 ½ cups HQVAC flour
- 1½ leveled cup Sugar
- 175g Margarine
- 2 teaspoons Baking powder
- 1 teaspoon Vanilla essence
- ½ Milk (liquid) (optional)
- Mixed fruit (optional)
- 5 large sized fresh Eggs
- A pinch of salt
- Mixed fruits optional

PREPARATION

1. Large cakes take a little longer to be well-baked than cupcakes
2. To be sure that the cake is cooked, insert a clean knife through the middle of the cake. The knife should come out clean, indicating that it is baked.
3. Use a cake pan with a smooth inner surface, as this does not allow cakes to stick to the bottom.
4. Half-fill cake cups or pan to avoid over-spillage during baking.
5. Cake cups or pans should be properly greased to avoid sticking and burning cakes
6. Do not open the oven until the aroma can be perceived

SERVING	COOK TIME	DIFFICULTY	PREPARATION
12 Pieces	20 Minutes	Mid-Level	50 Minutes



PREPARATION

1. Cream sugar and margarine until soft, creamy, and fluffy (Use a wooden spoon and work lightly, in a circular motion. Mixing can be done using a domestic or industrial mixer.
2. Whisk eggs until light and fluffy (egg whisk or fork can be used)
3. Sieve the flour and add baking powder.
4. Add the whisked eggs gradually to the batter (cream), continuing the creaming between each addition.
5. Fold in the flour gradually until it is well mixed. Add the milk.
6. Add vanilla essence and or mixed fruits.
7. The batter should be soft enough to drop from a spoon
8. Pre-heat oven
9. Lace queen cake wrappers in the baking cups or grease cups with little quantity of margarine
10. Scoop the cake mixture into each cake wrap to occupy half of the wrap.
11. Use and make a hole at the center for rising and smoothen the surface with a spoon.
12. Put one piece of raisins or mixed fruits on each. (That is if the fruits were not added during the preparation of the batter)
13. Bake immediately in a preheated oven at 120^{o}C for 10-15 minutes or until lightly but evenly brown.
14. Allow to cool before removing from the cake pan


QUEEN CAKES

EGG ROLL

This is a stomach-filling snack that is also rich in protein. It comes readily to mind when thinking of how to make children who are picky with food eat eggs without even feeling it. Always a delicious school snack and a delightful party starter.

INGREDIENTS

- 2 levelled cups of HQVAC flour
- ½ levelled cup margarine
- Salt or sugar to taste
- 1 large fresh Egg
- 7 medium boiled eggs
- ½ levelled teaspoon Baking powder
- ½ levelled teaspoon grated nutmeg (optional)
- ½ table spoon of salt
- 2 tablespoon butter
- Vegetable oil (enough for deep frying)

TIPS

- Dough should be light & free from cracks
- Mix dry ingredients before adding liquids
- In a situation where a pastry cutter is not available, the dough can be cut by hand

PREPARATION

1. Mix 1 ½ cups of the flour with margarine, baking powder, and nutmeg. Add the sugar or salt
2. Boil ½ cup of water, stir in the remaining flour into the boiling water and remove from heat.
3. Add the cooked flour into the bowl of ingredients in step 1.
4. Mix with fingertips until the mixture resembles bread crumbs.
5. Whisk the egg until light and add to the mixture
6. Mix until a smooth dough that leaves the side of the bowl clean is obtained
7. Roll out the pastry on a floured board
8. Use a round pastry cutter to cut the rolled dough into small sizes. The size of each cut pastry should be adequate to cover the egg properly.
9. Mold each egg with the cut-out pastry, smoothen until well covered
10. Deep fry until golden brown and serve as a snack.

SERVING	COOK TIME	DIFFICULTY	PREPARATION
7 Pieces	12 Minutes	Mid-Level	60 Minutes


EGG ROLL

CHIN-CHIN

Chin-chin is a very common fried West African snack. It is a quick snack, suitable for visitors, and a big party favorite. This snack is not just a favorite because it is delicious; it is also loved by many busy Mums because it can be stored for a long time when kept in air-tight containers. It can be eaten alongside healthy drinks like yogurt, kunnu, and chocolate beverages.

INGREDIENTS

- 2 levelled cups of HQVAC flour
- ½ levelled cup margarine
- Pinch of Salt
- ½ cup sugar
- 1 large fresh Egg
- ½ levelled teaspoon Baking powder
- ½ levelled teaspoon grated nutmeg (optional)
- Vegetable oil (enough for deep-frying)

TIPS

1. Store in air-tight containers to maintain freshness and crunchiness.
2. Uniformity of shape & size of the chin-chin is important to ensure customer acceptance.
3. Avoid adding too much flour during rolling & cutting to avoid a pastry that is too thick & hard.

PREPARATION

1. Mix 1 ½ cups of the flour with margarine, baking powder, and nutmeg. Add the sugar and salt
2. Boil ½ cup of water, stir the remaining flour into the boiling water and remove from heat.
3. Add the cooked flour to the bowl of ingredients
4. Mix with fingertips until the mixture resembles bread crumbs.
5. Whisk the egg until light and add to the mixture
6. Mix until a smooth dough that leaves the side of the bowl clean is obtained
7. Roll the prepared pastry evenly on a floured board. Do not knead
8. Cut into desired shapes and sizes with chin-chin cutters or knives (the length and thickness should be cut as desired)
9. Heat the vegetable oil before frying the chin-chin
10. Deep-fry in oil for about 7 minutes or until an attractive golden-yellow color is obtained
11. Remove from oil, drain off the excess oil and allow to cool.

SERVING	COOK TIME	DIFFICULTY	PREPARATION
240g	15 Minutes	Easy	50 Minutes

COOKIES

Cookies are a very special confectionery treat that is popular among Nigerians. Though often regarded as bad choices for snacks, it can be a nutrition-saving grace for children who are unable to meet their daily energy needs. It can also be eaten in combination with healthier foods like sandwiches, yogurts, or just simply with a cup of milk.

INGREDIENTS

- 6 cups HQVAC flour
- 225g margarine
- ½ cup sugar
- 4 Eggs (whisked)
- 4 teaspoons baking powder
- ½ teaspoon nutmeg
- 2 teaspoons Milk
- Flavors (as desired)

PREPARATION

1. Cream sugar and margarine together for about 10 minutes
2. Pour whisked egg into the creamed mixture
3. Add the flavor of choice
4. Mix all dry ingredients: VAC flour, nutmeg, baking powder
5. Add the mixed dry ingredients and mix to form a smooth dough
6. Roll out dough lightly on a floured board to 1cm thickness Pre-heat oven to about $175^{0}C$
7. Cut with a biscuit cutter into desired shape and size
8. Prick the surface with a fork to prevent the dough from excess rise and cracks
9. Bake in preheated oven for 15min or until evenly light brown
10. Serve with a chilled drink or tea.

SERVING	COOK TIME	DIFFICULTY	PREPARATION
30 Pieces	20 Minutes	Easy	45 Minutes

FISH ROLL

Fish roll is a traditional snack in Nigeria. It is called fish roll because a tasty sauce of fish fillet is wrapped in between a rolled pastry. The fish can be replaced with beef or sausage and this automatically changes the name to beef roll or sausage roll respectively. For the recipe in this book, the paste is made using HQVACF. Fish roll is filling, rich in protein, and comes in handy as a school lunch snack or for those on the go.

INGREDIENTS

- 1 ½ cups (225g) - HQVAC flour
- ¼ cup (50g) of Butter
- 120g fish
- 1 tbsp of baking powder
- ¼ tbsp of ground nutmeg
- ½ table spoon of salt
- 1 medium egg

PREPARATION

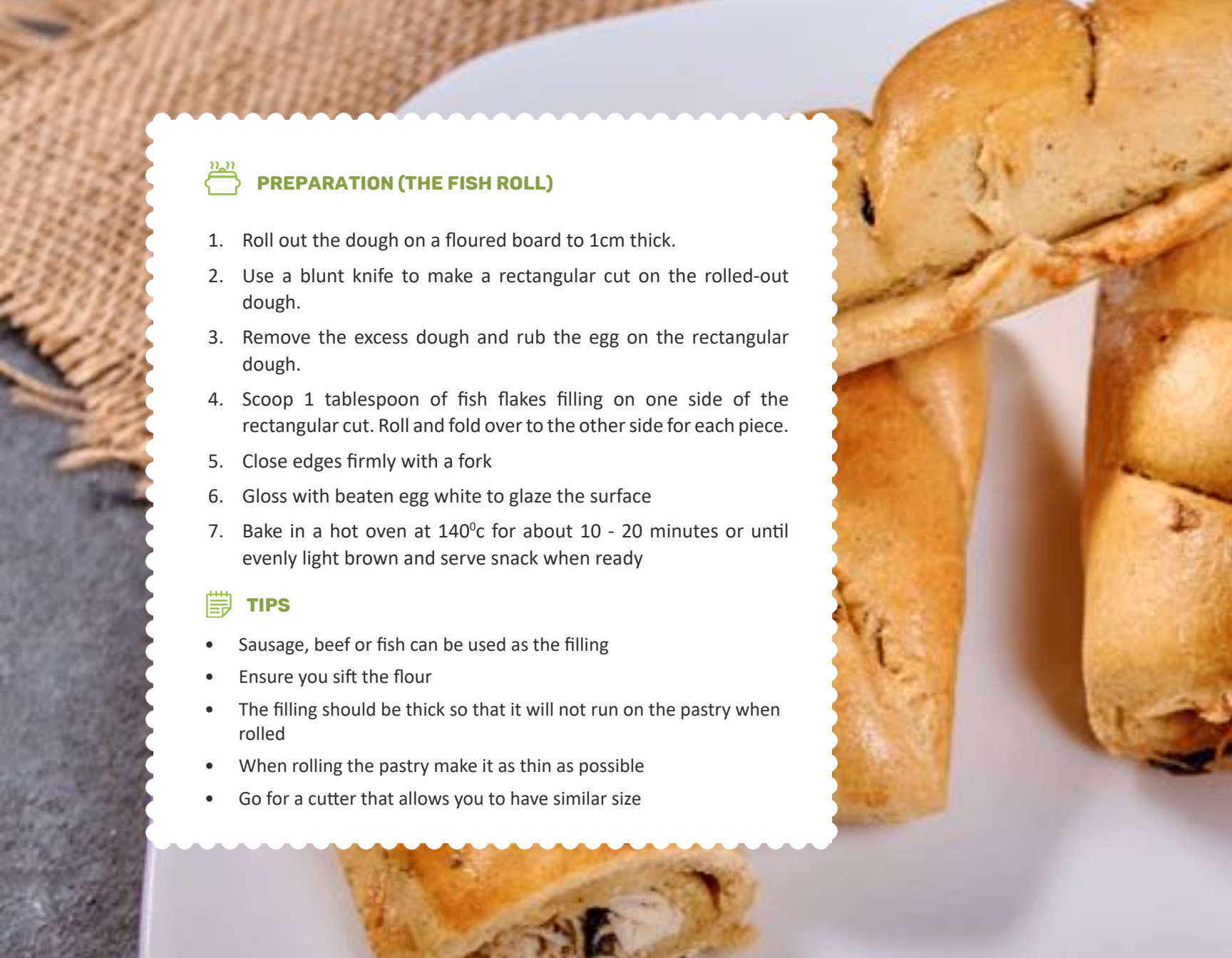
- **Preparing (The Filling)**

1. Season and boil fish
2. Use fingers to break boiled fish into very small pieces to form flakes
3. ½ cup (125ml) boiled water used to mix ½ cup of vitamin A cassava flour

- **Preparation (The Pastry)**

4. Mix 1 ½ cups of the flour with margarine, baking powder, and nutmeg
5. Add a pinch of salt
6. Boil ½ cup of water, stir the remaining flour into the boiling water and remove from heat.
7. Add the cooked flour into the bowl of ingredients
8. Mix with finger tips until the mixture resembles bread crumbs.
9. Whisk the egg until light and add to the mixture
10. Mix until a smooth dough that leaves the side of the bowl clean is obtained

SERVING	COOK TIME	DIFFICULTY	PREPARATION
5 Pieces	20 Minutes	Mid-Level	60 Minutes



PREPARATION (THE FISH ROLL)

1. Roll out the dough on a floured board to 1cm thick.
2. Use a blunt knife to make a rectangular cut on the rolled-out dough.
3. Remove the excess dough and rub the egg on the rectangular dough.
4. Scoop 1 tablespoon of fish flakes filling on one side of the rectangular cut. Roll and fold over to the other side for each piece.
5. Close edges firmly with a fork
6. Gloss with beaten egg white to glaze the surface
7. Bake in a hot oven at 140^0c for about 10 - 20 minutes or until evenly light brown and serve snack when ready

TIPS

- Sausage, beef or fish can be used as the filling
- Ensure you sift the flour
- The filling should be thick so that it will not run on the pastry when rolled
- When rolling the pastry make it as thin as possible
- Go for a cutter that allows you to have similar size


FISH ROLL

MEAT PIE

Meat pie is both of commercial and household interest. It is a yummy stomach-filling snack made with beef and potato sauce as the filling. Its ingredients are diverse making it able to provide different nutrients to the consumer. As per the flour used, a composite of wheat and High Quality Vitamin A Cassava Flour (HQVACF) in the ratio of 1:1 is used in this book. However, other ratios are possible and depend on taste and preference.

INGREDIENTS (PASTRY)

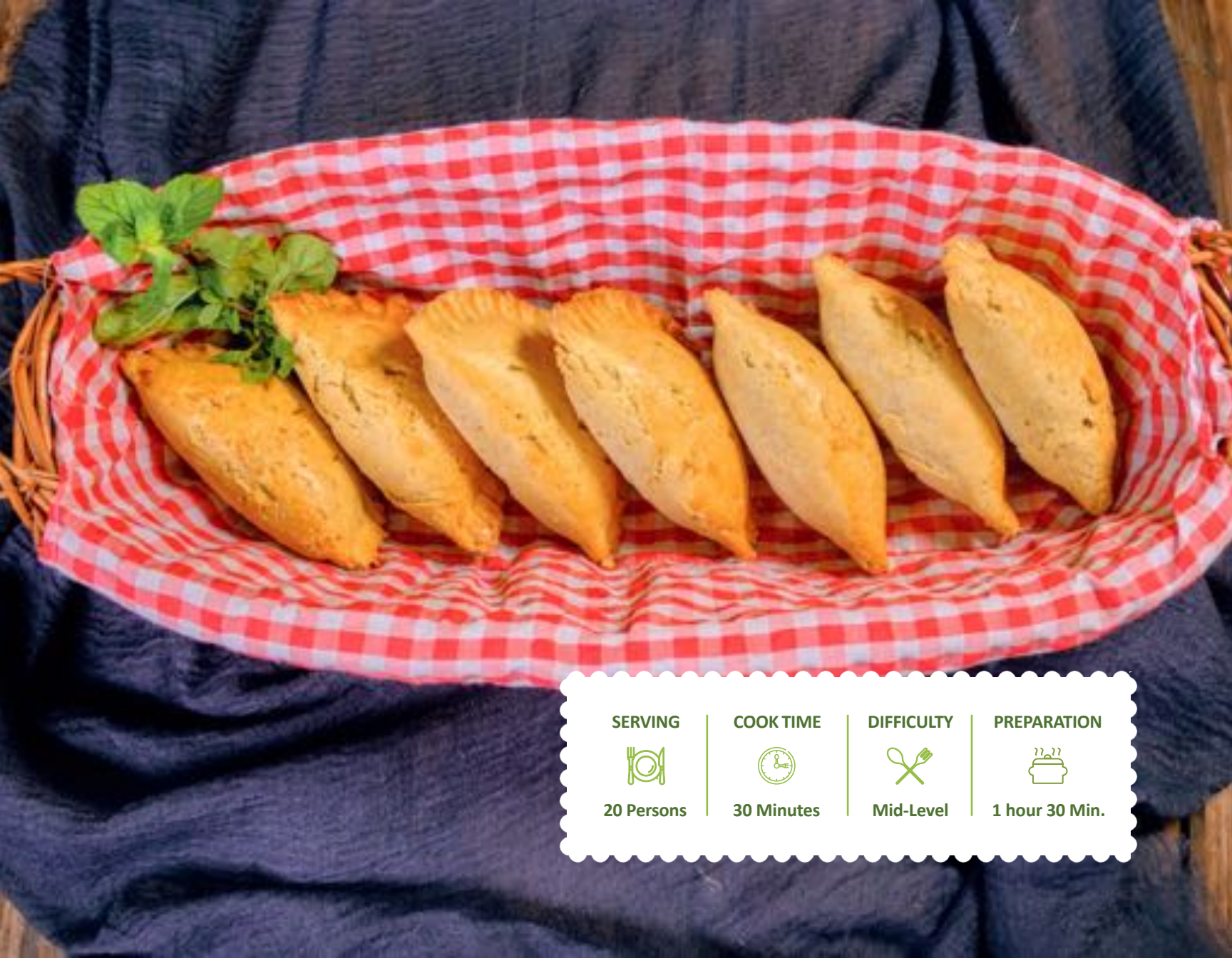
- 4 cups HQVAC flour
- 4 cups wheat flour
- 1/8 cup margarine
- ½ table spoon of baking powder
- 1table spoon of salt
- 1/3 cup water

INGREDIENTS (FILLING)

- 2 medium Irish potatoes
- 1 cup carrots (diced)
- 7 cups minced meat (900g)
- 1 medium sized Onion
- 2 cooking spoons Vegetable oil
- Seasonings to taste
- Water 1 cup
- ¼ table spoon of salt

PREPARATION (PASTRY)

1. Mix 2 cups of the High Quality Vitamin A Cassava Flour (HQVACF) and wheat flour with margarine, baking powder, and nutmeg
2. Add the salt
3. Boil 1 cup of water, stir in the remaining High Quality Vitamin A Cassava Flour (HQVACF) into the boiling water and remove from heat.
4. Add the cooked flour into the bowl of ingredients in step 1
5. Mix with finger tips until the mixture resembles bread crumbs
6. Whisk the egg until light and add to the mixture
7. Mix until a smooth dough that leaves the side of the bowl clean is obtained



SERVING	COOK TIME	DIFFICULTY	PREPARATION
20 Persons	30 Minutes	Mid-Level	1 hour 30 Min.

PREPARATION (FILLING)

1. Peel the Irish potatoes and wash.
2. Cut into tiny cubes.
3. Wash and slice the onions into tiny pieces.
4. Heat the vegetable oil in a pot at medium heat, add the diced onions and stir for about 2 minutes
5. Add the minced meat and stir vigorously till the minced meat changes color.
6. Add the seasonings, and potatoes and cook till tender.
7. Sprinkle 2 tablespoons of Vitamin A cassava flour on the meat pie filing to prevent it from drying up during baking. It is also what makes the meat pie filling moist.
8. Add salt to taste, stir the contents and turn off the heat
9. Set the meat pie filling aside

BAKING THE MEAT PIE

1. Pre-heat oven
2. Base the baking trays by rubbing them with margarine.
3. Break the egg, beat it, and set it aside.
4. Roll out the hot crust pastry to a 5mm thickness.
5. Use a meat pie cutter to make round cuts on the rolled-out dough.
6. Remove the excess dough, leaving behind the round cuts.
7. Grease the cut-out dough with some eggs and add the filling
8. Fold one part of the dough to meet the other end and use a fork to press the 2 edges together to close tightly.
9. Place in the oven tray and repeat the previous step till all the cut-out dough is exhausted.
10. Roll out more dough, cut, fill, close and place in the greased oven tray till all the dough is used.
11. Rub the egg on the meat pies. This gives the meat pie a golden-brown look when baked.
12. Set the tray in the preheated oven and bake for about 30 minutes

PANCAKES

This pancake is a hearty breakfast, made basically from vitamin A cassava flour-based batter and other ingredients like eggs, butter, and milk. They are often made as flat cakes that are thin and round. Pancakes provide a high quantity of carbohydrates and a wide range of vitamins and minerals. Though a high calory food, it can be eaten with a vegetable salad or with a cup of nutritious drink like soya milk or even yogurt to make it healthier.

