



16
DELICIOUS
RECIPES



Small fishes

COOKBOOK



Easy-to-prepare Recipes

Dishes | Soups | Sauces | Porridge

1ST EDITION

The three
small pelagic
fishes in
Uganda

Engraulicypris bredoi (**Muziri**)



Brycinus nurse (**Ragoogi**),



Rastrineobola argentea
(**Mukene**)




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List of Abbreviations

g	grams
Kg	Kilogram
L	Litre
ml	millilitre
SDG	Sustainable Development Goals
SPFs	Small Pelagic Fishes
tbsp	Tablespoon
tsp	Tea spoon
WHO	World Health Organization



The contribution of Small Pelagic Fishes (SPFs), namely: *Rastrineobola argentea* (Mukene), *Brycinus nurse* (Ragoogi), and *Engraulicypris bredoi* (Muziri) to nutrition, income and livelihoods of the population is recognized by the Government of Uganda. Currently, the catches of the large fish species such as the Nile perch are declining due to increased fishing pressure brought about by increase in local, regional and international demand. In addition, there are high post-harvest losses in the fishery. On the contrary, SPFs dominate fish catches in the Ugandan lakes, thus providing an opportunity to boost nutrition and incomes particularly among the vulnerable communities. However, the SPFs are not being consumed in sufficient quantities due to: high levels of adulteration with grit, soil and sand; off-flavors (smelly fish); bitter taste and lack knowledge of the different methods of preparation. Traditionally, the SPFs are regarded as fish for the poor and livestock.

This cookbook was developed by the NutriFish project team at Makerere University with the aim of increasing the consumption of the SPFs. Currently per capita fish consumption in Uganda is between 10-12 Kilograms per person per year which is below the internationally recommended amount of 26 kilograms per person per year according to the Food and Agriculture Organization (FAO). The NutriFish project is implemented in Uganda by the Department of Zoology, Entomology and Fisheries Sciences - Makerere University in partnership with the National Fisheries Resources Research Institute (NaFIRRI) - National Agricultural Research Organization (NARO), NUTREAL Limited and McGill University, Canada. The project is funded by the Australian Center for International Agricultural Research (ACIAR) and the International Development Research Center (IDRC), Canada. The goal of the project is to increase availability, access and consumption of underutilized small fishes and processing by-products for sustainable food, nutrition security and better livelihoods of vulnerable groups in Uganda.

The project recognizes the nutritive value of the SPFs as they are rich in bioavailable micronutrients including iron, zinc, calcium, vitamin A and essential fatty acids (omega 3, 6). Besides, they are consumed whole, which enhances their nutritional benefits compared to the large fishes. Most consumers, including vulnerable groups in rural and peri-urban communities can purchase SPFs in small quantities at relatively affordable prices. The SPFs are therefore crucial in improving human nutrition, particularly during the first 1000 days of life (from conception to the second birth day) as they contribute to maternal health and better child development.

The cookbook contains easy-to-cook recipes for dishes, soups, sauces and porridge. The recipes were developed based on available common local ingredients, consumer preferences in the different communities and affordability by rural and peri-urban communities. Most of the ingredients can be grown locally or purchased in the local markets. By using these recipes, it is envisaged that the households will have the opportunity to consume SPFs in diverse forms. The high micronutrient content inherent in the SPFs included in the recipes will particularly benefit the vulnerable groups such as women of child bearing age and children below the age of five. These recipes have been demonstrated in selected fishing communities and peri-urban areas in Kampala.

I hope that the use of the recipes will change attitudes towards consumption of the SPFs for the better and correspondingly increase consumption of these nutritious fishes among the populations. Although the cookbook was developed for Uganda, it can be adapted by other communities within the East and Central African region where SPFs are available and accessible.

It is my strong desire and trust that the use of this cookbook will result in increased consumption of the SPFs, improved nutrition and better health, particularly among the vulnerable groups in Uganda and beyond.



