



Soybean Processing and Recipes

MANUAL AND RECIPES FOR HOUSEHOLD USE
CATHOLIC RELIEF SERVICES TANZANIA/FARMER-TO-FARMER



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Acknowledgements

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Many initial recipes were developed through a workshop in Njombe in July 2015, arranged by IITA through N2Africa project in collaboration with Catholic Relief Service (CRS) and Rural Urban Development Initiative. These recipes have been adapted (soy milk) and combined with additional recipes (lishe, soy beverage, soy meat, kebabs, initial soy processing) developed by Kelly Higgins and Jane Leland.

Photos courtesy of Jane Leland, Farmer-to-Farmer Volunteer, and Mwantumu Omari, N2Africa Business Development Officer.



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Introduction

The “meat of the field” is a name often given to soy by farmers, and for good reason. It contains more protein than any other grain or legume and it is among few plant-based foods that offers a complete profile of all the amino acids humans need for adequate nutrition. Moreover, the protein in soybeans is similar to animal protein in digestibility and absorption, meaning it is easily incorporated and used within the body for growth, repair, and maintenance.



Children enjoy soy milk, which provides essential nutrition for their growing bodies

Soybean has diverse potential in the kitchen. It can be used in dishes the way the common bean is used (keeping in mind it is best to avoid soybean contact with cold water for the sake of palatability). It can be prepared to be eaten as one would peanuts. It can be processed into a milk or a meat substitute, which keeps longer and is more easily carried. And, it can be ground into flour versatile enough to be used in numerous other recipes. In fact, baked goods prepared with flour from soy that has not been defatted (as is typical in household settings) tend to be softer and moister than their conventional counterparts.

This manual aims to document the preferred method for processing raw soybeans and common foods made from them, adapted for household situations with minimal equipment and technology requirements. It can be used by extension agents as a training manual or copied and distributed to households.



Ugali made with soy flour

Nutrition

In Tanzania, children under five, women of reproductive age (especially pregnant and lactating women), and adolescent girls are most affected by undernutrition. Undernutrition is among the major culprits of childhood mortality and stunting. Poor nutrition begins in the womb, so ensuring a healthy diet during pregnancy, weaning, and childhood are crucial to preventing undernutrition for both mother and child.

Soybeans are high in protein, in addition to other important nutrients. It is, therefore, well positioned as a potential remedy to undernutrition and stunting.

Ideally, a 3:1 or 4:1 maize flour to soy flour ratio is used when mixing. This optimizes the nutritional benefits from both ingredients, which complement each other to make a very high-quality protein. Furthermore, soy is best consumed together with foods high in vitamin C (e.g. citrus fruit, leafy greens, papaya) to help absorption of nutrients in soy.

Maize meal (whole grain)

Nutrition Facts	
Serving Size 100 grams	
Amount Per Serving	
Calories 361	Calories from Fat 32
% Daily Value*	
Total Fat 4g	6%
Saturated Fat 1g	3%
Trans Fat	
Cholesterol 0mg	0%
Sodium 5mg	0%
Total Carbohydrate 77g	26%
Dietary Fiber 7g	29%
Sugars 1g	
Protein 7g	
Vitamin A 0%	Vitamin C 0%
Calcium 1%	Iron 13%

*Percent Daily Values are based on a 2,000 calorie diet. Your daily values may be higher or lower depending on your calorie needs.



Soybean meal

Nutrition Facts	
Serving Size 100 grams	
Amount Per Serving	
Calories 436	Calories from Fat 173
% Daily Value*	
Total Fat 21g	32%
Saturated Fat 3g	15%
Trans Fat	
Cholesterol 0mg	0%
Sodium 13mg	1%
Total Carbohydrate 35g	12%
Dietary Fiber 10g	38%
Sugars 8g	
Protein 35g	
Vitamin A 2%	Vitamin C 0%
Calcium 21%	Iron 35%

*Percent Daily Values are based on a 2,000 calorie diet. Your daily values may be higher or lower depending on your calorie needs.