INGREDIENTS

- 2 cups HQVAC flour
- 3 medium size Eggs
- ½ cup Milk
- 2 teaspoon Baking powder
- 1/3 cup Granulated sugar to taste
- Water - As required
- Oil as required

PREPARATION

1. Sift flour and baking powder into a bowl
2. Add sugar
3. Beat eggs
4. Add the milk and egg to the flour. Mix thoroughly to form a smooth batter.
5. Allow standing for 10 minutes
6. Prove a pancake pan
7. Oil the pan with a teaspoon of oil.
8. Pour a ladle of batter into the pan.
9. For best result, toss/turn the pancake after 3 minutes to brown both sides
10. Repeat until all the batter is used up.
11. Rub oil in the frying pan and fry a scoop of the batter at a time.
12. Serve with a drink or tea.

SERVING	COOK TIME	DIFFICULTY	PREPARATION
8 Pieces	8 Minutes	Mid-Level	20 Minutes

WAFFLES

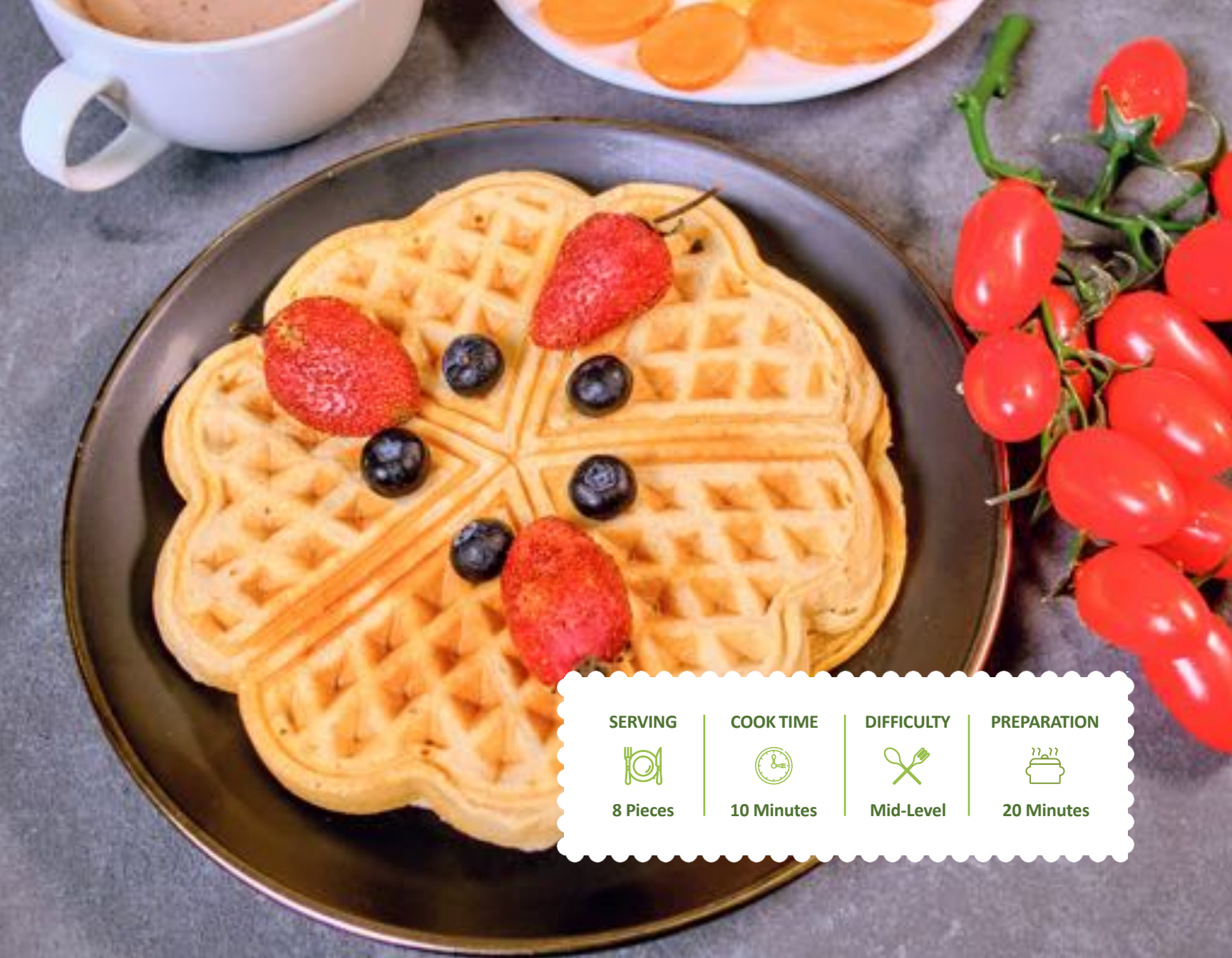
Waffles are a yummy, nutrient-dense all-purpose sweet dish, often taken as breakfast. The waffle recipe is made using vitamin A cassava flour and other protein sources like milk and eggs. This meal is best enjoyed with accompaniments such as beverages, yogurts, or even a bowl of fruit salad.

INGREDIENTS

- 2 cups HQVAC flour
- 3 medium size eggs
- ½ cup milk
- 2 teaspoon baking powder
- 2 table spoon sugar
- 1/3 cup butter (melted)
- Baking spray, oil/margarine as required

PREPARATION

1. Sift flour. Mix the flour, salt, baking powder and sugar. Set aside
2. Pre-heat the waffle iron to the desired temperature
3. Beat the eggs, add the butter. Mix this mixture into the dry ingredients in step 1
4. Add water a little at a time and mix properly to have free flowing slurry that is lump free
5. Spray the waffle iron with baking spray. Alternatively, rob in margarine
6. Laddle some batter into the pre-heated waffle iron and cook until it is golden brown
7. Repeat step 6 until all the waffle batter is coked
8. Serve hot



SERVING	COOK TIME	DIFFICULTY	PREPARATION
8 Pieces	10 Minutes	Mid-Level	20 Minutes

CASSAVA BALLS

Cassava balls (also called 'Akara-Akpu' is Eastern Nigeria) is popular snack consumed by both adult and children. "Akara-akpu is prepared from paste of shredded/grated cassava roots and coconut (optional). The paste is seasoned with pepper and infused with steamed yummy fish as the main protein provider.

INGREDIENTS

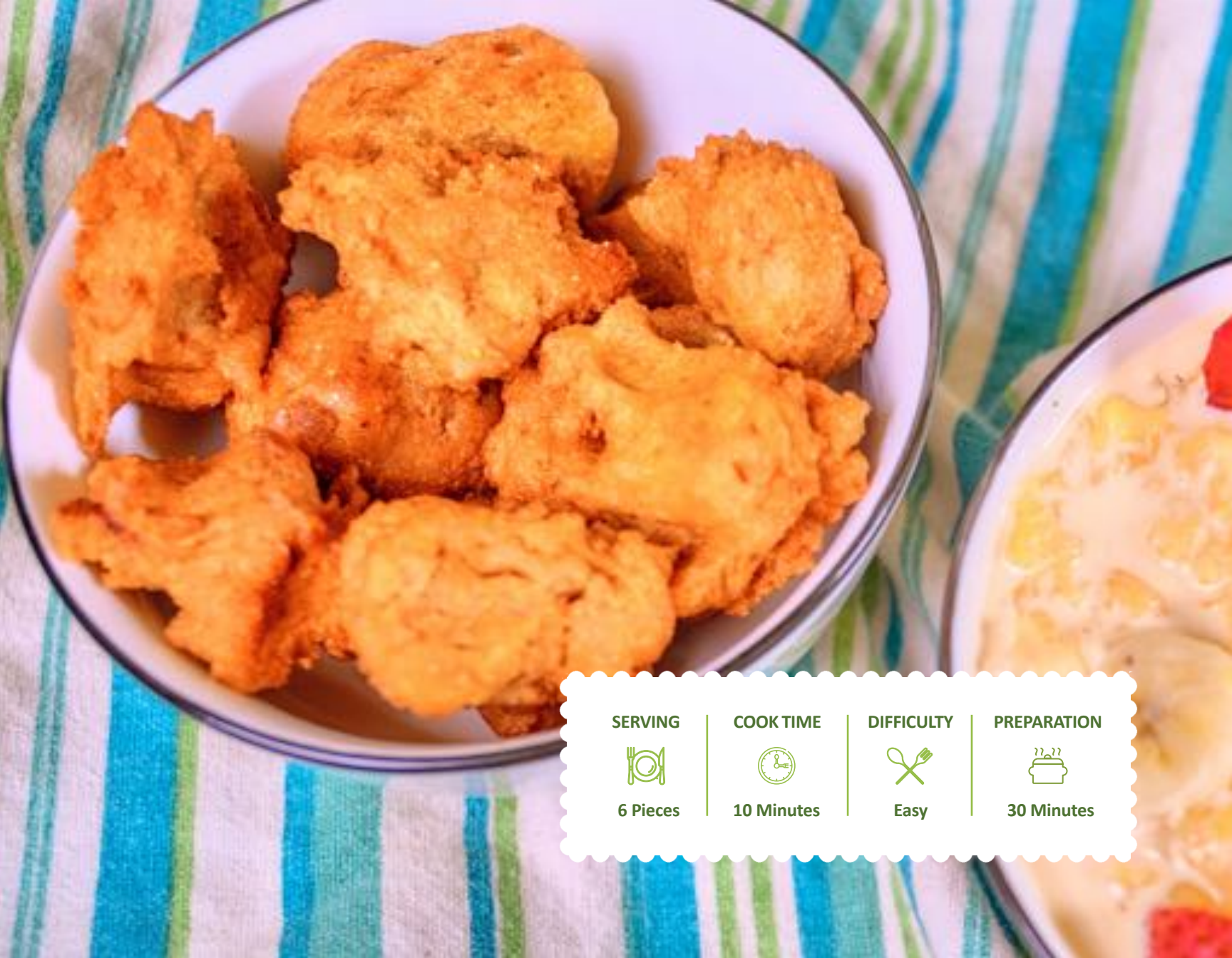
- 2 fresh cassava roots
- 1 cup grated coconut and 2 medium size Onions
- Salt to taste and Boiled fillet or tinned fish
- Red palm oil/vegetable oil as required for deep frying
- Peppers (scotch bonnet, cayenne peppers as preferred)

TIPS

- Ensure that the cassava roots are finely peeled to remove all peels
- The molded paste should not be too big to make cooking faster. If you prefer big-size cassava balls, then ensure you fry them under very low heat
- Preheat the oil before frying, but take care so that is not too hot. If too hot, the product will only be fried on the outside, but uncooked within

PREPARATION

1. Peel, cut, and grate freshly harvested cassava
2. De-water and pulverize the grated cassava root using a muslin cloth
3. Grate coconut
4. Measure 2 cups of grated cassava and 1 cup of grated coconut into a bowl
5. Add salt to taste
6. Mix all the ingredients
7. Mold into a small ball
8. Open the middle of the ball, add the boiled or tinned fish
9. Cover and remold the ball
10. Fry in moderately hot oil to a golden-brown Color



SERVING	COOK TIME	DIFFICULTY	PREPARATION
6 Pieces	10 Minutes	Easy	30 Minutes

VITAMIN A CASSAVA BREAD

This is the bread that has been baked using a percentage of some High Quality Vitamin A Cassava Flour (HQVACF). For this recipe, 20% of the flour used is High Quality Vitamin A Cassava Flour (HQVACF). This way, dependence on wheat is reduced and some level of vitamin A from the HQVACF is available to those who eat the bread.

INGREDIENTS

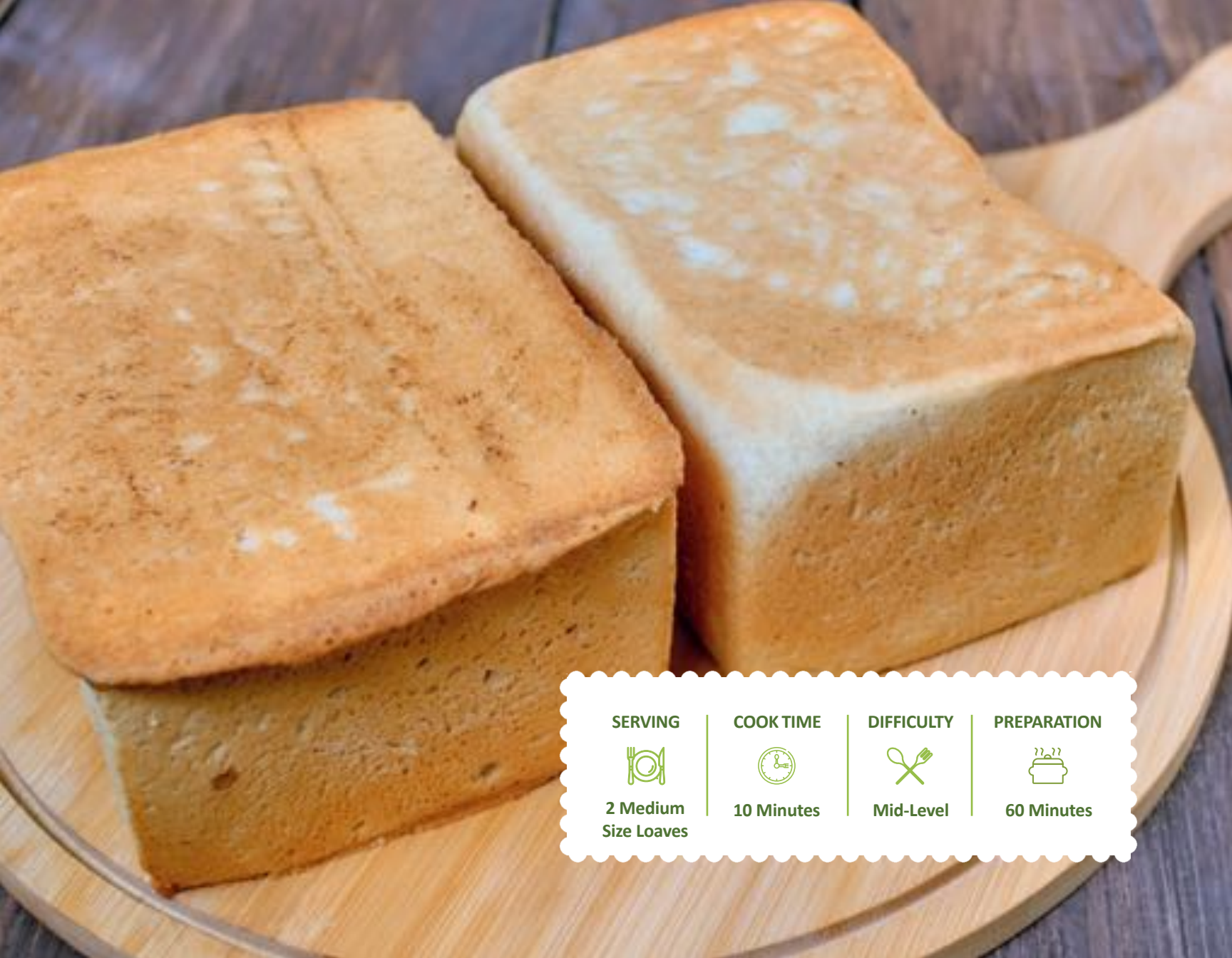
- 1 cup HQVACF
- 4 cups wheat flour
- ½ cup sugar
- 3 ½ level tbsp of yeast
- ¼ cup margarine
- 1 level tbsp of nutmeg
- 1 tbsp of full milk flavor
- 500ml lukewarm water

PREPARATION

1. Mix all dry ingredients together with margarine
2. Add milk flavor
3. Add lukewarm water and knead the dough for about 10 -15 minutes
4. Grease 4 bread pans and divides the dough into them
5. Leave to prove (rise to double its size) in the pan for 20 -25 minutes in a warm place
6. Bake in the oven at 160°C for about 20 minutes

TIPS

It's best to proof the dough where it will be baked (e.g., near the oven). This will prevent the risen dough from falling during movement from one place to another.



SERVING	COOK TIME	DIFFICULTY	PREPARATION
2 Medium Size Loaves	10 Minutes	Mid-Level	60 Minutes


CASSAVA BREAD

Innovative Food
Products from
VITAMIN A CASSAVA

CASSAVITA

Cassavita is produced from a combination of vitamin A cassava and vitamin A maize. It is a yellow edible stiff dough eaten with vegetable soups or sauces. It combines the rich malleable texture of vitamin A cassava flour and the soft attribute of tuwo masara from vitamin A maize. It is a double source of vitamin A and offers lots of carbohydrates and fibre. Freshly processed Cassavita has been found to have the potential of contributing up to 25% of daily vitamin A needs.

INGREDIENTS

- 2 cups cassavita flour
- 5 cups water

PREPARATION

1. Put cassavita flour into a pot and mix some water to form a soft paste
2. Allow standing for about 5 minutes
3. Place on the heat source and stir with a wooden spoon until you get a thick paste.
4. Add little water, cover the pot and allow cooking for about 3-5 minutes. Stir.
5. Repeat step two, if need be, to get a cooked dough that is smooth and moldable.
6. Serve

TIPS

- Turn paste in one direction only when you start to stir on the heat source to avoid lumps
- Aim for a consistency that you desire

SERVING	COOK TIME	DIFFICULTY	PREPARATION
2 Wraps	10 Minutes	Mid-Level	15 Minutes

CASSARITA

Cassarita is a fried product, made from fermented vitamin A cassava chips – similar to fried yam. It can be taken as a snack or as a main meal when eaten with the typical Nigerian pepper sauce. It is a suitable finger food enjoyed by children and adults. Cassarita made from boiled cassava retains over 90% of beta-carotene in the fresh cassava, consuming this snack will increase vitamin A intake for children and adults.