Hon. Hellen Adoa (MP)

Minister of State for Fisheries


Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)

1.0 Introduction

Uganda's fisheries resources contribute to livelihoods, employment, foreign exchange earnings, food and nutritional security. Three Small Pelagic Fishes (SPFs), namely: *Rastrineobola argentea* (Mukene), *Brycinus nurse* (Ragoogi), and *Engraulicypris bredoi* (Muziri) dominate fish catches in Ugandan lakes, accounting for more than 50% of the catch. Moreover, the SPFs can keep up to three months when well preserved and kept in well ventilated stores which are not infested with pests such as insects and rodents. Traditionally, SPFs have been regarded as food for the poor and livestock, yet they are rich in bioavailable micronutrients such as iron, zinc, calcium, vitamin A and essential fatty acids (Omega 3, 6) and protein. In addition, the small size of the SPFs allows them to be easily apportioned among household members at a meal. Most consumers, including vulnerable groups in rural and peri-urban communities can purchase SPFs in small quantities at relatively affordable prices. The SPFs therefore hold potential to improve human nutrition, particularly during the first 1000 days of life (from conception to the second birth day).

Consumption of SPFs during the first 1000 days is known to be positively associated with increased growth and better cognitive development in children. However, the SPFs have not been systematically included in food and nutrition security interventions in Uganda. As such, Uganda's annual per capita fish consumption, estimated at 10-12 Kg, is low compared to the 26 Kg recommended by the World Health Organization (WHO). The low consumption of SPFs is attributed to various reasons, including: high levels of adulteration with grit, soil and sand; off-flavors (smelly), bitterness taste associated with spoilage, pride and prejudice about eating SPFs as they are considered food for low income earners and feed for livestock, scanty information on nutritional values and lack of knowledge on preparation methods.

There is need to include SPFs in simple and affordable food recipes based on locally available and commonly consumed foods as a way of increasing consumption and ultimately improved nutrition.




Increased consumption of SPFs will help build a smart, strong, healthy nation and contribute to the achievement of several Sustainable Development Goals, including: SDG 2 - End hunger, achieve food security and improved nutrition, and promote sustainable Agriculture; SDG 3 - Ensure healthy lives and promote well-being for all at all ages; and SDG 4 - Ensure inclusive and equitable quality education and promote life-long learning opportunities. It will also contribute to achievement of the UN Decade of Action on Nutrition (2016-2025).

Food preparation is an integral part of consumption at household level. It consists of pre-processing methods such as washing, chopping, blending and milling. Additional methods may entail steaming, stewing, baking, boiling and frying. As a contribution to increase consumption of the SPFs, the NutriFish project in collaboration with key stakeholders, developed and tested fish-based recipes. The cookbook contains recipes for dishes, sauces, soups and porridge which will indisputably increase the consumption of the SPFs in different forms at household level.

The purpose of this cookbook is to promote the consumption of SPFs by providing simple and easy to use recipes (step by step instructions for food preparations) that will increase their consumption. The cost for each of the fish-based recipes has been estimated but may differ depending on prices of ingredients.

The cookbook is intended for households, communities, local government staff (Fisheries, Community Development Officers, Nutrition staff and Village Health teams), line ministries (Health, Education, Agriculture and Fisheries) and non-governmental organizations.

The cookbook can be used alongside other resources, such as the Uganda food and Nutritional Strategy and Investment Plan (2004), Uganda Food and Nutrition Policy, Uganda Nutrition Action Plan (2011-2016), National Food and Nutrition Strategy (2005) to promote consumption of SPFs particularly among vulnerable groups (women of reproductive age and children under the age of five years).



Health benefits associated with consumption of the Small Pelagic Fishes (SPFs)

- Contain calcium which is essential for strengthening the bones.
- Rich in omega 3 and 6 which are important for proper brain development and functioning; protects against heart attack and stroke.
- Rich in proteins which builds and repairs body tissues.
- Sources of energy.
- Contain micronutrients such as vitamins, minerals and fatty acids (for details on health benefits, please refer to the NutriFish brochure on nutritional importance of SPFs).