Soybean Initial Processing Method

1. Sort; remove sand, stones, and broken beans
2. Boil whole beans for 30 minutes (this balances the destruction of antinutritional factors with maintenance of protein quality).
3. Drain water from beans and rinse with cold water several times until sufficiently cooled for hand dehulling.
4. Leaving them in water, dehull beans by manually rubbing and squeezing them to separate the hulls, which will float to the top (dehulling removes indigestible carbohydrates that can produce uncomfortable stomach gas).
5. Sun-dry on mat 1-4 days depending on weather, unless proceeding to make soy milk or meat



Draining boiled soybeans
(step 3)



Dried, de-hulled soybeans



De-hulling soybeans by hand (step 4)

Soy Milk

Equipment

- Hand grinder or mortar and pestle
- Pot
- Sieve or cloth
- Bucket

Ingredients

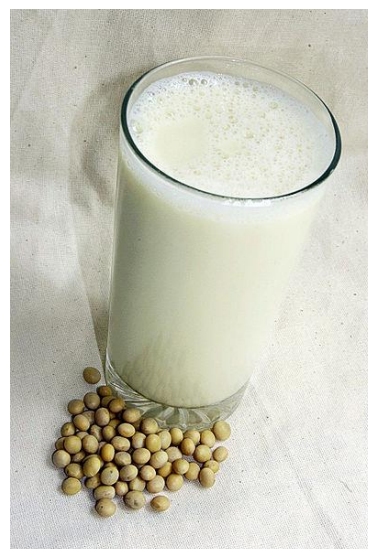
- 2 kg raw soybeans (preferably, an improved variety, e.g. Semeki, SB19 for best soy milk flavor)
- 6 L water
- Sugar
- Salt
- Flavoring (optional, e.g. vanilla)

Yields 6-10 L soy milk per 2 kg soybeans

Procedure

1. Process soybeans per initial processing procedure through step 4 (do not dry)
2. Grind or crush beans
3. Heat water until boiling
4. Add ground beans and boil for 15 minutes
5. Let sit for 20 minutes, until cool enough to handle
6. Strain through sieve or cloth
7. Boil soy milk 15 minutes
8. Add sugar and salt to taste
9. If desired, add flavoring once cooled

NOTE: Spent bean grounds (okara or soy mash) can be dried and used to fortify ugali, uji, or other doughs (maandazi, chapati, bread); can be added to soups, blended with fruits (bananas, avocado); can also be used as animal feed



Soy beans after grinding/mashing (step 2)



Squeezing remaining soy milk from soy mash using cloth (step 6)

Soy Lishe/Uji

Ingredients

- 1 kg soy flour
- 3 kg maize flour, or 4 kg if soy oil separates

Procedure

1. Prepare soy beans per initial processing procedure
2. Grind dried soy beans into flour using maize milling machine
3. Mix maize flour with soy flour
4. Use for making uji



Ugali

Ingredients

- 1 kg soy flour
- 4 kg maize flour

Procedure

1. Prepare soy beans per initial processing procedure
2. Grind dried soy beans into flour using maize milling machine
3. Mix maize flour with soy flour
4. Use for making ugali



Soy Beverage (Roasted Soy Flour)

1. Follow initial processing procedure for whole beans.
2. Dry-roast prepared beans as minimally as possible until desired brown color or flavor are achieved (longer for soy “coffee” than soy “chai”)



Dry roasting soybeans

** Ideally, roast only a portion of the beans to provide the desired color and flavor, using the rest unroasted. This will minimize the degradation of proteins by heat.*

3. Grind into powder/flour using a milling machine.
4. Add spices, if desired.
5. Use as an instant coffee/tea beverage, mixing by the spoonful into hot water to desired strength.

Soy Chapati

Equipment

- Mixing bowl
- Measuring cups and spoons
- Rolling pin and surface
- Frying/chapati pan

Ingredients

- ½ cup soy flour
- 2 cups wheat flour
- 1 teaspoon salt
- 1 cup water
- 1 egg, beaten
- ¼ cup oil



Procedure

1. Combine dry ingredients, mix thoroughly
2. Add oil, water, and beaten egg to mixture
3. Mix until smooth dough forms
4. Break off pieces to roll into desired size
5. Roll on floured surface
6. Heat some oil in pan on low heat
7. Add chapati, cook until both sides golden

Soy Maandazi

Equipment

- Mixing bowl
- Measuring cups and spoons
- Rolling pin and surface
- Frying pan

Ingredients

- ½ cup soy flour
- 2 cups wheat flour
- ¼ cup sugar
- Pinch of salt
- ¾ teaspoon ground nutmeg
- 1 teaspoon baking powder
- 1 tablespoon yeast
- 1 cup water
- Oil for frying



Procedure

1. Combine all dry ingredients, mix thoroughly
2. Add water until a smooth dough forms
3. Allow to rise 45-60 minutes
4. Roll out dough on floured surface
5. Cut into pieces of desired size
6. Fry in oil, turning occasionally, until gold in color
7. Remove from oil, allow to drain and cool before storing

Soy Doughnuts

Equipment

- Mixing bowl
- Measuring cups and spoons
- Sieve for sifting
- Rolling pin and surface
- Glass or tin for cutting doughnuts
- Frying pan