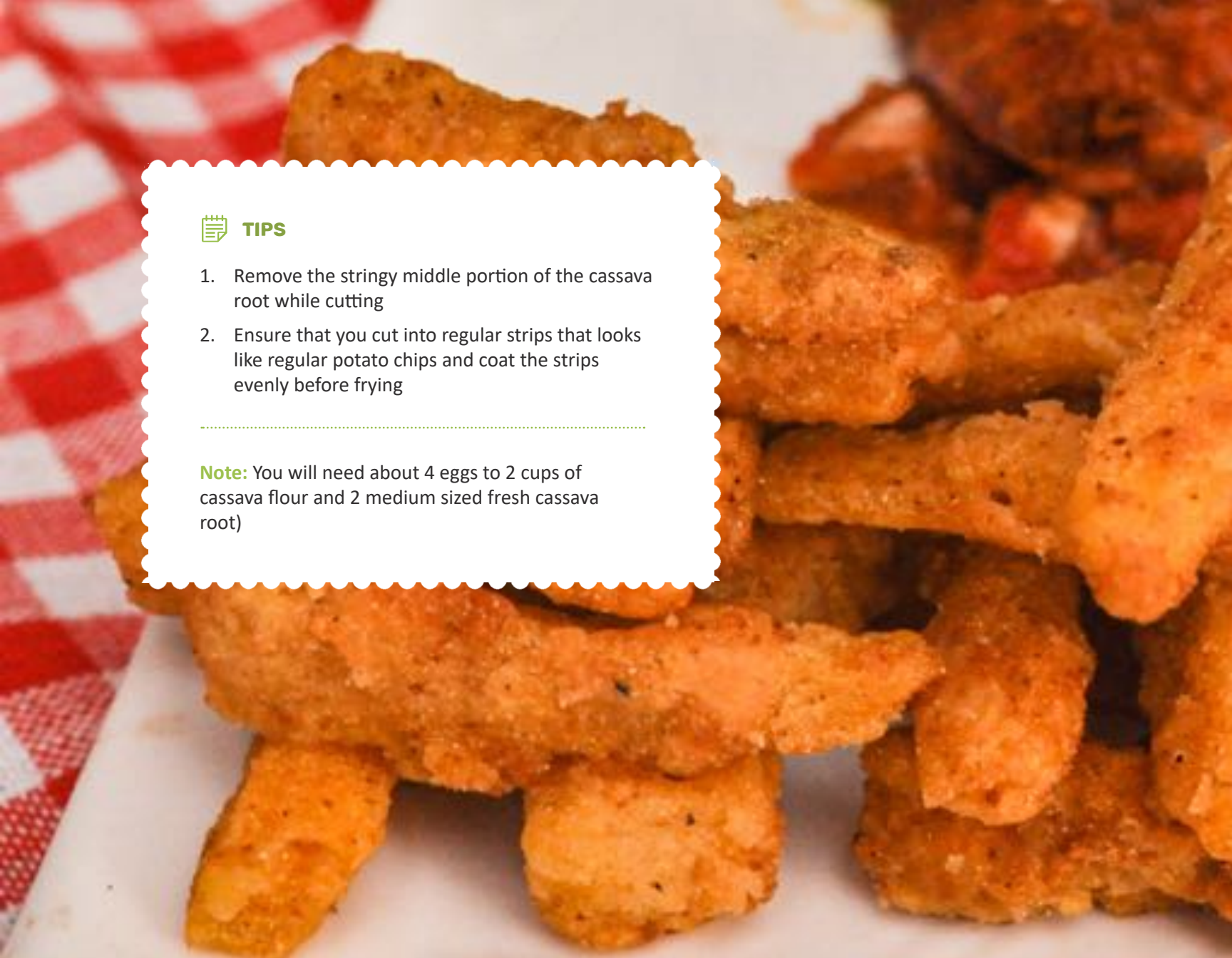
INGREDIENTS

- 2 medium sized fresh vitamin A cassava roots
- 2 cups of HQVAC flour
- Vegetable oil (enough to fill ¾ of the fryer)
- 4 Eggs (whisked) & Salt to taste
- 1 tin (140ml) evaporated milk
- Powder Seasonings (combination of dry peppers, thyme, curry, garlic, ginger, nutmeg, salt, & seasoning cubes)

PREPARATION

1. Peel, cut, and wash cassava roots.
2. Cut into sizable pieces and parboil for about 35 minutes
3. Drain, cool, and cut the cassava into strips or chips.
4. Add seasoning to HQVAC flour in a bowl and to whisked egg and milk mixture in another bowl
5. Sprinkle some of the seasoned VAC flour mixes on the cassava strips
6. Pour the egg and milk mixture into the bowl with the cassava strips
7. Heat up the oil in readiness for frying
8. Pick a few cassava strips mixed in the egg mixture in batches; Coat strips in seasoned flour,
9. Deep fry turning gently until they are cooked and golden in color
10. Scoop from oil, strain & arrange on a paper towel to remove excess oil.
11. Repeat Steps 6, 7, and 8 until there are no more cassava strips
12. Serve alone as a snack or with Nigerian fried stew

SERVING	COOK TIME	DIFFICULTY	PREPARATION
24 Pieces	40 Minutes	Mid-Level	1 hour 10 Min



TIPS

1. Remove the stringy middle portion of the cassava root while cutting
2. Ensure that you cut into regular strips that looks like regular potato chips and coat the strips evenly before frying

Note: You will need about 4 eggs to 2 cups of cassava flour and 2 medium sized fresh cassava root)


CASSARITA

CASSTARD

Casstard is a bright-colored yellow porridge, obtained from modified vitamin A cassava starch. It is similar to custard produced using maize. Casstard comes in different flavors – vanilla, banana, and strawberry. Casstard is a suitable breakfast porridge for all household members and a good start to vamp your vitamin A intake anytime.

INGREDIENTS

- 2 cups Casstard flour
- 750ml Water (room temperature)

Note: You can add sugar, honey or other sweeteners of choice and or milk if you desire

TIPS

- Stir the reconstituted paste just before you pour the hot water
- You can vary the consistency of the cooked casstard to suit the age of the child or consumer

PREPARATION

1. Scoop casstard flour into a bowl
2. Add about 125ml water and mix to get a free-flowing paste
3. Bring water to a boil and allow to stand for about 2 minutes
4. Pour hot water while stirring until a thick paste is obtained
5. Serve casstard with cassmoi, beans, akara, fish, or other such accompaniments.

SERVING	COOK TIME	DIFFICULTY	PREPARATION
12 Plates	3 Minutes	Easy	10 Minutes

CASSALAD

Cassalad is a vegetable dish that can be eaten as a whole meal or taken as an accompaniment with main meals like rice, or pasta. The vitamin A cassava is not overly processed and so it retains up to 70% of the original beta-carotene level in the fresh roots. Cassalad is a new and perfect way to combine veggies and staples on a plate. Satisfying taste and nutrition and bringing life to otherwise plain dishes with its yellow, red, and green Colors.

INGREDIENTS

- 2 medium size Cassava roots (Peeled)
- 2 large Carrot (diced)
- 1 large Cucumber (shredded)
- 1 medium Cabbage (shredded)
- 1 small head Lettuce (thinly cut)
- Tomatoes (sliced) optional
- Mayonnaise/ Salad cream

TIPS

- Aim for uniform strips when grating the precooked cassava
- You may vary the quantities of vegetables to suit your preferences
- Ensure that root does not ferment

PREPARATION

1. Wash and peel the vitamin A cassava roots, then wash them again.
2. Cut into big sizes, cover with water in a pot and parboil for about 35 to 40 minutes
3. Leave to drain and cool.
4. Shred with a metal grater, rinse and soak overnight, or for about 6 hours.
5. Rinse and allow to drain.
6. Neatly spread the cut and diced vegetables one at a time in a salad tray.
7. Serve with the salad cream/mayonnaise as a whole meal or as an accompaniment to rice, spaghetti, cassmoi or other similar foods

SERVING	COOK TIME	DIFFICULTY	PREPARATION
10 Persons	10 Minutes	Easy	20 Minutes

CASSCONUT

Cassconut is a unique snack prepared with vitamin A cassava and coconut as the main ingredient to produce a flavor-filled and slightly crispy yum. This delightful snack boasts of a good amount of vitamin A from the minimal processing as well as all the goodness of real coconut.

INGREDIENTS

- 1 small root fresh VAC roots (peeled)
- 1 cup desiccated coconut
- Salt (to taste)
- 1 cup Vegetable oil

TIPS

- Large quantities of cassava could be grated with the cassava grating machine. (You could de-shell coconut and grate it if packaged desiccated coconut is not available
- Pounding or grating is necessary before blending so as to break the cassava to blend easily with a kitchen blender
- Ensure that the oil is not too hot and that it is hot enough to cook

PREPARATION

1. Peel and wash cassava roots
2. Cut into handy sizes and grate into a wet mash (or pound to pulverize and blend with a kitchen blender).
3. Drain off the water using a muslin cloth or a sieve
4. Put the grated mash into a bowl and add desiccated coconut and salt
5. Scoop small handy bits unto a clean surface and flatten
6. Use a biscuit cutter to cut into the desired shape.
7. Heat the oil in a frying pan and fry until cooked and golden yellow in color
8. Drain and serve as a snack

SERVING	COOK TIME	DIFFICULTY	PREPARATION
14 Pieces	10 Minutes	Easy	30 Minutes

CASSPLA BALLS

Casspla balls, are a yummy, naturally sweet snack that combines ripe plantains with vitamin A cassava. This recipe is a good way to use up ripe plantains instead of wasting them. Plus, it can be a good appetizer because of its slightly hot taste.

INGREDIENTS

- 2 cups Vitamin A cassava flour
- 1 medium size Plantain
- Fresh peppers (Blended) (as desired)
- Salt (to taste)
- ¼ cup Crayfish blended (optional)
- 1 medium size egg
- 1 medium bulb Onion
- ½ cup Water
- Oil (to deep fry)

PREPARATION

1. Peel plantains and blend until smooth. Set aside
2. Roughly blend the onion and pepper and mix with the blended plantain.
3. Add crayfish, salt, and cassava flour.
4. Mix together until a uniform dough is obtained. The dough should be moldable
5. Beat egg and add to the dough.
6. Mix well until smooth, if too thick, add water to soften it.
7. Take the dough in bits, mold it into balls and deep fry.
8. Serve as a snack or with tea

SERVING	COOK TIME	DIFFICULTY	PREPARATION
8 Pieces	8 Minutes	Easy	20 Minutes

CASSMOI

Cassmoi is a nourishing steamed food product made from a combination of vitamin A cassava and cowpea (beans). This combination makes it able to supply iron and protein (from cowpea) and vitamin A (from vitamin A cassava) alongside carbohydrates making it a wholesome and nutritious meal. It is also a suitable complementary food because the taste and consistency can be varied to suit children of different ages. Cassmoi can be eaten alone or with common breakfast porridges.

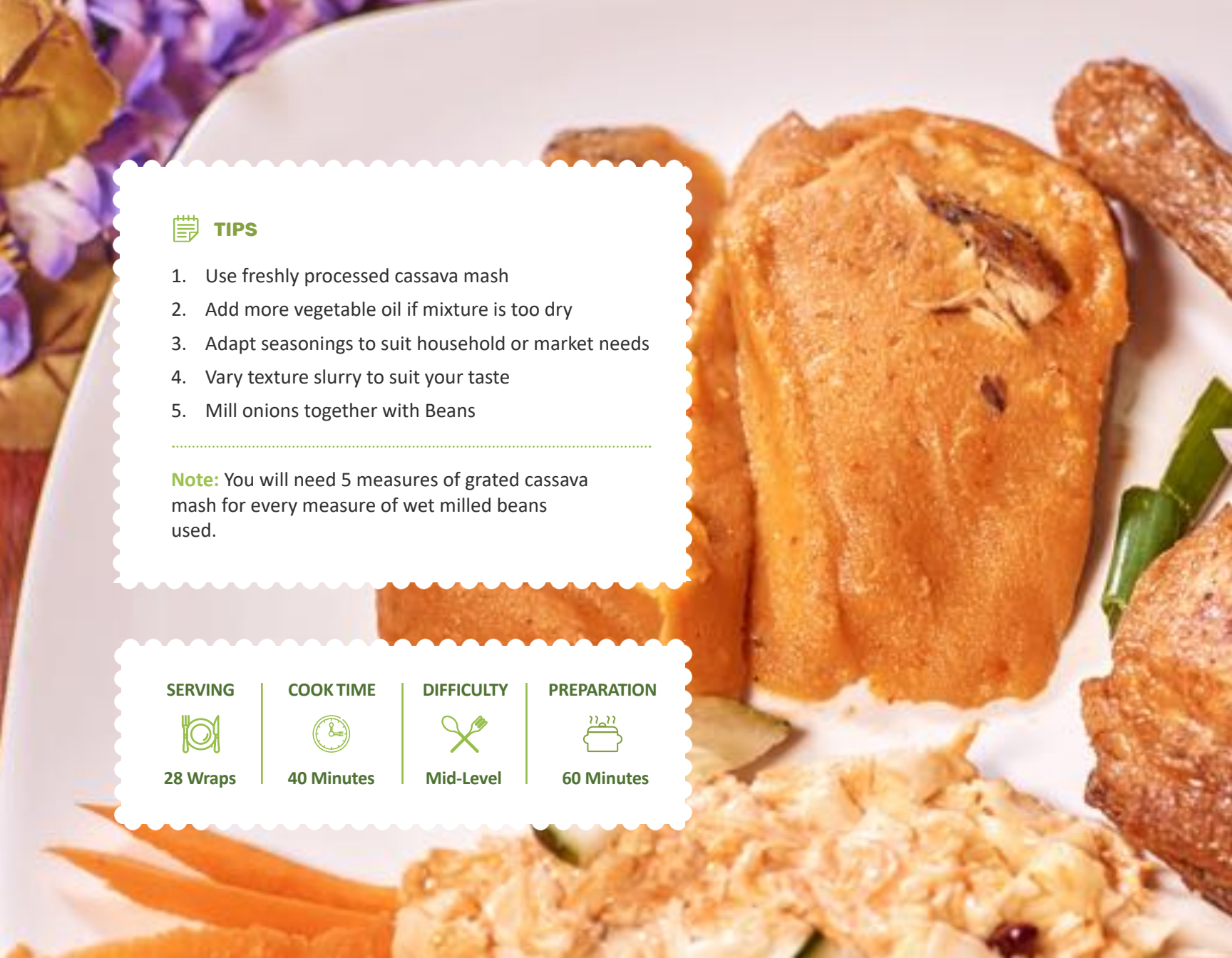
INGREDIENTS

- 5 cups of dewatered cassava mash
- 1 cup of dehulled and wet milled Beans
- Seasonings to taste - (ginger, garlic, curry, thyme etc) optional
- 1 cup (250ml) Vegetable oil or palm oil
- Salt to taste & 2 tablespoon ground crayfish
- Boiled eggs (optional)
- 1 medium size mackerel fish (flaked)
- 2 medium size onions (optional)
- 12 small scotch bonnet pepper (Rodo)
- 7 large pieces bawa pepper
- Boiled liver or other suitable proteins (optional)
- Water

PREPARATION

1. Blend peppers, onion, and dehulled beans in a blender with 500ml water into a smooth paste
2. Add the de-watered cassava mash into a bowl and mix with the blended mixture from step 1 to form a soft dough
3. Add the vegetable/palm oil to the mash and mix
4. Add crayfish and other seasonings as desired and mix.
5. Add the, boiled eggs, flaked fish, boiled liver, or other suitable proteins (these are optional)
6. Mix thoroughly
7. Scoop small portions of the seasoned paste into suitable leaves, cups, or mold and wrap or cover tightly.
8. Put some water in a pot, arrange the portioned paste in the pot, cover and allow to boil.
9. Steam for about 40 – 50 minutes or until well cooked.
10. Remove from the heat source and serve as a main meal or with vitamin A pap, garri, custard, or other accompaniment of choice.

SERVING	COOK TIME	DIFFICULTY	PREPARATION
28 Wraps	40 Minutes	Mid-Level	60 Minutes



TIPS

1. Use freshly processed cassava mash
2. Add more vegetable oil if mixture is too dry
3. Adapt seasonings to suit household or market needs
4. Vary texture slurry to suit your taste
5. Mill onions together with Beans

Note: You will need 5 measures of grated cassava mash for every measure of wet milled beans used.

SERVING	COOK TIME	DIFFICULTY	PREPARATION
28 Wraps	40 Minutes	Mid-Level	60 Minutes

VITAMIN A MAIZE RECIPES in the class of Traditional household foods

PAP/OGI/KOKO

Vitamin A pap is a cooked porridge made from fermented vitamin A maize paste or pap flour. It has an attractive yellow color and is a perfect choice by mothers any time of the day for children 6 months and above. Other family members can also enjoy taking vitamin A pap for breakfast. When consumed, it gives vitamin A in addition to other nutrients.

INGREDIENTS

- 160g (1/2 cup) Vitamin A pap mash
- 290ml Water

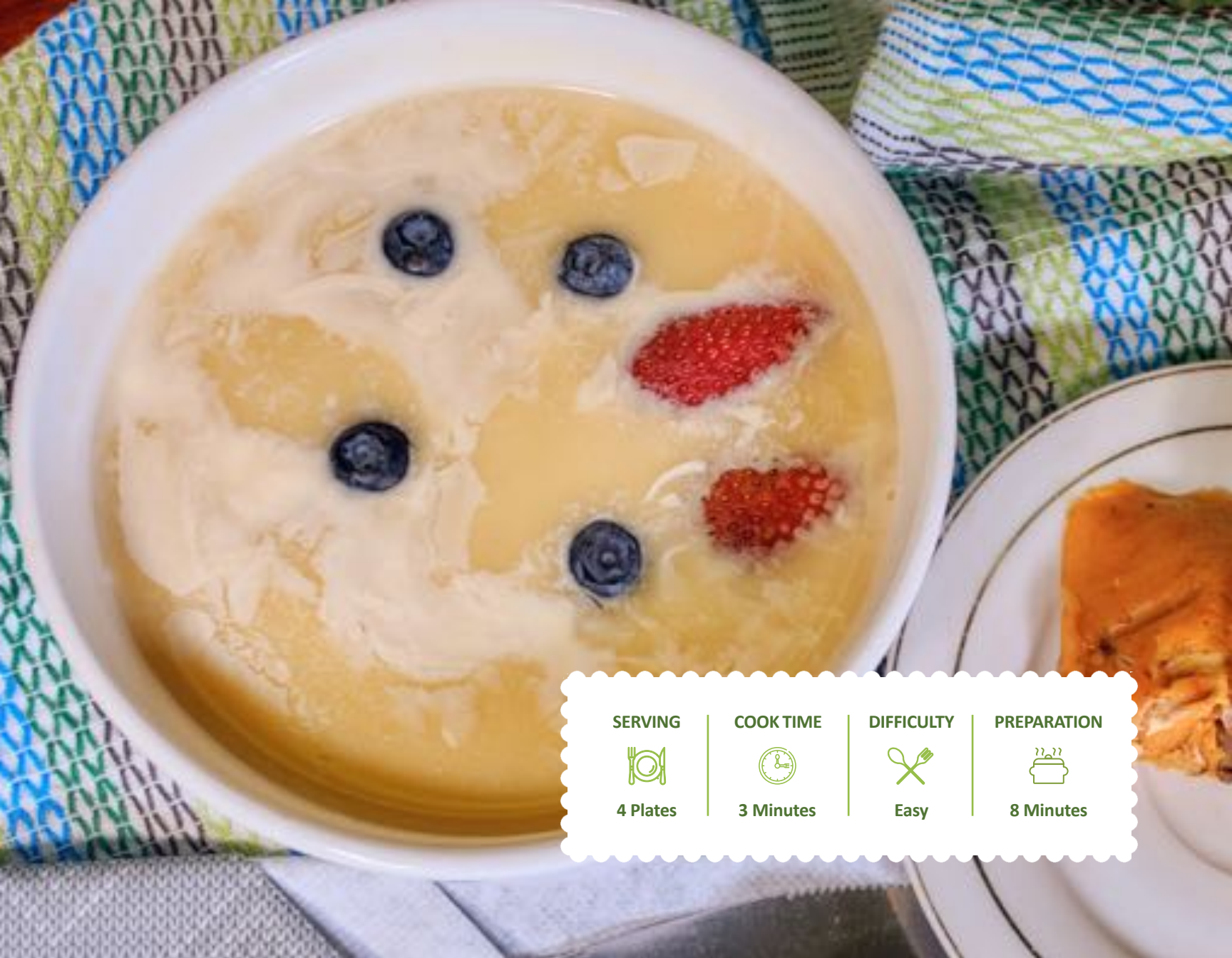
Note: You can add sugar, honey or other sweeteners of choice and/ or milk if you desire

TIPS

- Stir the reconstituted paste just before you pour the hot water
- You can vary the consistency of the pap to suit the age of the child or consumer

PREPARATION

1. Scoop desired quantity of pap mash into a bowl
2. Add water and mix to a get free flowing paste
3. Bring water to boil
4. Pour hot boiling water while stirring until a thick is obtained
5. Serve with cassmoi, beans, akara, fish or other such accompaniments.



SERVING	COOK TIME	DIFFICULTY	PREPARATION
4 Plates	3 Minutes	Easy	8 Minutes

EKO/AGIDI/KAFA

Vitamin A Eko/Agidi is an orange-colored thick paste made by cooking vitamin A maize pap in ready-to-eat portions. This food is a complimentary food of choice with mothers and a light breakfast or supper with other family members. It is delicious as cold-pap-in-milk, or with vegetable sauces or other healthy accompaniments. A different, but light food, it supplies fibre and vitamin A in regular meals

INGREDIENTS

- 2 cups vitamin A pap flour (or mash)
- 3 cups (750ml) Water (for mixing the flour)

TIPS

Reduce heat if you observe that lumps are forming

PREPARATION

1. Dissolve vitamin A pap flour in water and mix to get a smooth paste. If you are using mash, break and dissolve it in a bowl to get a smooth paste.
2. Pour the paste into a saucepan and stir continuously on a heat source until it is free flowing
3. Reduce heat to medium/low and continue stirring until the paste becomes thicker.
4. Add some hot water, cover the pot and leave it on the fire for about 5 minutes to cook and thicken more
5. Scoop small quantities of thickened paste into traditional leaves, or into desired containers or moulds. Leave to solidify while cooling.
6. Serve with a favorite accompaniment like cassmoi, beans balls, and porridge beans


SERVING
4 Wraps
COOK TIME
20 Minutes
DIFFICULTY
Mid-Level
PREPARATION
38 Minutes

MAIZE & BEANS POTTAGE (ADALU)

Adalu is a one-pot bean and maize pottage recipe. It is a very tasty and nutritious meal suitable for the whole family. Nutritionally, you get the best of both foods in this balanced combination; from fibre to vitamins (especially vitamin A) and minerals. It is also a good source of energy.