Mukene delight

Ingredients

- ½ kg of sweet potatoes
- ½ kg of fresh Cassava
- ½ of medium sized cabbage
- 2 tbsp of blue band
- 500 g of mukene
- 1 tsp of salt
- 1 medium sized onion
- 1 leveled tsp of coriander
- 2 eggs (optional)
- ½ liter of milk (optional)
- 1 medium sized carrot



Steps to Prepare

1. Wash the mukene (if necessary) before soaking it with salt in 200 ml of potable water over night
2. Peel sweet potatoes and cassava
3. Chop sweet potatoes into 10 gram portions
4. Chip the cassava
5. Put sweet potatoes at the bottom of the saucepan and the chipped cassava on top and add 1L of water
6. Add one tsp of salt
7. Cover and cook until soft
8. While sweet potatoes and cassava is cooking, cut the cabbage into thin stripes
9. Cut the onions into small portions or grate
10. Grate carrots
11. Mix cabbage, onions, carrots and spices of your choice thoroughly
12. Smear the oven dish with a teaspoon of blue band and dust with baking flour (pour baking flour in a saucepan, shake to ensure they have a thin line)
13. Add the first layer of cabbage mixture (onions, carrots) on top of the mashed cassava & sweet potatoes
14. Add the mukene
15. Add another layer of vegetable
16. Add the last layer of mashed sweet potatoes and cassava
17. Beat eggs with a whisk or table spoon
18. Garnish (enhance its appearance) with the last layer of mashed sweet potatoes and cassava
19. Wrap it with foil and put in an oven at 180°C
20. Serve while hot.

Estimated cost is UGX 8,000, Servings: 5 persons

Mukene-n-potato

Ingredients

Three large Irish potatoes

100ml of milk

200g of corn starch

200g of grated carrots

1/2 tsp of salt

1 medium sized onion

200g of mukene

Curry powder

Paprika

Black pepper,

Tomatoes

Vegetable oil



Steps to Prepare

1. Pre roast mukene
2. Wash with hot water
3. Fry onions, add tomatoes & cook for 3 minutes
4. Add mukene
5. Add salt, curry powder, paprika and black pepper, cook for 7 minutes and put a side
6. Peel Irish potatoes and dice before boiling in water with salt till soft
7. Drain excess water and mash with milk, corn flour and grated carrots to a soft consistence
8. Put 20ml of vegetable oil in a frying pan
9. Place a pancake cutter on the frying pan
10. Scoop two tbsp of potato mash, put it in the pancake cutter
11. Add 5g of cooked mukene on top
12. Add another layer of 1 tbsp of mashed potato on top of the mukene (sandwich mukene between two layers of potato mash)
13. Take out the pancake cutter
14. Turn the other side to brown
15. Remove from the frying pan and leave it to cool before serving.

Estimated cost is UGX 4,000, Servings: 3 persons

Mukene potato balls

Ingredients

Three large Irish potatoes
 100ml of milk
 200g of corn starch
 1/2 tsp of salt
 1 medium sized onion
 200g of SPFs
 Curry powder
 Oregano/spices of your choice
 Black pepper
 Tomatoes
 Vegetable oil
 Bread crumbs
 An egg



Steps to Prepare

1. Pre roast mukene to attain a crunchy texture
2. Wash with hot water
3. Fry onions, add tomatoes and cook for three minutes
4. Add mukene
5. Add salt, curry powder, oregano & black pepper, cook for 7 minutes and put a side
6. Peel Irish potatoes and dice before boiling in water with salt till soft
7. Drain excess water, and mash with milk and corn flour to a soft consistence
8. Scope 1 tbsp of mashed potatoes
9. Put in the hollow of your palm
10. Use your hand to make a depression in the mash
11. Scope a tsp of cooked mukene and place it into the hallow of potato mash, and roll it in to a ball and put it a side
12. Wet the surface of the ball with milk, and then add a layer of wheat flour before rolling it beaten eggs
13. Finish by rolling it in a bowl of bread crumbs and rest it on a tray
14. Heat 100ml of vegetable oil to cover the bottom of the frying pan
15. Place the balls in the frying pan
16. Gently turn till all sides are golden brown
17. Remove from the pan & serve hot.