Ingredients

- 1 cup soy flour
- 1 cup wheat flour
- 2 teaspoons baking powder
- ¼ teaspoon salt
- 1 tablespoon oil
- 3 tablespoons sugar
- 1/3 cup milk or water
- 1 egg
- ¼ teaspoon ground cinnamon or nutmeg
- Oil for frying

Procedure

1. Sift flours, baking powder, salt, and spices together
2. Combine egg, sugar, and oil; beat thoroughly
3. Combine dry mixture, egg mixture, and milk/water
4. Blend thoroughly; if necessary, add additional flour, but keep the dough as soft as can be easily handled
5. Roll dough to ½ inch thick on floured surface
6. Cut into doughnut shapes using the top of a glass or tin
7. Fry in oil at moderate heat; turn as soon as doughnuts rise to the top
8. Remove when golden brown and drain

Soy Scones

Equipment

- Mixing bowl
- Baking pot

Ingredients

- 2 cups soy flour
- 2 cups wheat flour
- ¼ cup sugar
- 1 ½ teaspoons salt
- ¼ cup oil
- 2 tablespoons yeast
- 1 cup warm water



Procedure

1. Dissolve yeast in warm water, let sit 15 minutes
2. Sift soy and wheat flour together
3. Combine yeast mixture, sugar, salt, and oil
4. Mix in flour mixture
5. Turn dough onto floured surface, knead until smooth and elastic (approximately 10 minutes)
6. Place dough in a greased bowl; cover and let rise in a warm place until it doubles in size (approximately 1 – 1 ½ hours)
7. Once doubled, punch down and form into scones, placing in a greased baking pot
8. Allow to rise again until it doubles in size (approximately 1 hour)
9. Place in a hot oven and bake 12-20 minutes



Baking with an oven constructed from two inverted pots and blankets; alternatively, hot coals may be used on top instead of blankets

Banana Soy Cake

Equipment

- Mixing bowl
- Measuring cups and spoons
- Baking pot

Ingredients

- 1 cup soy flour
- 1 cup wheat flour
- 1 tablespoon baking powder
- ½ teaspoon salt
- 1 teaspoon cinnamon or nutmeg (optional)
- 1 egg, beaten
- 3 tablespoons oil
- 1 cup water or milk
- 1 teaspoon vanilla flavor (optional)
- 3 bananas (very ripe), mashed



Procedure

1. Combine flours with salt, baking powder, and spices (if using)
2. Mix beaten egg, oil, water/milk, and vanilla (if using) into mashed bananas
3. Combine wet and dry mixtures, mix until dough forms
4. Place into greased baking pot
5. Bake in oven for about 1 hour

Soy Meat

Equipment

- Pot
- Sieve or cloth

Ingredients

- 2 L soy milk
- 1 tablespoon lemon juice or vinegar

Yields ½ to 1 kg soy meat

Procedure

1. Bring soy milk to a boil
2. Lower heat to simmer, add lemon juice while stirring, continue to simmer for 3-5 minutes until mixture coagulates (process is complete when all the milk turns into a clear, yellowish liquid and solid white curds)
3. Take off the heat and allow to stand for a few minutes, the curd will form a large mass and gradually sink to the bottom.
4. Drain off whey, which is nutritious and can be used in other dishes (whey contains protein, minerals, and vitamins)
5. Drain off remaining whey through sieve or cloth and shape curds into desired presentation (patties, rectangles, cubes, sausage, or minced/ground)
6. Alternatively, place curds in a sieve lined with cloth, fold cloth over the top, set a weight on top and allow the remaining liquid to drain for several minutes (this will achieve more firmness in finished product)
7. Fry or roast with seasoning/sauce as if cooking meat, or marinate before cooking. Could also be smoked.



Drained soy meat after boiling with lemon juice (step 5)



Marinating soy meat (step 7)

Soy Kebabs

Equipment

- Blender, or mortar and pestle
- Mixing bowl
- Frying pan

Ingredients

- 2 cups cassava fibers (prepared as below)
- 1 cup soy flour
- ¼ teaspoon salt
- 2 onions (small), diced
- 1 carrot (optional), diced or grated
- 1 sweet pepper (optional), diced
- Hot pepper (optional), diced
- Water
- Oil for frying



Procedure

1. Peel and clean cassava
2. Use blender, or mortar and pestle, to process the cassava, separating the starch from fibers
3. Mix cassava fibers with soybean flour
4. Combine remaining ingredients
5. Add water until ingredients hold together
6. Form into desired shapes
7. Fry in oil, removing when brown