INGREDIENTS

- 2 cups beans – picked and cleaned
- 3 cups boiled fresh vitamin A maize
- 2 medium size Onions cleaned & sliced
- 3 tablespoon ground crayfish (optional)
- Fresh pepper, and onion- coarsely blended desired quantity)
- Seasoning cubes and salt to taste
- 1 cup palm oil
- Water (enough to cover the beans/maize while cooking)
- 50g Smoked fish (Optional)

PREPARATION

1. Wash beans for about 5 minutes and drain off the water.
2. Wash again till the water runs clean and takes to the heat source
3. Pour in the corn and beans and cook (add diced onions at the same time) in about 7 cups of water.
4. Cook for about 30- 40 minutes
5. Add the sliced onions and blended tatase/onions/tomato puree.
6. Add palm oil, and cayenne pepper. Salt and crayfish and fish
7. Mix thoroughly so that all the flavors will come together and allow to simmer for another 20 minutes

TIPS

- More water or sauce in the beans is preferable but depends on individuals
- You may also soak beans overnight to cut down cooking time
- Usually, more corn than beans

SERVING	COOK TIME	DIFFICULTY	PREPARATION
4 Plates	40 Minutes	Easy	20 Minutes

MAIZE MOI

Maize moi is a traditional steamed maize pudding. It is a traditional delicacy that provides a good opportunity of making use of fresh vitamin A maize both in season & out of season. It is prepared in similar ways to the popular Nigerian Moi Moi (bean pudding). It's a full meal that is rich in fiber, healthy, & filling. It can be eaten as breakfast, or as a side dish for lunch, brunch, or dinner.

INGREDIENTS

- 2 Cups of Corn (5-6 pcs fresh corn on cobs)
- 25g Smoked fish (optional)
- 1 medium Onion
- 4 medium-bell peppers (tatashe)
- 5 pcs scotch bonnet peppers (ata-rodo)
- 2 cooking spoons palm oil
- 2 tablespoons crayfish
- Salt to taste
- 2 seasoning cubes
- Plantain/uma/banana leaves for wrapping or foil paper

TIPS

The fresh maize should be coarsely ground

PREPARATION

1. Remove the husks, then remove corn kernels from the cob; thereafter, wash and transfer to a blender add water (250ml), rough blend into a paste, and set aside.
2. Wash and blend the bell pepper (tatashe), and onion. Pour the blended onion and pepper into the corn and mix.
3. Pour in the palm oil, add your crayfish, seasoning cubes, and salt, mix properly to combine, and then adjust the taste if necessary.
4. Similarly, in a large pot, place the stems and leaves add about 2 cups of water into the pot, and boil.
5. Wrap the corn mixture – ukpo oka just like wrapping moimoi by using uma/ banana/ plantain leaves or foil paper; then gently arrange the wrapped ukpo oka into the pot of boiling water.
6. Finally, cover and cook for about 30 minutes depending on the sizes wrapped, ensure you add more water in order for it not to get burnt.


SERVING
3 Wraps
COOK TIME
30 Minutes
DIFFICULTY
Mid-Level
PREPARATION
60 Minutes

MAIZE/PLANTAIN PUDDING

Pairing maize with plantain in dishes and snacks is common in West Africa. It offers the advantage of having meals and snacks that are packed with assorted nutrients for all categories of consumers. When such pairing is with vitamin A maize, the benefits extend to offering more nutrition to the dish.

INGREDIENTS

- 5 medium fingers soft, ripe plantains (chopped)
- 1/3 (83ml) cup Red palm oil
- 1 cup of fresh maize kernels
- Peppers (diced) as desired
- 1 bulb Onions (sliced)
- Seasonings:1 tbsp salt, 2 seasoning cubes
- 1½ tbsp crayfish
- 75g cleaned and de-boned smoked fish or other proteins (optional)
- 1 cup Water

PREPARATION

1. Soak the fresh maize kernels for 7 – 10 minutes in 375ml water
2. Blend the maize, soft ripe plantain, pepper, and onions with about 450ml of water
3. Add the blended onions, pepper, and crayfish, season to taste, and mix thoroughly
4. Add the water and mix
5. Wrap in moimoi leaves and steam until it is properly cooked
6. It's ready. Serve as a main meal, with vegetable sauce, meat, chicken fish or any such like it

TIPS

Plantain leaves can also be used to wrap and steam.

SERVING	COOK TIME	DIFFICULTY	PREPARATION
8 Wraps	30 Minutes	Easy	60 Minutes

MAIZE PORRIDGE (EGBO)

Egbo is a meal made from dried broken corn by boiling it until it pops and is very soft. It is a tasty meal served with a special pepper sauce and beans. It is a tasty traditional recipe consumed in south-west Nigeria. With the use of vitamin, A maize, you can be sure of some added nutritional value to this traditional delicacy.

INGREDIENTS

- 2 Cups Dried Shelled Crushed/dehusked vitamin A maize
- Water enough to cook the maize

Sauce:

- Fresh scotch bonnet peppers or bell pepper cleaned, chopped
- Onions and Palm oil as needed
- Dried fish (or protein of your choice) (cleaned & deboned)
- Seasoning
- Salt to taste

TIPS

- Soak the maize for some hours to help cut cooking time
- Pressure cooking is an option that can shorten the cooking time for this recipe
- For a more nutritious and healthy diet, oil and salt must be used in moderation

PREPARATION

1. Rinse the maize and put it in a pot. Add enough water (about 10 – 12 cups to cover all the maize. Alternatively, use a pressure cooker pot.
2. Cook until it is soft and pulpy (1hr 45minutes). Adding more water during the cooking process
3. To prepare the sauce, rough blend all the peppers
4. Heat palm oil slightly and add chopped onions. Sauté until it is light brown
5. Add the blended pepper and fry to get a cooked thick paste
6. Toss in the cleaned dried fish or protein of your choice, add seasoning and salt then continue to fry until the oil floats.
7. Serve egbo, beans, & top with the stew. Enjoy

SERVING	COOK TIME	DIFFICULTY	PREPARATION
4 Plates	60 Minutes	Easy	10 Minutes

DAN- MALELE

Dan-Malele is a traditional food of northern Nigeria. It is fast and easy to prepare It is an attractive meal, tastes yummy, and is packed with varied nutrients including micro-nutrients from the vegetables used to prepare it.

INGREDIENTS

- 3 cups maize grit
- 1 cup vitamin A maize flour
- 2 ½ cups water
- 2 Seasoning cubes
- Vegetable/palm-oil
- 3 large firm tomatoes (sliced)
- 1 small size cucumber (sliced)
- 1 medium size onions (sliced)
- 1 small lettuce (sliced)

PREPARATION

1. Boil water
2. Add maize grits and flour to boiling water and allow to cook for about 10 minutes
3. Add seasoning cubes and stir the mixture thoroughly to prevent lumps from forming
4. Cook for about 30 minutes and then remove from the heat source to cool
5. Add edible oil of choice
6. Dish the cooked maize meal (porridge) and garnish with the sliced vegetables

SERVING	COOK TIME	DIFFICULTY	PREPARATION
6 Persons	30 Minutes	Easy	10 Minutes

TOM BROWN

This is a yummy, attractive and healthy porridge made by cooking composite flour of roasted vitamin A maize, soya bean, and groundnut. One meal that is essential for babies from 6 months of age as well as for older children is this combination of healthy cereals and nuts. This is because it is packed with essential nutrients needed for growth and development. Adults equally enjoy Tom Brown as a healthy breakfast option. Tom Brown made from vitamin A maize, as the energy source is a nutritious meal because it contains vitamin A in addition to carbohydrates, protein, fat, iron, and fiber.

INGREDIENTS

- 125g Tom brown flour
- 3 cups (750ml) Water

Note: You can add sugar, honey or other sweeteners of choice if you desire.

It could be mixed with breast milk for children 6 months – 24 months

Total yield 1200g

TIPS

Vary the consistency of the cooked porridge to suit your taste or age of your child

PREPARATION

1. Mix Tom Brown flour with some water (2 cups) to get a smooth paste
2. Bring 1 cup of water to a boil in a saucepan and pour the mixture into the boiling water
3. Stir continuously to avoid lumps.
4. Add more water (3 cups) intermittently and continue to stir
5. Cook for about 7 minutes on medium heat or until the porridge becomes cooked, smooth and of the consistency you desire
6. Serve either plain or with milk, cassmoi, akara, beans, or other accompaniments that you like.

SERVING	COOK TIME	DIFFICULTY	PREPARATION
3 Persons	8 Minutes	Easy	15 Minutes

TUWON MASARA

Tuwon Masara from vitamin A maize is an orange-colored cooked paste made from vitamin A maize and eaten with soups. It is a traditional household meal in Nigeria, similar to 'Nsima' in East and South Africa. It has a soft texture and is packed with the natural goodness of fibre. This is one meal that offers a great option to increase vitamin A intake because the process of getting the flour from vitamin A maize does cause minimal loss of beta-carotene. Two methods of preparation are described in this section.

INGREDIENTS

- 2 cups (300g) Vitamin A maize flour
- 3 cups (750ml) Water

TIPS

- Repeat step 4 if you see that the paste is not yet fully cooked
- Aim for a soft paste because tuwon masara becomes thicker as it cools.

PREPARATION

1. Measure desired quantity of maize flour.
2. Mix the maize flour with water (2½ cups) to form a paste and place on a heat source
3. Stir well until it starts to form a dough. Allow cooking for 3 - 5 minutes or more
4. Add the reaming ½ cup of water and allow to cook a little more and stir continuously to get a firm smooth paste
5. Scoop and serve with any Nigerian sauce/soup that you desire

SERVING	COOK TIME	DIFFICULTY	PREPARATION
4 Plates	15 Minutes	Mid-Level	24 Minutes

TUWON MASARA OPTION B

INGREDIENTS

- 3 cups vitamin A maize flour
- 9 cups water

PREPARATION

1. Mix maize flour with 3 cups of water to form smooth light paste
2. Pour gently into hot boiling water and stir simultaneously and continuously to prevent lumps from forming
3. Add 1 cup of maize flour (83ml) to 2 cups of water (83ml) to thicken the tuwo
4. After cooking and stirring intermittently for about 35 minutes, cover the pot to allow tuwo to steam for about 5 minutes
5. Add another 2 cups of dry tuwo flour to thicken the paste while still cooking

TIPS

1. If tuwo paste is watery, mix some more maize flour with some water to form paste and add it to the tuwo while still cooking
2. This method of tuwo preparation gives it a long shelf life of up to 1 week without refrigeration

VITAMIN A MAIZE RECIPES in the class of Snacks & Confectioneries

MASA

It's a local snack made from vitamin A maize flour. It is usually eaten by both adults and children and is specially used during occasions. It contains vitamin A and other nutrients.

INGREDIENTS

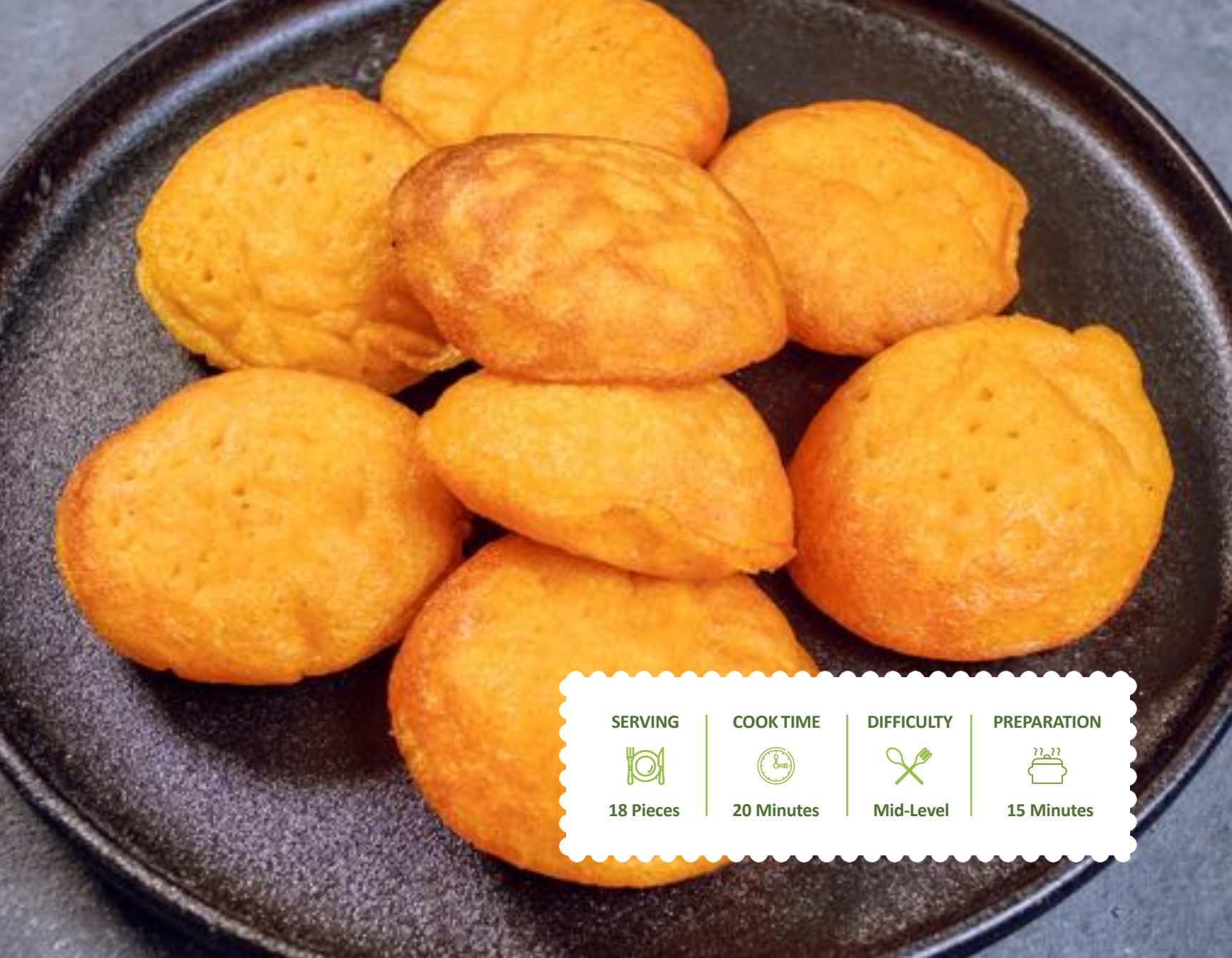
- 10 cups vitamin A maize grits (¼ cup size)
- Vitamin A maize flour (3 cups)
- ½ tbsp yeast & 250g cooked tuwo
- Vegetable oil & ¼ cup Sugar (optional)
- 1 tbsp baking powder or yogurt

TIPS

- Needs special attention during frying.
- Fermentation depends on the weather
- Add little water when blending to allow the blender to roll
- Well-cooked masa should feel very light when lifted from tanda
- A new tanda may cause masa to burn until after two sets of frying

PREPARATION

1. Soak maize grit and maize flour overnight
2. Next day, blend-soaked maize grit + flour with yeast and cooked tuwo to a smooth light paste (add 1 cup of water to blend)
3. Set aside for about 90 minutes to prove (rise)
4. Thereafter, add sugar and baking powder and mix thoroughly
5. Prepare special masa cups (tonda), heat lightly, and grease each cup with 1 table spoon of vegetable oil and heat for about 20 secs.
6. Scoop portion into it and fry for 1 minute turning from one side to another to avoid burning (color after frying is golden brown)
7. Serve with a choice of vegetable soup



SERVING	COOK TIME	DIFFICULTY	PREPARATION
18 Pieces	20 Minutes	Mid-Level	15 Minutes

TANFIRI

Tanfiri is ridiculously simple to make. It is similar to donkwa, except that it is not molded, but taken as gritty flour. It is made using just vitamin A maize, some sugar and spices..

INGREDIENTS

- 2 cups vitamin A maize (dry)
- 4 table spoon of sugar
- ½ table spoon of ginger powder
- ½ table spoon of nutmeg

PREPARATION

1. Roast the vitamin A maize in a pan until golden brown
2. Mill with other ingredients (sugar, ginger and nutmeg)

SERVING	COOK TIME	DIFFICULTY	PREPARATION
8 Sachets	10 Minutes	Easy	20 Minutes

KOKORO

Kokoro is a favorite of many in the southwest of Nigeria. It is a crunchy, sweet, and tasty snack made from vitamin A maize. There are two types though the crunchy non-seasoned type and the crunchy spicy type, giving you options to satisfy your taste.

INGREDIENTS

- 1 cup vitamin A maize flour
- ½ cup vitamin A cassava flour
- 2 tbsp sugar
- Salt (3.5g)
- 195ml Warm water
- Oil for frying

PREPARATION

1. Add ½ cup of the vitamin A flour in to a bowl
2. Add sugar, ginger, salt and mix
3. Place ½ cup of water to boil
4. Add the mixed vitamin A maize flour and mix together to form a smooth dough
5. Allow to cool for some minutes
6. Add the remaining vitamin A maize flour and knead together
7. Take some portion and roll in between your palm
8. Heat up oil and fry till golden brown
9. Drain and serve

SERVING	COOK TIME	DIFFICULTY	PREPARATION
8 Pieces	8 Minutes	Easy	10 Minutes

KUNUN ZAKI

Kunun zaki, is a non-alcoholic beverage often produced from millet but prepared using vitamin A maize pap in this book. Kunun-zaki is a Hausa word meaning 'sweet beverage' It is a common breakfast, but can be consumed at any time of the day. This drink is filling, like a meal, and is a favorite of both adults and children alike.

INGREDIENTS

- ½ cup water
- 1 medium size ginger
- 400g vitamin A maize pap (raw)
- ¼ cup sugar

PREPARATION

1. Wash peel and grate ginger
2. Add 1 cup of water to the grated ginger
3. Mix half of the pap (200g) with the ginger water stir and cook for about 3 minutes
4. Add sugar and allow to cool
5. Add the remaining raw pap (200g) into the cooked mixture
6. Add 1¼ cup of cold water
7. Sieve mixture to remove ginger residue
8. Add the flavor of choice and serve chilled

SERVING	COOK TIME	DIFFICULTY	PREPARATION
4 Cups	8 Minutes	Easy	10 Minutes

DAKUWA

Dakuwa is a savory Nigerian snack made from dried, roasted, and milled maize and groundnuts. It requires no cooking and is perfect as a starter or party small chops. Most people love the way it crumbles and melts in the mouth when eaten.

INGREDIENTS

- 2 cups vitamin A maize
- 2 cups raw groundnuts
- ½ table spoon of salt
- 2 table spoon of sugar
- ½ table spoon of groundnut oil
- Cayenne pepper

PREPARATION

1. Roast vitamin A maize and peanuts separately till golden brown
2. Place the roasted peanut in a blender and blend into a dough
3. Add the ground corn and other ingredients and blend again till formed
4. Empty in a bowl, add more of the oil, and mold with your fingers into bite-size balls

SERVING	COOK TIME	DIFFICULTY	PREPARATION
18 Pieces	10 Minutes	Easy	10 Minutes


DONKWA

Innovative
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VITAMIN A MAIZE

DAMBU

Dambu is an easy-to-make, tasty steamed recipe prepared using maize or rice grits as the main ingredients. Dambu can be prepared plain and eaten with any soup of choice. However, it is often eaten with local Hausa soups where the dish originates from. This recipe uses vitamin A maize grits, thus adding color and more nutrition. This vitamin A Dambu is cooked as a one-pot meal ''Jollof'' in which case all the condiments, seasonings, vegetables, and proteins are included as one dish.