Estimated cost is UGX 3,000

Servings: 4 persons

Fish and vegetable Soup

Ingredients

250g of fish powder

4 spoons of pumpkin leaves, dodo, nakati,

spinach or any leafy vegetable of choice

25ml of vegetable oil

2 medium sized tomatoes

1 big onion

1/2 leveled tsp of salt

2 spoons of corn flour

1L of water



Steps to Prepare

1. Wash and finely chop the leafy vegetables
2. Steam/boil the leafy vegetable till tender
3. Blend into paste
4. Chop/dice tomatoes and onions
5. Put oil in the sauce pan and allow it to heat for a minute
6. Add onions
7. Add tomatoes
8. Add fish powder
9. Add the leafy vegetable paste
10. Add salt
11. Add 1 tbsp of wheat flour
12. Stir while adding little water until the desired consistency
13. Lower the heat and simmer for 10 minutes

Estimated cost is UGX 5,000

Servings: 5 people

Steamed Mukene (Luwombo)

Ingredients

500g of mukene

½ leveled teaspoon of salt

4 cloves of garlic

3 stems of Parsley (optional)

1 medium sized onion

2 medium carrots

300g of green peas

Gravy of your choice

1 tbs margarine/butter

5 Medium sized Irish potatoes

500gms of maize flour and 500g of matooke



Steps to Prepare

1. Wash mukene of your choice thoroughly with clean water.
2. Mix washed mukene with salt, grated garlic, onions and finely chopped parsley (parsley optional)
3. Wrap as luwombo or put it in a metallic dish with a fitting lid to ensure flavor retention
4. Steam (on top of matooke or in a steam jack) for 2 hours
5. Peel Irish potatoes, add salt and boil for 30 minutes and then mash with margarine/butter
6. Boil green Peas with a pinch of bicarbonate to retain the green color for 15-25 minutes
7. Slice, dice or grate carrots and serve

Mukene-n- mushrooms

Ingredients

- 100 ml of milk/water
- 100 g of fish powder (can use whole fish)
- 250g of fresh mushrooms
- One medium sized onion
- 1tsp of ginger
- ½ leveled tsp of salt
- 1 medium red pepper
- 1 tsp of curry powder
- 1 tsp of coriander
- ½ tsp of black pepper
- 25ml of vegetable oil/olive oil
- 2 medium sized tomatoes



Steps to Prepare

1. Dice tomatoes, onions and red pepper and keep them separate
2. Cut mushrooms into small portions
3. Heat vegetable oil on a pan under medium heat
4. Add onions and stir for 2 minutes
5. Add mushrooms and salt and stir for 5 minutes and then cover to cook for 10 minutes
6. Add red pepper and stir for 5 minutes
7. Add curry powder and stir for 5 minutes
8. Add tomatoes and cover for 5 minutes
9. Add fish powder and stir well
10. Add 100ml of milk/water (milk is optional) & simmer on low heat for 10 minutes

Estimated cost is UGX 8,000

Servings: 7 persons as a side dish

Mukene-n-beans

Ingredients

500g of dry beans (can use fresh as well)

250g of mukene of your choice

1 tsp of salt

50ml of vegetable oil

4 large tomatoes

2 large onions

1 tbsp of Muchuzi mix

Chili (red pepper)