INGREDIENTS

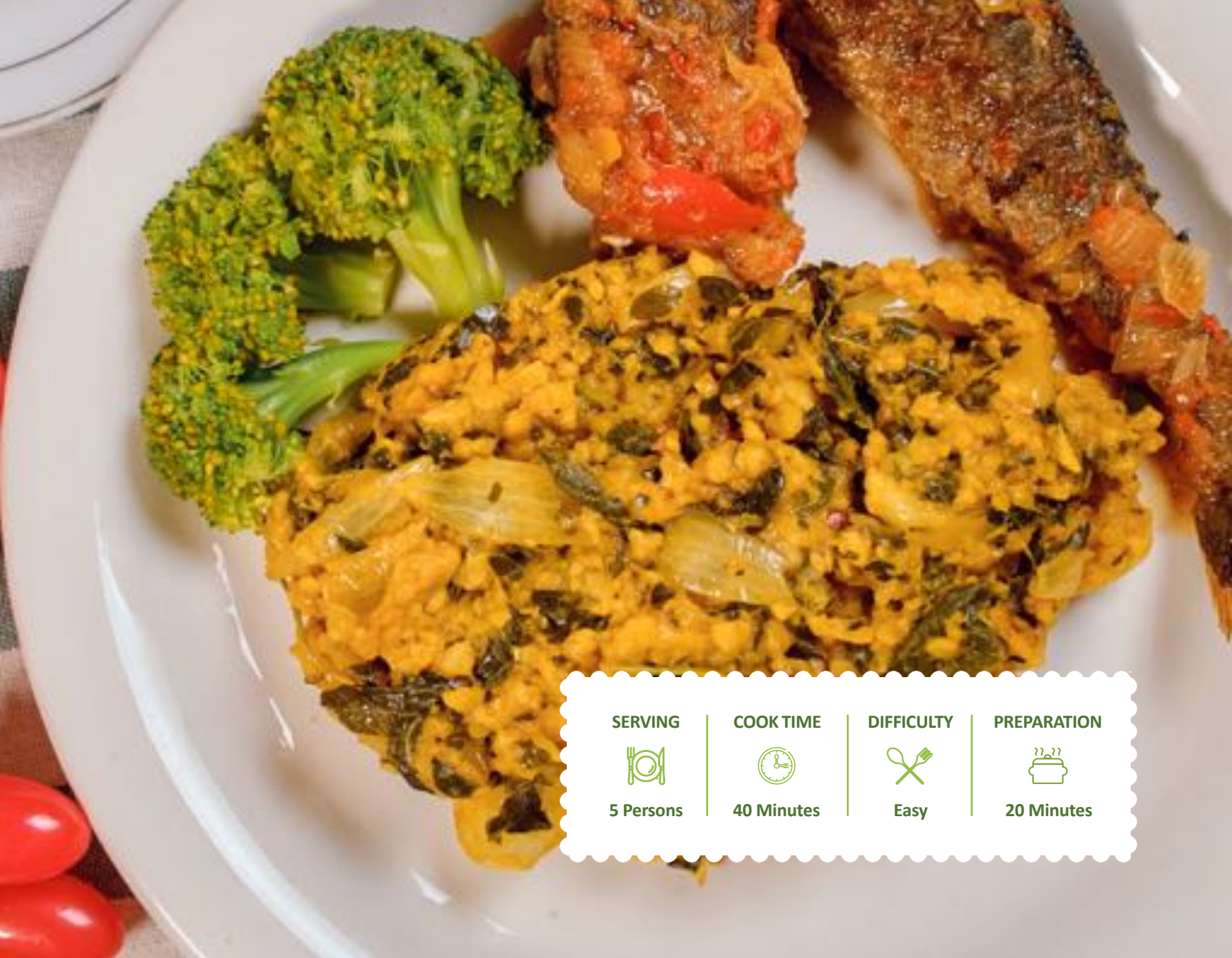
- 3 cups maize grits (soaked overnight)
- 1 cup maize flour
- Water & 2 table spoon of salt
- 4 seasoning cubes
- ½ table spoon of curry powder
- Dried curry leaves
- 1 cup groundnut grits
- 9 medium size scotch bonnet pepper (ata rodo) grated
- 5 medium size onions (sliced)
- 6 medium size carrots (diced)
- 1 ½ cups dried moringa leaves (washed)
- ¼ cup vegetable oil

PREPARATION

1. Drain out the water from soaked maize grits
2. Add maize flour and mix thoroughly
3. Steam maize flour and grits mixture in a steamer for about 30 minutes and remove from the heat source
4. Add the groundnut, pepper, onions, carrots, and moringa leaves and mix very well with the grit and flour mixture
5. Add seasonings, spices & vegetable oil as desired
6. Return the steamer pot to the heat source and steam for another 30 minutes
7. Remove from the heat source when maize grit becomes very soft and serve

TIPS

Steaming time depends on temperature of the steamer and quantity of dambu being steamed



SERVING	COOK TIME	DIFFICULTY	PREPARATION
5 Persons	40 Minutes	Easy	20 Minutes

BURABUSKO

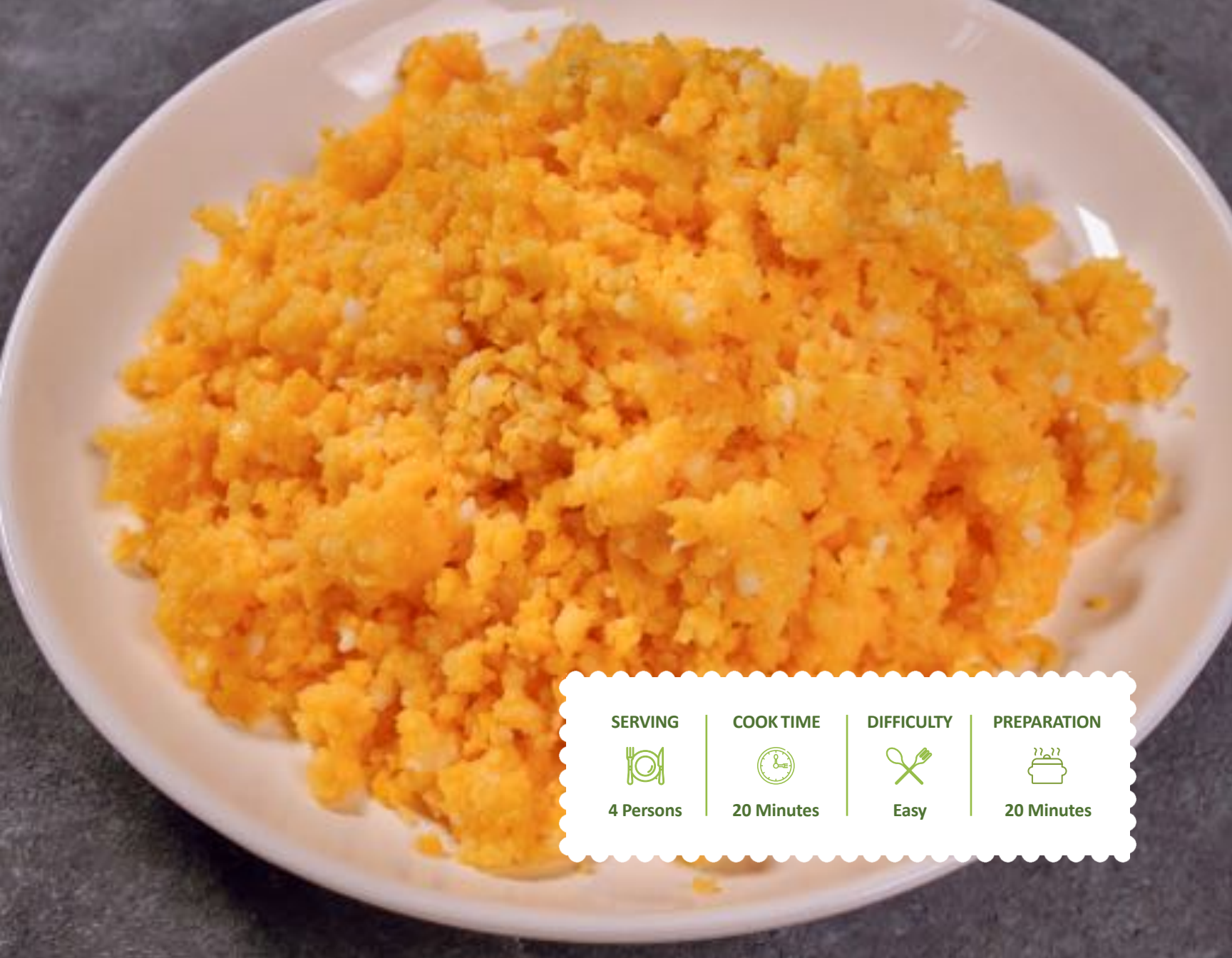
Burabisko is a favorite northern Nigerian dish made from vitamin A maize couscous. It is a tasty and healthy alternative to common high-starchy meals. This recipe is easy to prepare once you master the skills. It can be prepared and served in similar ways to rice dishes like white rice & stew/soup, jollof rice, or even fried rice when cooked with vegetables. It is one dish that is very versatile and allows you to try out your food fantasies.

INGREDIENTS

- 3 cups of maize grits soaked overnight
- 1 cup vitamin A maize flour
- ½ table spoon of baking powder
- 5 cups water
- 1 table spoon of salt
- ¼ cup vegetable oil

PREPARATION

1. Drain water from the soaked grits
2. Add vitamin A maize flour & the baking powder and mix (looks dry)
3. Bring water to boil
4. Add the mixed ingredients to the boiling water and stir
5. Add the vegetable oil and salt and mix thoroughly
6. Allow cooking for 20 minutes. Bring down from the heat source and serve



SERVING	COOK TIME	DIFFICULTY	PREPARATION
4 Persons	20 Minutes	Easy	20 Minutes

GWATE

Gwate maize and vegetable porridge is a nutritious traditional dish, commonly consumed as main meal. It is a one pot meal, super delicious, attractive and easy to digest.

INGREDIENTS

- 1 ½ cup maize grits
- 9 cups water
- Seasoning to taste
- 1 cup slightly roasted groundnuts
- 1 ½ cup palm oil
- 13 medium size scotch bonnet pepper (ata rodo)
- 4 medium size purple onions
- 5 pieces pumpkin (ugu) leaves (sliced)
- 1 table spoon of salt
- 1 tbsp curry powder
- Amaranthus leaves (as desired)
- 5 pieces of dried scent leaves

PREPARATION

1. Bring water to boil
2. Add vitamin A maize grits to boiling water
3. Add seasonings and scent leaves and stir into the maize grits while cooking it
4. Add groundnut, pepper, onions and ugu leaves
5. Add palm oil and stir everything together
6. Allow to cook for 35 – 40 minutes
7. Remove from heat source and serve

TIPS

Different types of local green leafy vegetables can be used to prepare the dish including moringa

SERVING	COOK TIME	DIFFICULTY	PREPARATION
2 Persons	40 Minutes	Easy	12 Minutes

BIONUGGET

Bionugget is a Vitamin A Maize product with soya beans and coconut as other ingredients. It is a crunchy and tasty snack that has a rich coconut mouth feel. Bionugget can also be taken as an instant cereal by adding cold or hot water and milk. In water, bionugget crumbles and becomes an exciting cereal for every time of day. It provides a good energy boost, vitamin A, protein, iron, healthy fats, antioxidants, and fibre.

INGREDIENTS

- 2 cups Vitamin A maize flour
- ½ cup HQVACF
- 3 spoons Desiccated coconut
- 1 tablespoon roasted soybean flour
- 4 teaspoons Margarine
- Milk flavor as desired
- 1 tablespoon sugar
- Salt to taste
- ½ cup water (or as required)

PREPARATION

1. Put all the dry ingredients except the HQVACF into a bowl and mix
2. Measure the HQVACF into a smaller bowl and set it aside.
3. Bring water to a boil and add a little to the cassava flour.
4. Mix and stir to get a soft, easy to turn the dough
5. Pour the per-gelatinized flour into the first bowl of ingredients
6. Add the margarine and mix till well combined
7. Add a little quantity of water to the dough and mix. Mix to obtain a firm paste that can be extruded
8. Grease a baking tray and dust it with some flour
9. Fill the extruder with the paste and extrude unto the tray
10. Place in the oven and bake at 80^0cfor 40 – 60 minutes
11. Remove, allow to cool, and serve as a snack or package in air-tight materials for, marketing/distribution

SERVING	COOK TIME	DIFFICULTY	PREPARATION
3 Sachets	50 Minutes	Easy	60 Minutes

BIOCRUNCH

Biocrunch, is a baked, crunchy vitamin A maize-based product with a unique 'pea nutty' taste. Its unique taste is due mainly to the combination of maize and roasted groundnut. It is a healthy on-the-go snack for children and adults alike

INGREDIENTS

- 1 cup HQVAC flour
- 2 cups vitamin A maize flour
- 1/3 cups Soya flour (slightly roasted)
- 1 cup Desiccated coconut
- 4 teaspoon Margarine
- Milk flavor as desired
- 1 cup groundnut paste
- Salt to taste
- Water as required

PREPARATION

1. Put all the dry ingredients except the HQVACF into a bowl and mix
2. Measure the HQVACF into a smaller bowl and set it aside.
3. Bring water to a boil and measure out ½ cup. Add this to the flour
4. Mix and stir to get a soft, easy-to-turn dough
5. Pour the per-gelatinized flour into the first bowl of dry ingredients
6. Add the margarine and mix till well combined
7. Add a little quantity of water to the dough and mix. Mix to obtain a firm paste that can be extruded
8. Grease a baking tray and dust it with some flour
9. Fill the extruder with the paste and extrude unto the tray
10. Place in the oven and bake at 80°c for 40 – 50 minutes
11. Remove, allow to cool, and serve as a snack or package in air-tight materials for, marketing/distribution

SERVING	COOK TIME	DIFFICULTY	PREPARATION
3 Persons	50 Minutes	Easy	60 Minutes

PAPSOY

Papsoy is an enriched variant of vitamin A pap. It is a composite flour made by combining vitamin A pap and quality soy flour. Papsoy is 75% pap and 25% soy. (3 cups Vitamin A pap flour + 1 cup Soya bean flour). This flour is higher in protein than regular vitamin pap and is a recommendation for complimentary feeding of children 6 months and above.

INGREDIENTS

- 4 cups Papsoy flour
- Approximately 290ml Water

TIPS

- Stir the reconstituted paste just before you pour the hot water
- You can vary the consistency of the pap to suit the age of the child or consumer

PREPARATION

1. Scoop papsoy flour into a bowl
2. Add water and mix to a get free flowing paste
3. Bring water to boil
4. Pour hot boiling water while stirring until a cooked paste of desired consistency is obtained
5. Serve with cassmoi, beans, akara, fish or other such accompaniments.

SERVING	COOK TIME	DIFFICULTY	PREPARATION
4 Persons	3 Minutes	Easy	8 Minutes

GRITS PORRIDGE

Vitamin A maize grits porridge is yellow, attractive, and prepared by cooking coarse-sized dry vitamin A maize to a soft pulp. It is similar to other thick maize-based porridges from around the world. Though, a delightful choice for anyone and for any time of the day, this porridge can be considered a complimentary food for babies, and a breakfast cereal for other household members. It provides vitamin A in addition to carbohydrates, and fibre. The porridge is low in fat but contains enough protein to give your body a healthy start especially when you take it with milk, peanuts, or other accompaniments of protein sources.

INGREDIENTS

- 2 cups vitamin A maize grits
- 4 cups water
- Sweeteners (sugar or honey) (optional)
- Milk (optional)
- Salt to taste

Note: You can add sugar, honey or other sweeteners of choice. Milk, soya bean milk, yogurt, peanuts, etc could also be added while still warm to enrich your grits and to improve its aroma

PREPARATION

1. Wash the dry maize grits and strain off the water
2. Pour water into a pot and bring to boil
3. Add salt (to taste) and stir as you do
4. Cover pot, reduce heat, and leave to cook, stirring intermittently
5. Cook for about 60-70 minutes or until it becomes smooth & creamy
6. Serve with cassmoi, akara or other accompaniments you desire.

TIPS

- If the porridge becomes too thick, add a little water and allow to simmer
- Ensure that the porridge does not get burnt by stirring at short intervals
- Grits is best served warm because it thickens as it cools

SERVING	COOK TIME	DIFFICULTY	PREPARATION
6 Persons	30 Minutes	Easy	40 Minutes

MAIZE GRITS

OPTION B

INGREDIENTS

- 5 cups water
- 2 ½ cups maize grits

PREPARATION

1. Bring water to boil
2. Rinse maize grits thoroughly
3. Add the grits to the boiling water and stir continuously for about 20 minutes
4. Add ½ cup of water to make the thick paste lighter
5. Allow to boil for another 10 minutes
6. Remove from the heat source
7. Serve as desired

ORANGE-FLESHED SWEET POTATO (OFSP) RECIPES in the class of Traditional household foods

BOILED/STEAMED ORANGE SWEET POTATO

Steamed or boiled OSP is chock full of vitamins A, C, fiber, and potassium. It is particularly a simple way to preserve the nutrients in OSP. It requires no added fat or other ingredients and gives a tender texture that crumbles easily. It is used as an ingredient in a number of other recipes.

INGREDIENTS

- 3 medium tubers OSP
- Salt to taste
- 2 ½ cups of water

TIPS

- Don't boil your sweet potatoes till they are tender to avoid them becoming soggy
- Boil sweet potatoes before cutting them to minimize the loss of nutrients

PREPARATION

1. Peel the potatoes and wash them properly
2. Put into a pot and add just enough water to boil the potatoes
3. Sprinkle salt and boil for about 10 minutes or until they are cooked.
4. Insert a thin sharp knife or a toothpick into the sweet potatoes to check if they are cooked
5. Remove from the heat source if the inserted knife or toothpick comes out clean.
6. Leave the cooked potatoes in the cooking water for about 5-7 minutes
7. Bring them out, slice them into desired shape and serve with any sauce of choice

SERVING	COOK TIME	DIFFICULTY	PREPARATION
2 Persons	10 Minutes	Easy	15 Minutes

ORANGE SWEET POTATO MEAL

OSP meal or swallow is a cooked paste made from a composite flour of OSP and vitamin A maize flour. It is prepared in a similar way as semovita, cassavita, lafun, or other such traditional swallows. OSP swallow is a healthy, lightweight food that provides lots of fibre and vitamin A when consumed. It is eaten with various traditional soups/sauces in Nigeria.

INGREDIENTS

- 2 cups OSP flour
- 2 cups vitamin A corn flour
- 4 cups of water

Note: Yield 4 medium size wraps

PREPARATION

1. Mix dry OSP and maize flour
2. Add the water to the flour mixture and stir into a smooth paste
3. Place on heat source and continue stirring for about 8 minutes

SERVING	COOK TIME	DIFFICULTY	PREPARATION
4 Wraps	10 Minutes	Easy	8 Minutes

FRIED ORANGE SWEET POTATO

One of the best and quickest ways to get all and sundry to eat OSP is by simply frying it. When fried it can be taken as a snack, or as a main meal when accompanied with egg sauce, fish sauce, porridge beans, and many more protein accompaniments. Its unique naturally sweet, and attractive Color packs loads of vitamin A, offering a nutritious meal or snack for any time of day.

INGREDIENTS

- 3 medium tubers OSP
- 1 table spoon of salt
- Vegetable oil for frying

PREPARATION

1. Peel potatoes and wash thoroughly
2. Slice into desired shape
3. Put about 500ml vegetable oil into a frying pan and heat for about 3 minutes
4. Sprinkle some salt on the sliced potatoes and deep fry for 10 minutes
5. Remove from the oil and put in a sieve to remove excess oil

SERVING	COOK TIME	DIFFICULTY	PREPARATION
4 Plates	12 Minutes	Easy	10 Minutes

FRIED ORANGE SWEET POTATO

Snacks & Confectioneries from **ORANGE-FLESHED SWEET POTATO (OFSP)**

ORANGE SWEET POTATO BREAD

OSP bread is like regular wheat bread, except that a percentage of the flour (about 35-55%) has been replaced with OSP (flour or puree). This enriches the bread and reduces the cost of production because OSP confers beta-carotene (vitamin A, natural sweetness, and soft texture to the bread. The bread comes out firm, lightweight, and with an attractive Color.