Steps to Prepare

1. Sort, wash and soak the beans in water for 6 hours
2. Boil beans till almost tender under medium heat
3. Add salt and continue to cook under medium heat till tender
4. Roast mukene for about 5 minutes
5. Wash mukene with warm water and put it a side
6. Put vegetable oil in a saucepan
7. Add sliced onions and fry till golden brown
8. Add tomatoes, cover and cook for 3 minutes
9. Drain the liquid from the cooked beans and put aside
10. Add beans in tomatoes and cook for 3 minutes
11. Add mukene and rub-in for 3 minutes
12. Add muchuzi mix or any spice of choice
13. Add the drained liquid from beans, stir briefly and cover to simmer for 10 minutes

Estimate cost is UGX 5000

Serving: 10 persons

Mukene groundnuts stew

Ingredients

250g of pre-roasted peanut paste

200g of mukene

4 large tomatoes

2 large onions

1 leveled tsp of salt

1.5L of water

1 tsp of muchuzi mix (optional)



Steps to Prepare

1. Pre-roast mukene
2. Wash and soak mukene in clean water for 10 minutes
3. Put 1.5 L of water in a saucepan
4. Add chopped onions and tomatoes to the water and bring to boil
5. Mix the paste with 200 ml of warm water to make a soft paste
6. Add the paste to the boiling water while stirring and cook for 40 minutes under low heat
7. Add mukene, muchuzi mix (optional) and salt and cover to simmer for 20 minutes

Estimated cost is UGX 5, 000

Servings: 6 persons

Mukene-n-cabbage

Ingredients

- 200 g of mukene
- 1Kg of sliced cabbage
- 1 large onion
- 2 large tomatoes
- 1 leveled tsp of muchuzi mix
- 25ml of vegetable oil
- 1 leveled tsp of salt



Steps to Prepare

1. Pre-roast mukene for 5 minutes
2. Wash and soak mukene with salt for 15 minutes
3. Put vegetable oil in a saucepan and heat for 1 minute
4. Add chopped onions and fry for 2 minutes
5. Add tomatoes and fry for 3 minutes
6. Add sliced cabbage
7. Add mukene, salt and muchuzi & cover to simmer for 7 minutes under low heat.

Estimated cost is UGX 4,000

Servings: 5 persons, as a side dish

Mukene-n-okra

Ingredients

- 2 medium sized tomatoes
- 15 pieces of okra
- 200g of mukene
- 1 large onion
- 1 leveled tspn of salt
- 25ml of vegetable oil
- 1L of water



Steps to Prepare

1. Pre-roast mukene
2. Wash and soak with salt for 10 minutes
3. Wash and chop okra and put aside
4. Put vegetable oil in a saucepan and heat for 1 minute
5. Add onions and fry for 1 minute
6. Add tomatoes and cook for 2 minutes
7. Add mukene and cook for 5 minutes
8. Add water and bring it to boil
9. Add chopped okra and cook for 15 minutes

Estimated cost is UGX 3,400

Servings: 3-4 persons

Mukene-n-jute leaves

Ingredients

- 4 tbsp of peanut butter/odii (optional)
- 1Kg of jute leaves
- 250g of mukene
- 1 medium onion
- 1 tbsp of local salt
- 1 leveled tsp of salt
- 1L of water



Steps to Prepare

1. Pre-roast mukene
2. Wash and soak with salt for 10 minutes
3. Put water in the saucepan and bring it to boil
4. Add mukene, salt and boil for 10 minutes
5. Add local salt
6. Add chopped okra and cook for 10 minutes
7. Add onion and cook for 3 minutes
8. Add peanut butter/odii and simmer for 5 minutes

Estimated cost is UGX 5,000

Servings: 8-10 persons as a side sauce

Mukene Omelette

Ingredients

- 1/8 tsp of ground black pepper
- 250 g of mukene
- 1/8 tsp of garlic powder
- 4 large eggs
- ¼ tsp of salt
- Black pepper
- Vegetable oil
- Corn starch