INGREDIENTS

- 1 cup of OSP flour (or OSP mash/puree)
- 4 cups wheat flour
- ¼ cup margarine
- ¼ cup sugar
- 3 ½ level teaspoon yeast
- 1 teaspoon nutmeg
- 1 teaspoon salt
- 2 cups lukewarm water – (or as required)

TIPS

Sugar required is minimized because of the natural sweetness of OSP

PREPARATION

1. Sieve the flours and mix the wheat flour and the OSP flour or mash
2. Add sugar, yeast, salt, and nutmeg
3. Rub in the margarine until the mixture resembles breadcrumbs. Or until a soft dough is formed if using OSP mash
4. Add water and fold to produce a soft dough (do not add water if OSP mash is used)
5. Place on a floured board (use OSP to dust the board) and knead until smooth for about 5 minutes
6. Cut into parts and put in greased bread pans
7. Allow to proof for about 15 minutes in a warm oven until the size is double
8. Bake in a hot oven for about 15 minutes.

SERVING	COOK TIME	DIFFICULTY	PREPARATION
3 medium size loaves	15 Minutes	Mid-Level	40 Minutes

ORANGE SWEET POTATO CHIN-CHIN

Chin chin, a favorite snack among both old and young is originally prepared from wheat flour. In recent times, it has been found that some other flours be used, albeit as composites. HQVACF and OSP flours are included in the ratio 3:1. This OSP chin chin is rich in vitamin A aside from other nutrients.

INGREDIENTS

- 3 cups HQCF VAC flour
- 1 cup OSP Flour
- ¼ cup Sugar
- Flavor
- 2 table spoons Margarine (25g)
- 1 medium egg
- A pinch of salt
- 1 level table spoon of nutmeg
- Water as required

TIPS

Store in an airtight container

PREPARATION

1. Gelatinize 1 cup of yellow root cassava flour with 1 cup of boiling water in a mixing bowl
2. In another bowl mix all other dry ingredients
3. Whisk egg and add
4. Mix the gelatinized vitamin A cassava flour and the mixture above including margarine to form a smooth dough
5. Mix into a stiff pastry which leaves the sides of the bowl clean
6. Dust the rolling board with OSP flour and roll the dough on a floured board
7. Cut into desired shapes
8. Deep fry in hot oil for about 6 minutes or until golden brown
9. Drain to remove excess oil

SERVING	COOK TIME	DIFFICULTY	PREPARATION
5 Sachets	15 Minutes	Mid-Level	20 Minutes

ORANGE SWEET POTATO BUNS

Buns are a very popular snack in Nigeria. They vary in texture, sweetness, and Color, depending on individuals. OSP buns are peculiar because it is made from OSP mash (or flour) in combination with wheat flour in a ratio of 1:2. They are lighter and fluffier than most others made using wheat flour only. The idea behind this recipe is to incorporate more vitamin A in this popular snack, thus making it another vitamin A source.

INGREDIENTS

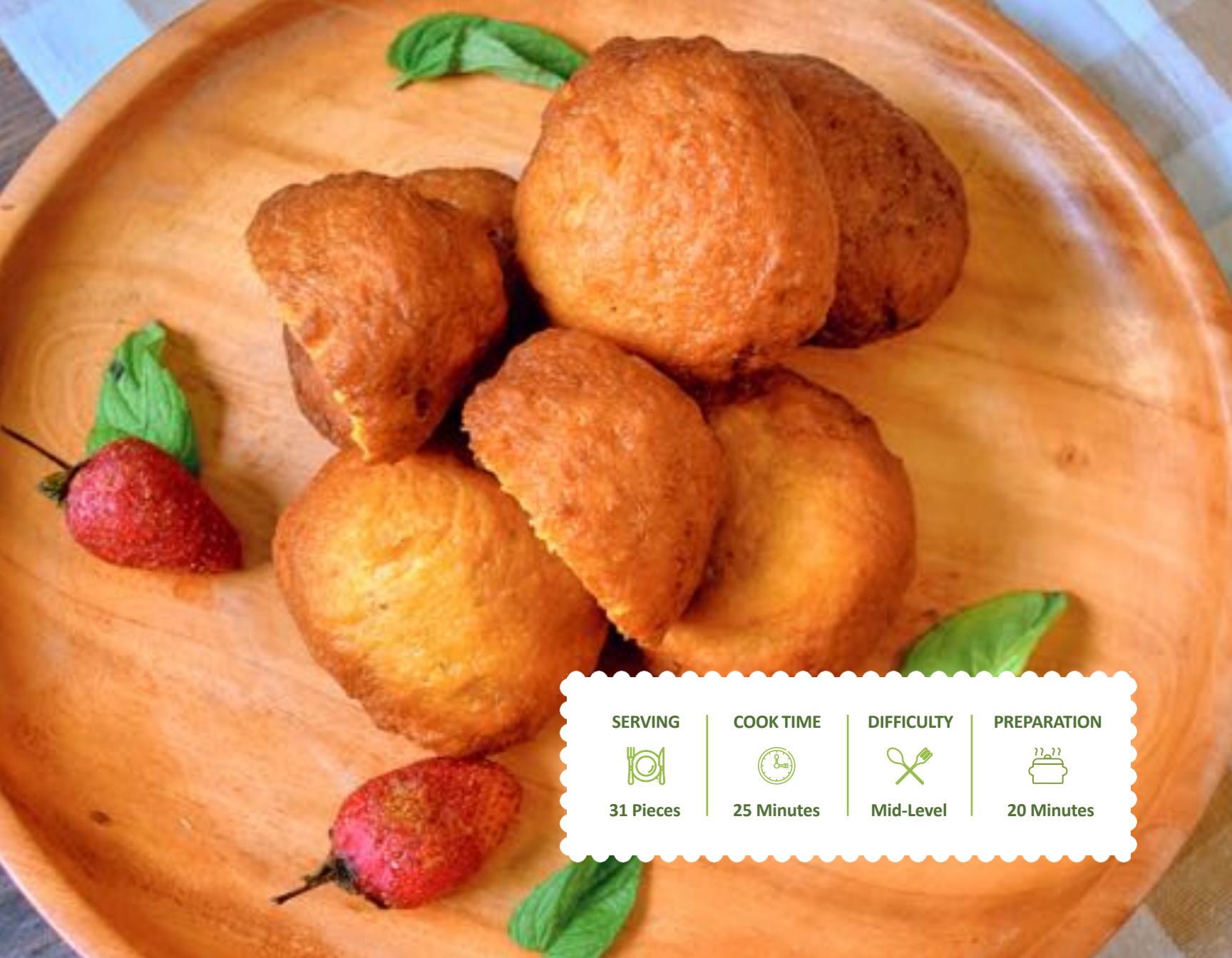
- 6 level cups wheat flour
- 3 cups Grated OSP
- ½ cup Sugar & 1 ½ table spoon of salt
- 1 tbsp Butter/ margarine
- 2 table spoon of nutmeg
- 9 table spoon of Yeast
- 6 eggs
- Water as desired

TIPS

- It is better consumed within 24 hours
- This dough can be used for Nigerian egg roll

PREPARATION

1. Mix the wheat flour, sugar, yeast, and nutmeg
2. Add grated OSP and rub in the margarine
3. Add the whisked egg and water
4. Mix into a smooth dough
5. Cover the dough in a mixing bowl and allow to proof for 15 minutes
6. Remove from the bowl and place on a flavored board
7. Knead till the dough is smooth
8. Mold into balls and place in an oiled tray
9. Allow to proof for 30 minutes
10. Fry in a hot (deep fry) for about 3 minutes or until golden brown



SERVING	COOK TIME	DIFFICULTY	PREPARATION
31 Pieces	25 Minutes	Mid-Level	20 Minutes

ORANGE SWEET POTATO DOUGHNUT

OSP donut comes handy as a recipe of choice when potatoes are in season. It is made using freshly prepared orange-fleshed sweet potato (OSP) puree and wheat flour. It is easy to prepare and even easier to munch.

INGREDIENTS

- 8 cups Wheat flour
- 2 cups OSP puree
- 1 tablespoon Margarine
- ½ cup Sugar
- 1 table spoon of Nutmeg & 1 table spoon of yeast
- ½ teaspoon Salt
- 2 medium eggs
- 1 cup of warm water

Note: Yield 27 pieces of medium sized doughnuts

TIPS

It is better to pound or mash cooked OSP to avoid addition of water which may be required if blending will be done

PREPARATION

To make OSP puree (600g of roots)

1. Peel and wash and cook OSP tubers for 10 mins
2. Pound/ march the boiled OSP (puree is ready)
3. Sieve the wheat flour and mix it with the OSP puree
4. Add sugar, yeast, salt, and nutmeg
5. Rub in the margarine until the mixture resembles breadcrumbs.
6. Whisk egg and add to the mixture
7. Add water and fold to produce a soft dough
8. Place dough on a floured board and knead for 10 minutes
9. Cut into shapes with a doughnut cutter, and allow for 15 – 30 minutes to increase in size (proof)
10. Fry in deep hot oil until golden brown (or for about 15 minutes)

SERVING	COOK TIME	DIFFICULTY	PREPARATION
27 Pieces	15 Minutes	Easy	40 Minutes

ORANGE SWEET POTATO BISCUITS

Biscuits are varied in composition and using OSP puree helps to improve the nutrient offerings of the snack. OSP biscuit is rich, soft textured and supplies the consumers with more than just energy. This recipe is a delight for children.

INGREDIENTS

- 4 cups OSP flour
- ½ cup margarine
- ½ cup sugar
- 4 eggs
- 2 table spoon of baking powder
- 1 table spoon of nutmeg

TIPS

Maintain baking temperature at low and bake for a short period as this produces biscuits with higher β-carotene retention

PREPARATION

1. Cream sugar and margarine until light and fluffy
2. Whisk egg and add to the creamed mixture
3. Mix the flour with baking powder and nutmeg (dry ingredients)
4. Add the cream mixture to the flour and fold into a stiff pastry
5. Roll on the board and cut into the desired shape
6. Place on a greased baking sheet
7. Bake for 20 minutes at 105^{0}c.

SERVING	COOK TIME	DIFFICULTY	PREPARATION
14 Pieces	20 Minutes	Mid-Level	10 Minutes

ORANGE SWEET POTATO PANCAKE

OSP pancake is the same as the classic pancake, but with more vitamin A and the perfect amount of sweetness from natural sugars. This recipe yields fluffy, and soft pancakes every time you make it.

INGREDIENTS

- 1 cup wheat flour 1 cup OSP
- 2 medium size eggs
- 1 tin evaporated milk
- 2 table spoon of baking powder
- 1 sachet milk flavor (optional)
- 2 cups water
- 1/8 cup sugar (optional)
- Pinch of salt

PREPARATION

1. Mix the wheat and OSP flour with salt together
2. Whisk the egg and liquid milk together
3. Add the content into the flour mixture
4. Mix until it forms a dropping texture
5. Pan-fry with a good vegetable oil

SERVING	COOK TIME	DIFFICULTY	PREPARATION
15 Pieces	10 Minutes	Easy	10 Minutes

ORANGE SWEET POTATO PANCAKE

Innovative Food Products from **ORANGE-FLESHED SWEET POTATO (OFSP)**

OSP MIXED VEGETABLE SALAD

This is a variant of the salad. This recipe showcases how OSP can be incorporated into a vegetable salad or any other type of salad that requires some vegetables. This delicious salad recipe offers plenty of tender, bite-sized sweet potatoes. It not only improves the vitamin A content of the salad, but it also adds bulk and fiber.

INGREDIENTS

- OSP (shred/sliced)
- 3- 4 medium sized Carrot (grated)
- 1 large Cucumber (sliced/cubed)
- 1 medium size Cabbage (shredded)
- 1 small head Lettuce (thinly sliced)
- Mayonnaise/ Salad cream as desired
- Boiled, flaked, de-boned Fish, cooked chunks of meat or sliced boiled eggs (optional)

Note:

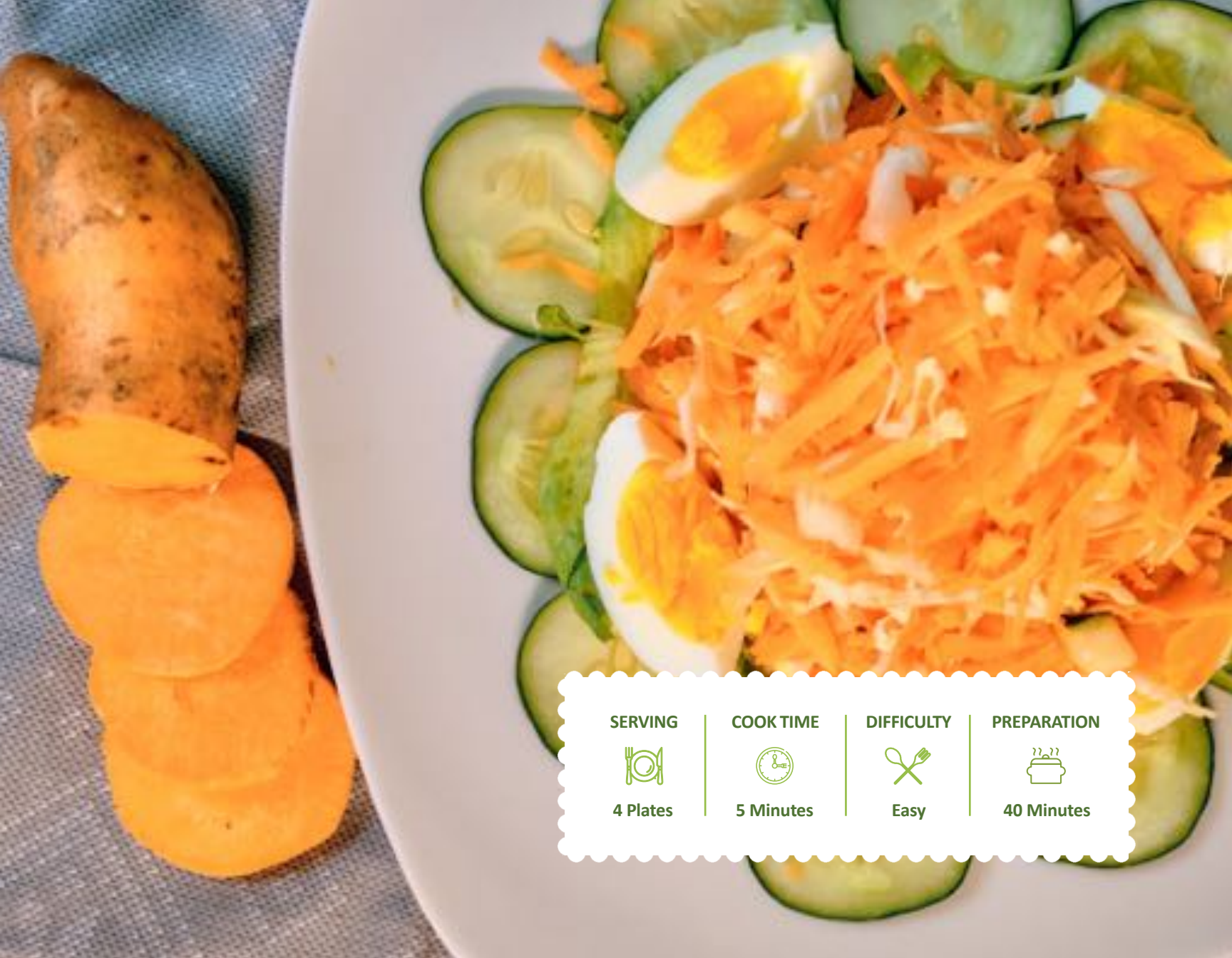
- Any suitable vegetable of choice can be used and in quantities that suits the consumer. A perfect vegetable salad is always one made with vegetables of your choice.
- This Vegetable salad may vary according to the choice of ingredients

PREPARATION

1. Wash and peel the orange sweet potatoes
2. Shred or cut into small bits/pieces
3. Blanch, rinse, and leave in a colander till ready to be added to the dish.
4. Neatly spread the vegetables including the OSP one at a time in a salad tray in layers
5. Also lay the Boiled, flaked, de-boned Fish, cooked chunks of meat, or sliced boiled eggs (if used) in the same manner
6. Place in the refrigerator to cool
7. Serve with the salad cream/mayonnaise.

TIPS

- Maintain high level of hygiene in preparing the vegetables to avoid contamination
- Choose healthy & fresh vegetables for rich salad
- Ensure you blanch before use to avoid color change.



SERVING	COOK TIME	DIFFICULTY	PREPARATION
4 Plates	5 Minutes	Easy	40 Minutes

ORANGE SWEET POTATO CHOPS

This is simply orange-fleshed sweet potatoes and any or all of the fish/meat chunks seasoned and spiced to give a blend of African and continental taste. This relish dish can be taken as breakfast lunch or dinner or even as a side dish when you desire something fast but different from the norm. It is such a colorful dish and has lots of proteins, vitamin A, iron and more depending on what you combine. It is a healthy and filling one-pot dish that brings out your creativity as a food lover.

INGREDIENTS

- 3 - 4 tubers Orange fleshed sweet potatoes
- 500g fish/meat chunks (seasoned)
- 2 medium sizes Red bell pepper (chopped)
- 2 large green pepper (chopped)
- 1 medium Onions sliced as desired
- 2 - 3 tablespoons Vegetable oil as desired
- Salt to taste
- Seasonings (ginger, garlic, curry, thyme etc) as desired

PREPARATION

1. Peel, wash, and dice orange-fleshed sweet potatoes
2. Place in the microwave for about 2 minutes
3. Put some oil in a frying pan and fry the fish/meat chunks slightly
4. Remove the chunks and set aside
5. Spray the saucepan with little vegetable oil
6. Add the potatoes and fry slightly
7. Add onions, diced peppers, and the fried fish/meat chunks: Saunter for about 2 minutes
8. Pour in the fish/meat chunks and the slightly baked potatoes. Mix to combine

TIPS

- To make it more attractive, make sure all the vegetables are all diced to the same shapes.
- You can steam the diced potatoes for 2 -3 minutes using medium heat if there is no microwave

SERVING	COOK TIME	DIFFICULTY	PREPARATION
6 Persons	10 Minutes	Easy	45 Minutes

POTATO/MAIZE PORRIDGE

This recipe is a combination of vitamin A maize and OSP, making it a dual vitamin A source. It is a porridge that is suitable for every household member depending on how it's consistency and amounts of seasonings/peppers used. Infants are often times unable to accommodate hot spicy foods, while older members of the household may be able to. This infant porridge is a good source of many nutrients. It can be served as a main meal or with fish, beef etc.

INGREDIENTS

- 3 - 4 tubers Orange fleshed Sweet potatoes
- 1 cup Vitamin A Maize flour
- 1 medium Bawa pepper
- 2 - 4 medium-size scotch bonnet pepper (rodo)
- 1 small size onion & Salt to taste
- Seasonings as desired
- OSP leaves (pounded) optional
- 1/3 cup palm oil

Note: Consider preparing the consistency and quantity of peppers and seasonings to suit the age of the child

Older children can be given thicker porridges, while younger ones should be given more loose porridges for ease of swallowing and digestion

PREPARATION

1. Peel, wash, and boil orange-fleshed sweet potato with about 4 cups of water for about 30 minutes
2. Blend pepper and onions
3. Add vitamin A maize flour to drained water from boiled OSP
4. Add the blended ingredients
5. Add the oil, salt, and other seasonings, Stir
6. Add the mixed ingredients to the boiled OSP & mix thoroughly
7. Mash the mixture with a wooden spatula
8. Allow simmering for 10mins

TIPS

- Mix potato mash and maize flour in the ratio of 2 OSP mash:1 maize flour
- Take care to maintain your desired consistency, adding more water if the food is too thick

SERVING	COOK TIME	DIFFICULTY	PREPARATION
6 Persons	40 Minutes	Easy	40 Minutes

ORANGE SWEET POTATO SMOOTHIE

Sweet potatoes are a gem when used in juices & smoothies. They are game-changers in terms of taste, color, and nutrition. In this recipe, they not only add loads of vitamin A, but also provide a unique taste, & thicken the smoothie for that real satisfaction.

INGREDIENTS

- 1 root Orange fleshed sweet potato (baked or boiled)
- 2 medium size apples
- 1 medium size orange
- 1 small size carrot
- Water as required

PREPARATION

1. Wash all the fruits as well as the orange-fleshed sweet potatoes
2. Peel the oranges and OSP
3. Boil the OSP for 30 minutes & cut it into smaller pieces for juicing
4. Cut the apples
5. Put all the cut ingredients into the juicer. Add some water
6. Juice to desired texture and consistency
7. Remove and add the turmeric or other additive of choice
8. Refrigerate and serve chilled

TIPS

- You may leave out the addition of water, the smoothie will still come out great
- Use good quality and wholesome fruits and vegetables
- This recipe can be prepared using fruits and vegetables of choice that are in season.
- The sweet potatoes are the added value
- The smoothie can be prepared in puree from by just boiling the OSP for 15mins, allow to cool & add any flavor of choice


SERVING
2 Glass Cups
COOK TIME
5 Minutes
DIFFICULTY
Easy
PREPARATION
30 Minutes

ORANGE SWEET POTATO JUICE

Thinking of a refreshing nutrient-dense drink and a vitamin A booster? This OSP juice readily comes to mind. It is prepared using the whole root of OSP, making it a good source of all the nutrients in the crop. This can go for a refreshing meal as well as juice because it is not diluted with water.

INGREDIENTS

- 3 large OSP tubers
- 9 cups water
- 1 finger ginger

TIPS

Alternatively, the OSP roots are first boiled, then blended into a smooth and thick paste. When you use this method, there is no need to boil again.

PREPARATION

1. Peel and wash OSP tuber thoroughly
2. Blend the OSP until a smooth thick paste is formed
3. Pour the paste into a muslin cloth, mix with some more water to loosen the paste a bit, and squeeze out the juice
4. Allow to settle for about 20 minutes then decant
5. Add the flavor of choice
6. Scoop the decanted liquid into a pot and boil for about 5 minutes
7. Allow to cool and dispense into appropriate containers/ bottles for consumption and storage

SERVING	COOK TIME	DIFFICULTY	PREPARATION
3 Glass Cups	5 Minutes	Easy	40 Minutes

PART B: IMMEDIATE BY-PRODUCTS OF BIOFORTIFIED CROPS

This section contains the major and intermediate products obtained from immediate post-harvest processing. They are often times prepared in the processing centres and are commercial products. These are mostly dry products with more extended shelf lives and are the products used in preparing the recipes in the first part of this recipe book.

In this part of the book, you will find information on practices and methods that will ensure that important nutrients like vitamin A are better retained.

IMMEDIATE POST-HARVEST PRODUCTS FROM VITAMIN A CASSAVA

INTRODUCTION

Vitamin A Cassava is a yellow-fleshed variety of cassava with beta-carotene* level between 7 – 15mcg/g making it able to provide up to 40% of the daily vitamin A needs of a child. It is a perishable crop with a shelf life of fewer than 3 days after harvest. Hence, it needs to be processed almost immediately after harvesting. Vitamin A cassava is a very versatile crop that has both household and commercial importance. Many people are investing in the processing, packaging, and distribution of vitamin A cassava products. It is however important for processors to take precautions during these post-harvest activities in order to ensure that product quality is maintained, and nutrients (especially vitamin A) are retained while also making profits. This section provides information, charts, and recommendations on how to achieve all these.

1. VITAMIN A CASSAVA LEAVES

Vitamin A Cassava leaves, especially the young tender part are good sources of protein (9.3-32.4%, dry weight) They add variety as well as better nutrition to major Nigerian soups and sauces when used as the leafy vegetable to replace conventional leafy vegetables. Cassava leaves have to be processed to eliminate some harmful substances known as cyanogenic glycosides. These are chemicals that can be broken down to release hydrogen cyanide. Processing can be done by grinding or pounding the leaves and then washing them in plenty of water about 4 times. Doing these reduces cyanide content to about 3% of its original content.

2. VITAMIN A GARRI

Vitamin A Garri is a partly gelatinized, roasted, free-flowing granular flour with a slightly fermented flavor, yellow, with no palm oil added. It can be consumed either stirred in boiling water to make a stiff paste and eaten with a soup of choice or soaked in cold water to take as a quick snack. Vitamin A garri does not give a rancid taste when soaked in water and eaten as is the case with garri processed with the addition of palm oil.

Vitamin A garri has lower starch content and reduced glycemic load than regular white cassava and this is even lower when processed from fields that have been pruned before harvesting.

3. VITAMIN A FUFU MASH & FLOUR

Vitamin A fufu also called Yellow fufu is a fermented cassava product. It is ranked next to garri as an indigenous food of most Nigerians in the south. Fufu is made by steeping cut peeled cassava roots in water to ferment for 2-4 days, depending on ambient temperature.

Fufu is often processed in the wet form, which is the common form in most households use it. In this form it was found to have retained as high as 40.8% of beta-carotene in the fresh roots, making it a potential supplier of vitamin A when further processed into ready-to-eat meals and consumed. However, it can be dried into the flour form to increase its shelf life and contribute to solving some of the challenges with household food access but its beta-carotene content will decrease rapidly during storage.

4. YELLOW LAFUN FLOUR (CASSAVA FLOUR)

Yellow lafun is a fermented, fibrous powdery form of cassava flour similar to yellow fufu flour. It is processed by cutting fresh cassava roots into chunks and steeping for 3-4 days or until the roots become soft, after which they are de-watered and dried, giving a flour whose texture is coarser than yellow fufu. Drying commercial quantities are done using flash dryers, or alternatively, cabinet dryers. For households who process yellow lafun, drying under a shaded area or away from sunlight is recommended.

5. VITAMIN A ABACHA

Vitamin A Abacha is pre-gelatinized, shredded, and fermented vitamin A cassava. This food can be prepared and used in fresh form or further dried and stored for future use. The dried form of abacha is however more suitable for households (who wish to use up available raw vitamin A cassava for the future) and for commercial purposes. Drying to retain the yellow color and invariably the beta-carotene is done using cabinet dryers at low heat. When dried, they are allowed to cool completely (away from direct light) and then packaged in small sizes of 500g or 1kg for buyers.

To use, the dried abacha is steeped in hot water for a few minutes to make it tender. It is then removed from the water and allowed to drain.

6. CASSOY FLOUR

Cassoy Flour is an enriched composite flour of casstard and soya bean flour. It is made from the vitamin A cassava product - casstard and soya bean that has been carefully processed into flour. This enriched food product is made from casstard & soy flour constituted in the ratio of 3:2. Cassoy flour is stored for home use or packaged for distribution. It is further prepared into a cooked porridge that is suitable for children and adults alike.

7. CASSTARD

Casstard flour is a bright-colored yellow commercial product obtained from vitamin A cassava starch. Processing vitamin A cassava into casstard flour involves, grating peeled cassava, sieving using lots of water to remove the shaft, and then sedimenting the slurry obtained for 2 days to obtain a mash that can be dried and used to prepare casstard porridge. To get commercial casstard flour, the moist starch is dried and pulverized into smooth flour. Additives – egg yolk and flavors are then added to enhance its Color and aroma before packaging. It is important to dry using methods that will reduce the loss of vitamin A.

Alternatively, households stop processing when they obtain the casstard mash. Though, this means that the mash has to be used up almost immediately, or it has to be kept under cold storage to prevent spoilage.

Casstard, either in moist or flour form is cooked by using hot water to gelatinize the starch. It is a high-calorie food, but can be enriched using protein sources like soybeans and eggs.

8. HIGH QUALITY VITAMIN A CASSAVA FLOUR (HQVACF)

High-quality vitamin A cassava flour (HQVACF) is fine flour produced from wholesome freshly harvested vitamin A cassava (preferably 10-12 months at harvest) roots. It is unfermented, smooth, odorless, yellow flour, and bland with no gluten. It is produced rapidly (within 24 hours) and is suitable for making a variety of pastries, whole or in composite forms (cakes, cookies, doughnuts, bread. etc). The flour has the potential of contributing to improving incomes when processed, packaged, and sold. It serves as the main ingredient in many snacks and confectioneries in this recipe book.

9. CASSMOI FLOUR

This is a fine yellow composite of HQCF and bean flour in a combination of 1-part cassava to 1-part beans. This flour is an enriched vitamin A cassava product used in making cassava pudding/moi also known as cassmoi. Cassmoi can be prepared using HQCF and fresh vitamin A cassava roots (that have been grated and dewatered) or by using this Cassmoi flour. The flour form was developed to make people who are unable to access fresh roots the opportunity to consume cassmoi.

PROCESSING FLOW-CHARTS FOR IMMEDIATE POST-HARVEST PRODUCTS OF VITAMIN A CASSAVA FOOD PRODUCTS

NO	PRODUCTS	FLOW CHART	NOTES
1	Vitamin A cassava leaves	Content is to be taken from the recipe data sheet	
2	Vitamin A garri	Harvesting & sorting -> Peeling -> Cutting -> Washing -> Grating -> Steeping -> Bagging & dewaterin -> Pulverizing -> Roasting -> Vitamin A Garri -> Cooling -> Grading -> Packaging	Number of fermentation days determines how sour the garri is
3	Vitamin A fufu	Harvesting & sorting -> Peeling -> Cutting -> Washing -> Steeping -> Washing -> Grating (optional) -> Sieving -> Bagging & De-watering -> Fufu mash -> Pulverizing -> Flash drying -> Milling -> Fufu Flour	• Steeping/fermenting for (2-4 days depending on the temperature & size of roots • Grating won't be necessary if the roots are well retted • Washing fermented roots several times eliminates unpleasant odour • Sieving: size of sieve aperture determines how smooth or fibrous fufu is
4	Yellow Lafun	Harvesting & sorting -> Peeling -> Cutting - Washing -> Steeping -> Washing -> Hand crushing/pulping Bagging & De-watering -> Flash Drying -> Milling -> Yellow Lafun -> Packaging	Steeping/fermenting for 3-4 days (depending on the temperature) or until retted

5	HQCF	Harvesting & sorting -> Peeling -> Cutting -> Washing -> Grating -> Bagging & dewatering -> Pulverizing -> Flash drying -> Milling -> HQCF Flour -> Packaging	
5	Cassavita flour	HQCF (50%) + Vitamin A Maize Flour (50%) OR Odorless vitamin A fufu flour + Vitamin A Maize Flour (50%)	-
6	Vitamin A abacha	Peeling -> Washing -> Cutting -> Boiling -> Slicing -> Soaking -> Washing -> Fresh wet Abacha slices -> Drying -> Dry Abacha -> Cooling & Packaging	Cut into small sizes of about 7-8cm before boiling Ry wet abacha at 65^{o}c for 6 hours or under shade away from light and Sun
7	Casstard	Harvesting & sorting -> Peeling - Cutting -> Washing -> Grating -> Sieving - Sedimenting -> Decanting -> Re-suspension of starch & washing -> Sedimentation & Decanting -> Mixing -> De-watering -> Drying -> Milling & Sieving -> Casstard flour -> Cooling -> Packaging	• Sieve grated pulp using muslin cloth • Sedimenting for 4-6 hours • Decanting: carotenoids & starch separately • Mixing: Carotenoids & starch - De-watering: using muslin cloth • Drying: flash drying at …. or cabinet drying at 40 – 50^{o}c for 18 hours • Milling & Sieving using 0.5mm sieve • Color & Flavor additives (optional)
8	Cassoy	75% Casstard flour + 25% Soy bean flour	

RECOMMEDED PROCESSING PRACTICES FOR VITAMIN A CASSAVA PROCESSORS

No	Processing operation	Recommendations	
		What should processors/handlers of VAC do?	Why is it important for them to do this?
1	Harvesting & Sorting	Use matured wholesome vitamin A cassava root varieties preferably 9-18 months old Harvest and deliver roots to processing points within 24 hours of harvesting (For HQVACF which is unfermented flour, the period between harvesting till the final product is obtained should not exceed 24 hours)	• Older roots contain more fibres and may be unsuitable for products like good quality garri • Younger roots are small, difficult to peel and are losses to the farmer • Prompt processing of harvested cassava prevents the onset of post-harvest deterioration which reduces quantity and quality of products • Exceeding 24 hours means that the flour obtained has undergone fermentation
2	Peeling & Cutting	Use sharp non-rusting knives, avoid peeling deeply into the root flesh and remove all peels	Peeling wrongly wastes root flesh available as food and introduces peels into products
3	Washing	Use portable water from known source and wash off all sand and dirt from all parts and contours of roots.	Sand and dirts in products is unhygienic and reduces money value (profits)

4	Grating	Use graters with sharp blades and wash before and after use	Well grated mash is smooth, saves root flesh and contributes to optimal quantity of products obtained
5	Fermenting	Ferment in dark colored (preferably black) drums with covers for the preferred number of days	Using dark medium allows faster and uniform fermentation and reduces exposure to flies and animal droppings
6	Wet sieving	Wet sieve using lots of water and choose quality sieves with the appropriate mesh for each product - ≤0.2mm for casstard and 0.2mm - 0.4mm for fufu	Using too little water can result in lower product yield and high waste/shaft Torn/broken sifters can result in end products containing shaft
7	Bagging & De-watering	De-water preferably, using hydraulic press (and not stones or logs of wood), maintain clean sacks and aim for a moisture content of around 55% in de-watered mash	Well pressed cakes are stone and dirt free and helps to improve retention of beta-carotene, especially during garri roasting
8	Pulverizing/ Sifting	Use cassava grating machine to pulverize/sift moist cake and keep in clean plastics with lids if not used immediately	Well pulverized cake gives uniform moist flour and keeping well ensures beta-carotene is retained better

9	Roasting/ Toasting (Garri)	Clean the roasting trays before use, roast in batches starting with a high heat/temperature for gelatinization and then reduced heat/ temperature for the drying phase aiming for moisture content that is between 11 and 12%	Good heat management yields attractive granular garri with bright yellow Color, good vitamin A retention and extended shelf life
10	Drying	Dry moist flours by flash drying, cabinet drying or shade drying to get moisture level of about 10 - 11%	Drying appropriately ensures higher retention of beta-carotene in final products
11	Milling ,Sieving /Grading	Mill and sieve flours uniformly using 0.22 mesh sieve and sieve roasted garri using a uniform graduator of about 3.55mm depending on market demands	Well milled flours are uniformly smooth and yellow and well graded garri is free flowing thus, ensuring high market value
12	Cooling	Cool processed flours or garri rapidly avoiding unnecessary exposure to light	Dried flours and garri have a wider surface area that predisposes to rapid loss of beta-carotene
13	Packaging	Package immediately after cooling preferably in double lined sacks or non-transparent materials	This keeps products away from sunlight which breaks down the vitamin A in them

PROCESSING & STORAGE PRACTICES THAT RETAIN VITAMIN A (VITAMIN A CASSAVA)

Cassava is a staple crop that is high in carbohydrate but contains little or no micro-nutrients including vitamin A. Biofortified cassava however, has higher amounts of vitamin A than conventional white varieties. When processed and consumed, biofortified cassava has been shown to contribute to intake of vitamin A and ultimately to improving vitamin A status. Vitamin A by nature is easily degraded in foods when exposed to air, heat and light. This degradation/losses occur during processing and storage/marketing of vitamin A cassava foods like garri, fufu and high quality cassava flours.

VITAMIN A LOSSES DURING PROCESSING INTO GARRI, FUFU AND HIGH QUALITY CASSAVA FLOUR		
TREND IN LOSSES DURING GARRI PROCESSING	**PRACTICES THAT CONTRIBUTE TO VITAMIN A LOSSES**	**STEPS TO REDUCE VITAMIN A LOSSES**
	• De-watering grated mash until the moisture content of pressed cake is below 45% • Leaving pulverized mash uncovered before or during garri roasting • Keeping pulverized mash exposed to air or light prior to drying into flour • Roasting pulverized cake using low heat (recommended temperature depends on the roasting facility)	• Continue to de-water cassava mash until water stops to drip from the sacks and does not give a cracking sound when broken with hands (45% - around 50% moisture content) • Cover pulverized mash immediately before and during garri roasting or when preparing to dry into HQVACF and fufu flour • Gelatinize pulverized mash at high temperature and dry at lower temperature during garri roasting (temperature depends on the roasting facility used)

	• Sun drying pulverized cake in HQVACF and fufu flour production • Roasting below 14% moisture level during garri processing and drying below 12% in flour production	• Roast garri below 12% moisture content and do not dry pulverized cake below 12% when processing into flour • Choose flash drying over other methods of drying pulverized mash into fufu flour/HQVACF. Alternatively, use cabinet dryers
VITAMIN A LOSSES DURING STORAGE & MARKETING OF GARRI, FUFU AND HIGH QUALITY CASSAVA FLOUR		
TREND IN LOSSES DURING GARRI STORAGE & MARKETING	**PRACTICES THAT CONTRIBUTE TO VITAMIN A LOSSES**	**STEPS TO REDUCE VITAMIN A LOSSES**
	• Storing or packaging processed garri, fufu flour and HQVACF directly in sacks or in transparent materials • Displaying packaged garri, fufu flour and HQVACF under sun in markets/stores • Keeping garri, fufu flour and HQVACF uncovered and exposed to air and light especially in markets/stores	• Store and package garri that has moisture content of 10-11% • Do not store or package fufu flour and HQVACF that has moisture level higher than 12% • Package garri, fufu flour and HQVACF in double lined sacks (sacks with nylon lining) or in black Colored polyethylene bags • Keep garri covered or under shade in stores/market places • Reduce storage time by packaging, selling or buying small sizes of 1kg, 2k or 5kg packs for household use • Sell or use up garri, fufu flour and HQVACF in batches as they are processed or purchased following the First in, first out (FIFO) rule

IMMEDIATE POST-HARVEST PRODUCTS FROM VITAMIN A MAIZE

INTRODUCTION

Vitamin A maize is a deep orange Colored maize variety with elevated levels of beta-carotene when compared with regular yellow maize found in Nigeria. It contains beta-carotene content ranging from 9-11mcg/g depending on the variety. Vitamin A maize can provide up to 50% of the daily vitamin A needs of a child and women of reproductive age. The process of making vitamin A maize foods available for commercial and household uses involves many steps. Some of these steps contribute to low-quality end products, high nutrient losses as well as poor market value for the products. In this section, users of vitamin A maize will find current information, charts, and recommendations on how to process quality and nutritious vitamin A maize products.

1. VITAMIN A MAIZE GRAINS

This is the first product of post-harvest handling of maize. It is obtained by drying harvested maize in order to increase its shelf life, making it available for future use and for ease of transportation to other places apart from where they were grown. Vitamin A maize grains form major components of many household and commercial food products. They are often sold in open markets packaged in large-sized bags. They also form a major part of government intervention programs.

2. VITAMIN A MAIZE FLOUR

Vitamin A Maize flour (also called maize meal) is a yellow/orange-colored flour produced from the milling of dry vitamin A maize. It is often a flour of fine/slightly coarse consistency, containing vitamin A, fibre, and carbohydrates among other nutrients. It forms the main ingredient in a number of recipes for household cooking and large-scale food processing requiring maize. It offers high fibre and carotenoids with total carotenoid content of up to 17.17(µg/g) depending on the variety of maize used in producing it.

3. PAP MASH & FLOUR

Pap mash/flour is a commonly consumed food in most parts of Nigeria. It is processed from fermented dry vitamin A maize and is an intermediate product used in preparing some recipes. It is often cooked into a breakfast porridge which is a common first food for children in most parts of the country. This popular by-product serves both household and commercial purposes. It exists as either an attractive orange Colored moist mash or flour. It is sold locally by women who pack the mash in small portions for households as a ready-to-use product. Sometimes, the women also package moist mash in small buckets with lids and supply them to urban households that can preserve them using refrigerators. The flour form requires drying facilities and this is often available with SMEs. When dried, pap flour is often sold in 1kg packs.

4. PAPSOY FLOUR

Papsoy is an enriched variant of vitamin A pap. It is a composite flour made by combining vitamin A pap and quality soy flour. Papsoy is 75% pap and 25% soy. This flour is higher in protein than regular vitamin pap and is a recommendation for complimentary feeding of children 6 months and above.

5. TOM BROWN FLOUR FROM VITAMIN A MAIZE

Tom Brown from vitamin A maize is a complimentary food that could be made from roasted dry vitamin A maize, millet sorghum, groundnut, and soya beans. When these grains and nuts are milled together, the composite flour has a uniform brown Color and gives an inviting aroma. It is nutritious because it contains protein, fats, folate, and fiber in addition to the abundant carbohydrate in the product.