Steps to Prepare

1. Beat the eggs, salt, garlic powder, black pepper, and corn starch and put a side
2. Pre-roast mukene
3. Wash and soak mukene for 10 minutes
4. Slightly squeeze the mukene to remove excess water and put a side
5. Heat oil in a pan, pour around ¼ cup of the mixture at a time and cook for 2-3 minutes then add the mukene and turn to cook for 2-3 minutes
6. Continue with step 5 until done
7. Serve and enjoy

Estimate cost is UGX 5,000

Servings: 4 persons

Mukene pizza

Ingredients

- 500g of wheat flour
- ½ tsp of yeast
- 100ml of water
- ½ tps of salt
- ½ tsp of sugar
- Grated cheese of 50g
- 30g of mukene
- Green paper, tomato paste,
- Onion, poultry viennas or any
- Topping of your choice



Steps to Prepare

1. Mix the dough and let it rest until it raises
2. Pre-roast mukene to get a crunchy texture
3. Wash in hot water
4. Put mukene in the pan, add chopped onions, poultry viennas and green paper (oil is optional) and cook for 5 minutes
5. Roll the dough into a round shape
6. Spread the tomato paste evenly using a back or a spoon on the rolled dough
7. Spread the cooked mukene evenly on top of the tomato sauce
8. Spread grated cheese evenly
9. Place it in an oven at 1800c for 5-10 minutes
10. Remove and serve

Estimate cost is UGX 15,000

Servings: 4 persons



Mukene millet porridge

Ingredients

250 g of millet flour

10 g (1 leveled tbsp) of powdered mukene

1000 ml of water

Sugar

500 ml of milk

Steps to Prepare

1. Boil water in a saucepan
2. Mix the soya, millet flour and mukene powder with little cold water to make a paste
3. Pour it in the boiling water while stirring to get a fine paste
4. Add milk
5. Allow it boil for 10-20 minutes depending on taste
6. Add sugar to your desired taste

Estimated cost is UGX 5,000

Servings: 4-5 persons



Mukene maize porridge

Ingredients

250 g of maize flour

10 g of powdered mukene

Sugar

500ml of water

500ml of milk (optional)

Steps to Prepare

1. Boil water in a saucepan
2. Mix the flour and mukene powder with little cold water to make a paste
3. Pour it in the boiling water while stirring to get a fine paste
4. Add milk
5. Allow it boil for 10 minutes
6. Add sugar to your desired taste

Estimated cost is UGX 5,000

Servings: 4-5 persons



Mukene-millet-soya composite porridge

Ingredients

- 100 g of soya flour
- 100 g of millet flour
- 10 g of powdered mukene
- Sugar
- 100 ml of water
- 500 ml of milk

Steps to Prepare

1. Boil water in a saucepan
2. Mix the soya, millet flour and mukene powder with little cold water to make a paste
3. Pour it in the boiling water while stirring to get a fine paste
4. Add milk
5. Allow it boil for 10-20 minutes depending on taste
6. Add sugar to your desired taste

Estimated cost is UGX 5,000

Servings: 4-5 persons



Dr. Margaret Masette is a Researcher, Lecturer and Consultant with 40 years' experience in fish handling, processing, quality assurance, marketing and product development. She is currently Work Package 3 Team Leader under the NutriFish Project. She has authored several peer-reviewed papers, book chapters and operational manuals. She is widely traveled on the African, European and Asian continents, where she has participated in developing nutritious food products for communities.

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Dr. Jackson Efitre has over 20 years' experience in Research collaboration at national, regional and international levels in Fisheries, climate Change and capacity building, among others. He is currently a Senior Lecturer at the Department of Zoology, Entomology and Fisheries Sciences, Makerere University. He is also the Principal Investigator of the NutriFish Project.

This cookbook contains easy-to-follow recipes for micronutrient-rich Small Pelagic Fishes available in the Ugandan waters. It aims to promote consumption of Small Pelagic Fishes that would otherwise be relegated to animal feed production. Although the booklet was developed in the context of the Small Pelagic Fishes of Uganda, it can be adapted by other communities within the African region where they are available and accessible.

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