Tom Brown is one meal that is essential for babies from 6 months of age and onwards. It is also a good choice for older children and adults and sometimes comes readily as an alternative option to pap. While individuals can choose to mix the grains of choice as they wish, the recipe for which tom Brown used in this book specifically has vitamin maize to increase the carotenoids and especially beta-carotene in it. Guinea corn/ or millet may be used instead of sorghum.

6. VITAMIN A MAIZE GRITS

This is vitamin A maize that has been dried, de-germed, and milled into uniformly small particle sizes. Grits could be of small or medium sizes depending on the product that is to be prepared from it. When processing it for use as a complementary food or as burabusko as is in this book, a very small particle size is preferred. Processing VAM to use in egbo recipe requires breaking the whole grains into 3-4 only. Egbo grains are therefore bigger in size.

Both the very small and the bigger grits can be packaged commercially in 2kg or 5kg sizes and sold in shops for households who prefer to buy than go through the stress of processing it themselves.

7. CASSAVITA FLOUR

Cassavita flour is a deep yellow Colored smooth flour made by combining two by-products – High-quality vitamin A cassava flour and vitamin A maize flour in a ratio of 1:1. Alternatively, odorless fufu flour can be used to replace the HQVACF. These two flours contain beta-carotene, making Cassavita a double provider of vitamin A to consumers. This product, which is easy to process either for household or commercial purposes, is a new introduction to the nutritious food chain in Nigeria. It is processed and packaged in small sizes of 1 or 2kg and the average size of 5kg bags. It is made into ready-to-eat form by cooking in hot water over the fire to get a moldable soft paste – 'swallow'.

PROCESSING FLOW-CHARTS FOR PROCESSING VITAMIN A MAIZE FOOD PRODUCTS

No	PRODUCTS	FLOW CHART	NOTES
1	Vitamin A Maize grains		
2	Tuwo flour (Maize flour)	Cleaning -> Temperin -> De-hauling & De-germing - Winnowing -> Dry milling -> Sieving -> Maize flour -> Packaging & storage	Sieving: to pass through an aperture of 250 micrometer sieve
3	Pap flour & mash	Sorting & Winnowing -> Soaking -> Wet miling -> Wet sieving -> Sedimenting/Fermenting -> Decanting -> Moist pap mash - Bagging & Dewatering -> Drying -> Pap flour -> Cooling -> Packaging	Drying 50 – 60°c in cabinet dryer
4	Tom Brown	Sorting & Winnowing grains & nuts -> Roasting each ingredient -> Mixing -> Grinding -> Tom Brown -> Packaging	
5	Maize grits	Cleaning -> Tempering -> De-hauling & De-germing -> Winnowing -> Grits	Size of grits depends on the recipe it will be used for

RECOMMEDED PROCESSING PRACTICES FOR VITAMIN A MAIZE PROCESSORS

	Processing operation	Recommendations	
	What should processors/handlers of vitamin A maize do?		Why is it important for them to do this?
1	Harvesting	Harvest matured maize at 55-80 days after planting, (depending on variety when the silk has turn brown. But when harvesting targets grains, harvest between 80-110 days after planting.	• To get maximum yield from your farm • To have the best concentration of beta-carotene
2	Shelling & Drying	• Shell when husk is dried • Dry vitamin A maize grains away from sunlight • Dry grains to about 13% Moisture content	• This is when the moisture content is low and further drying required is minimal • To reduce vitamin A losses in the grains • To prevent the growth of moulds
3	Sorting/Cleaning/ Winnowing	Remove the damaged, mouldy or black head	This helps to limit aflatoxin growth and removes other impurities
4	Storing grains	• Store only insect free grains • Maintain moisture at 13% avoid damp areas • Store in air free containers e.g PICS bags, air free silos • For polypropylene bags storage, use pallets in stores with cross ventilation • Use up grains stored first before those newly stored following the first-in-first-out (FIFO) rules	This is to maintain the quality of the grains during storage and to avoid wastage

5	Milling into flour	• Removing the gem is optional and depends on the recipe • However, the gem if not removed will increase fibre in the diet • Store grains and mill in batches for home use	• Removing the gem gives fine (low-coarse) flour required in some recipes • Eating enough fibre however promotes healthy digestion
5	Milling into grits	• Mill into the size of grits that you desire for your recipes • It is important to use specific sieve with uniform aperture	To get uniform granulation
6	Packaging /Storing flour	• Package in polyethylene or air free containers • Package, sell or buy vitamin A maize flour in small sizes of 1kg, 2kg, or 5kg • Follow the First In, First Out (FIFO) rule in using up vitamin A maize flour	• To reduce the rate of vitamin A loses, which are highest during the first 2 weeks of storage • Minimize storage period of maize flour • Packaging is very important for marketing /distribution of vitamin A maize flour

PROCESSING & STORAGE PRACTICES THAT RETAIN VITAMIN A (VITAMIN A MAIZE)

Maize is a staple crop that is high in carbohydrates. Yellow maize contains some amounts of vitamin A in addition to this level of carbohydrate. Biofortified maize varieties however have been bred to contain appreciable amounts of vitamin A than the conventional yellow maize. Vitamin A maize has been shown to contribute to the intake of vitamin A in meals and to improve vitamin A status when consumed regularly. Vitamin A by nature is easily degraded in foods when exposed to air, heat, and light. These losses occur during immediate post-harvest drying and storage of maize grains, as well as during cooking, storage & marketing of maize products including flour.

VITAMIN A LOSSES DURING DRYING & STORAGE OF GRAINS		
TREND IN LOSSES DURING DRYING & STORAGE OF GRAINS	**PRACTICES THAT CONTRIBUTE TO VITAMIN A LOSSES**	**STEPS TO REDUCE VITAMIN A LOSSES**
	• Drying maize grains under direct sunlight • Storing grains that have been infected with insects • Storing grains directly in sacks or other materials that are not air free	• Dry maize grains under shade and away from direct sunlight. Alternatively, use mechanical dryers • Dry grains until the moisture content is between 11 and 13% • Store only grains that are free of insect contamination • Keep moisture content below 13% during storage • Sell or use up grains in batches following the First In, First Out (FIFO) rule

VITAMIN A LOSSES DURING STORAGE & MARKETING OF MAIZE FLOUR		
TREND IN LOSSES DURING STORAGE & MARKETING OF MAIZE FLOUR	**PRACTICES THAT REDUCE VITAMIN A**	**PRACTICES THAT RETAIN VITAMIN A**
	• Storing flour in transparent, packages • Exposing maize flour to air or light during storage or marketing • Keeping milled flour for long in storage	• Maintain moisture level in milled flour between 10 and 13% moisture content • Store grains and mill in batches for home use (retention within the first two weeks of storage is highest) • Keep milled flour away from air, light and sun during storage • Store/package maize flour in air-free materials, or in double-lined sacks • Keep milled or packaged maize flour covered or under shade • Package, sell or buy maize flour as small sizes of 1kg, 2kg,or 5kg • Minimize storage period of maize flour following the First In, First Out (FIFO) rule

MAJOR BY-PRODUCTS FROM ORANGE FLESH SWEET POTATO USED IN THIS RECIPE BOOK

INTRODUCTION

Orange Sweet potato roots are a biofortified variety of sweet potatoes that is in great demand because of their high beta-carotene content, attractive Color, high fiber (2.5-3.3g/100g) content, and an excellent source of strong antioxidants. It is also a good source of potassium, and vitamins C and E.

OSP is a perishable crop just like its non-biofortified variety. It is either used up immediately, stored for a few days before use, or processed into puree or flour for future use. It is high-yielding, disease-resistant, and drought-tolerant. OSP is high in beta-carotene (Precursor of vitamin A) and provides up to 100% of the daily vitamin A needs of a child.

There are currently 3 varieties propagated in Nigeria. OSP is lightweight, and very orange Colored because of the high content of vitamin A. OSP is consumed in several ways making it useful for both household and commercial purposes. It can be boiled, roasted, baked, and transformed into flour for further processing into several other consumables.

1. ORANGE SWEET POTATO PUREE

This is a very important by-product of orange sweet potato that has contributed greatly to the uptake of OSP for commercial purposes It retains more of its beta-carotene when compared with its flour form. This nutritious and naturally sweet puree is used in producing OSP juice and in combination with wheat flour in the production of bread and many other confectioneries. It has been established that it is more economical to use OSP puree in confectioneries than using flour because 1kg of OSP flour requires about 5-7kg of fresh OSP roots, whereas, 1kg of OSP puree only requires about 1.5kg of OSP roots. OSP purees are used to substitute 30-60% of the flour in a wide range of processed snacks.

Used this way, OSP puree increases the nutritive values of the products, reduces reliance on imported wheat, and reduces the quantity of sugar used as well as the overall production cost for investors in the confectionery sector.

At the household level, OSP puree forms part of the ingredients in the preparation of complementary foods and juice.

2. ORANGE SWEET POTATO FLOUR

This is non-fermented, orange-colored flour, processed by drying and milling sliced OSP roots. OSP flour retains appreciable amounts of beta-carotene during, contributing to the intake of vitamin A by consumers of its products. It also adds natural Color, sweetness and flavor to food products. OSP flour is not used wholly in baked products, but oftentimes in combination with wheat flour.

NUTRIENT PROFILE OF SOME BIOFORTIFIED FOOD RECIPES

S/N	Product Name	% MC	% Ash	% Fat	% Protein	% Sugar	CHO	Energy (kcal)	β carotene (ug/g)	Vitamin A ug Retinol	Sodium (ppm)	Iron (ppm)	Zinc (ppm)
1	Eba	35.5	0.49	0.81	0.02	1.31	63.14	196.7	12.54	1.045	27.22	19.90	8.14
2	Yellow Fufu (Meal)	34.8	0.14	0.89	0.12	1.11	64.05	200.5	2.27	0.189	3.95	11.43	6.84
3	Yellow Lafun Meal	35.8	0.35	0.79	0.00	0.98	63.09	196.4	24.93	2.077	19.53	18.59	7.38
4	Abacha	36.1	0.15	0.19	0.00	1.57	63.60	192.5	0.27	0.022	54.12	12.81	9.79
5	African Salad	12.9	1.73	6.73	1.30	3.09	77.31	296.4	7.06	0.588	247.40	62.72	10.02
6	Combobite Cereal	0.6	2.12	31.28	2.80	10.88	63.18	479.4	0.80	0.066	196.95	21.66	11.04
7	Combobite	12.6	0.84	0.22	2.06	5.83	84.30	261.1	21.72	1.810	101.42	22.48	9.66
8	Queens/ Celebration Cakes	10.1	1.46	23.68	1.48	23.94	63.30	407.5	2.64	0.220	188.63	21.45	12.33
9	Egg Roll	9.1	1.34	6.40	7.64	10.61	75.49	307.0	0.28	0.023	161.00	20.14	11.00
10	Chinchin	10.1	1.46	23.68	1.48	23.94	63.30	407.5	2.64	0.220	188.63	21.45	12.33
11	Cookies	2.4	2.33	27.13	0.01	10.54	68.09	448.5	1.32	0.110	257.97	27.08	12.56
12	Fish Roll	11.7	2.57	18.28	6.87	2.51	60.55	366.8	1.88	0.157	289.13	21.53	9.87
13	Meat Pie	8.7	0.86	6.65	7.11	1.76	76.65	311.1	6.97	0.581	166.39	17.15	15.75
14	Pancakes	14.5	1.77	22.35	1.88	16.25	59.47	385.2	5.27	0.439	220.09	21.41	12.31
15	Waffles	14.5	1.77	22.35	1.88	16.25	59.47	385.2	5.27	0.439	220.09	21.41	12.31

S/N	Product Name	% MC	% Ash	% Fat	% Protein	% Sugar	CHO	Energy (kcal)	β carotene (ug/g)	Vitamin A ug Retinol	Sodium (ppm)	Iron (ppm)	Zinc (ppm)
16	Cassava Balls/ Croquette	6.3	2.22	16.49	3.53	2.82	71.48	373.4	2.01	0.168	254.59	21.62	10.19
17	Cassava Bread	16.6	0.64	5.19	2.54	10.78	75.03	279.4	21.26	1.772	70.95	23.07	26.45
18	Cassavita (Ojakpa)	33.1	0.26	0.90	0.41	3.41	65.36	205.4	0.97	0.081	18.64	17.05	8.68
19	Cassarita	10.0	1.16	14.11	1.81	1.46	72.91	351.1	1.85	0.154	97.52	24.46	7.42
20	Casstard	85.9	0.07	0.06	0.64	1.18	13.31	42.4	4.66	0.389	3.22	2.79	0.90
21	Cassalad	16.7	0.41	1.43	0.72	1.67	80.70	257.2	4.30	0.358	19.13	12.96	7.92
22	Cassconut	4.7	2.18	13.47	1.35	7.58	78.30	360.2	1.67	0.139	216.47	34.23	8.70
23	Casspla Balls	7.6	1.96	9.86	3.17	14.63	77.37	330.4	2.47	0.206	157.19	40.20	10.68
24	Cassmoi	62.9	1.66	2.70	7.85	1.70	24.92	122.6	4.90	0.409	13.67	12.37	35.51
25	Pap	12.7	1.67	4.73	3.56	0.70	77.30	285.1	1.30	0.108	215.85	27.40	9.63
26	Eko/Agidi/Kafa	15.5	0.22	0.62	1.24	1.21	82.46	256.7	0.18	0.015	16.50	11.50	7.42
27	Maize & Bean Pottage	8.7	1.30	14.58	12.00	10.28	63.37	357.3	1.70	0.141	14.16	49.19	72.21
28	Maize Moi	76.4	1.13	54.58	4.23	1.24	36.30	395.0	8.64	0.720	14.00	6.45	20.00
29	Maize Plantain Pudding	14.3	1.23	1.10	0.34	12.42	83.00	259.9	7.71	0.643	155.95	27.02	10.32
30	Maize Porridge (Egbo)	13.7	2.08	1.11	1.69	2.19	81.44	259.4	0.44	0.036	184.72	12.81	6.54

S/N	Product Name	% MC	% Ash	% Fat	% Protein	% Sugar	CHO	Energy (kcal)	β carotene (ug/g)	Vitamin A ug Retinol	Sodium (ppm)	Iron (ppm)	Zinc (ppm)
31	Dan-Malele	13.9	0.60	0.94	2.01	1.21	82.57	262.2	0.69	0.058	125.27	21.45	7.11
32	Tom Brown	15.6	0.44	0.63	1.61	3.56	81.72	255.7	0.68	0.057	37.21	18.77	9.65
33	Tuwo Masara	14.9	0.25	1.02	1.46	1.56	82.32	260.6	0.52	0.044	13.90	19.78	10.26
34	Masa/Waina	22.2	0.71	7.63	1.28	7.31	68.21	277.1	0.67	0.056	97.14	14.32	7.39
35	Tanfiri	13.7	2.08	1.11	1.69	2.19	81.44	259.4	0.44	0.036	184.72	12.81	6.54
36	Kokoro	1.2	1.26	4.27	4.28	5.56	89.03	318.4	0.32	0.026	134.74	84.99	18.67
37	Kunu Zaku	23.1	0.08	0.15	0.30	10.17	76.37	231.4	0.91	0.076	26.65	10.02	7.66
38	Dakuwa	13.7	2.08	1.11	1.69	2.19	81.44	259.4	0.44	0.036	184.72	12.81	6.54
39	Papsoy	14.9	0.15	0.97	2.61	1.71	81.34	260.6	0.55	0.046	19.42	19.90	7.33
40	Dambu	28.1	1.42	5.38	1.32	3.95	63.75	243.6	14.89	1.241	192.58	30.18	9.04
41	Burabusko	30.5	0.23	1.31	0.62	0.70	67.38	215.7	1.41	0.118	65.35	11.39	6.54
42	Fate	14.7	1.05	5.61	3.68	1.95	74.96	286.4	3.43	0.286	157.81	27.35	9.33
43	Bionugget	0.1	1.36	10.70	6.11	25.55	81.72	359.8	0.96	0.080	49.04	50.51	23.30
44	Biocrunch	0.2	2.58	16.48	13.04	8.37	67.72	390.6	0.66	0.055	252.57	58.88	23.47
45	Grits Porridge	35.8	0.08	0.47	0.65	1.20	62.95	195.1	19.16	1.597	14.87	21.49	6.58
46	Boiled/Steamed OSP	14.4	0.78	0.38	0.21	0.97	84.27	256.9	0.82	0.068	103.03	17.12	8.44
47	Orange Sweet Potato Meal	28.7	0.62	1.38	0.87	15.90	68.40	220.2	5.68	0.473	17.36	34.71	12.46

S/N	Product Name	% MC	% Ash	% Fat	% Protein	% Sugar	CHO	Energy (kcal)	β carotene (ug/g)	Vitamin A ug Retinol	Sodium (ppm)	Iron (ppm)	Zinc (ppm)
48	Fried Orange Sweet Potato	6.3	2.22	16.49	3.53	2.82	71.48	373.4	2.01	0.168	254.59	21.62	10.19
49	Orange Sweet Potato Bread	16.6	0.64	5.19	2.54	10.78	75.03	279.4	21.26	1.772	70.95	23.07	26.45
50	Orange Sweet Potato Chinchin	33.1	0.26	0.90	0.41	3.41	65.36	205.4	0.97	0.081	18.64	17.05	8.68
51	Orange Sweet Potato Buns	10.0	1.16	14.11	1.81	1.46	72.91	351.1	1.85	0.154	97.52	24.46	7.42
52	OSP Doughnut	85.9	0.07	0.06	0.64	1.18	13.31	42.4	4.66	0.389	3.22	2.79	0.90
53	Orange Sweet Potato Biscuits	16.7	0.41	1.43	0.72	1.67	80.70	257.2	4.30	0.358	19.13	12.96	7.92
54	Orange Sweet Potato Pancake	4.7	2.18	13.47	1.35	7.58	78.30	360.2	1.67	0.139	216.47	34.23	8.70
55	OSP Mixed Vegetable Salad	7.6	1.96	9.86	3.17	14.63	77.37	330.4	2.47	0.206	157.19	40.20	10.68
56	Orange Sweet Potato Chops	62.9	1.66	2.70	7.85	1.70	24.92	122.6	4.90	0.409	13.67	12.37	35.51
57	OSP Smoothie	12.7	1.67	4.73	3.56	0.70	77.30	285.1	1.30	0.108	215.85	27.40	9.63
58	OSP Juice	15.5	0.22	0.62	1.24	1.21	82.46	256.7	0.18	0.015	16.50	11.50	7.42

SELECTED RECIPES FOR CHILDREN AND SCHOOL FEEDING PROGRAMS

Generally, children should be introduced to adult foods from when they turn 6 months. The recipes in this book can be adapted as complementary foods as well as for older children including school-age children. Hence, they can be incorporated into private and public-school feeding programs in primary and secondary schools. The recipes on this page, selected from the different sections of this recipe book are recommended for mothers, school caterers, and others that are involved in the development of menus for children in schools.

COMPLIMENTARY FOODS (SUITABLE FOR CHILDREN 6 MONTHS TO ABOUT 2 YEARS)

- Casstard
- Cassmoi
- Tom Brown
- Steamed OSP *(mashed)*
- Papsoy
- Maize Moi
- Grits Porridge
- Pap

CHILDREN FRIENDLY FOODS (SUITABLE FOR SCHOOL AGE CHILDREN FROM PRE-PRIMARY LEVEL)

- Casspla Balls
- Cassarita
- Breads *(Sandwich)*
- Maize porridge Egbo *(with beans)*
- Masa
- OSP juice
- OSP Smoothie
- OSP chops

NUTRITIOUS SNACKS

- Cassconut
- Combobite
- Cookies/Biscuits
- Kokoro
- Dakuwa
- Bionugget
- Biocrunh

HarvestPlus improves nutrition and public health by developing and promoting biofortified food crops that are rich in vitamins and minerals and providing global leadership on biofortification evidence and technology. HarvestPlus is part of the CGIAR and is based at the International Food Policy Research Institute (IFPRI), a CGIAR research center.