

Soy as nutritional and functional ingredients: the nutritional, functional, and economic advantages of soy ingredients.

Mary Kanyingi & Shannon Ward, WISHH

August 22, 2006

Nairobi, Kenya

WISHH Mission

To create sustainable solutions for the protein demands of people in developing countries through the introduction and use of U.S. soy products.

What Services do we Provide?

- **Business Development-** new product development, technology transfer, business advisory services
- **Food Technology-** incorporating soy into the local diet, consumer acceptance
- **Nutrition-** baseline and follow-up nutritional surveys, research, training
- **Program Development-** intervention area research, program design, proposal preparation

Highlighted Countries of Involvement

Sub Saharan Africa

- Kenya, Southern Africa region, Ghana, Mozambique, Cote d'Ivoire, East Africa region

Central America, Caribbean

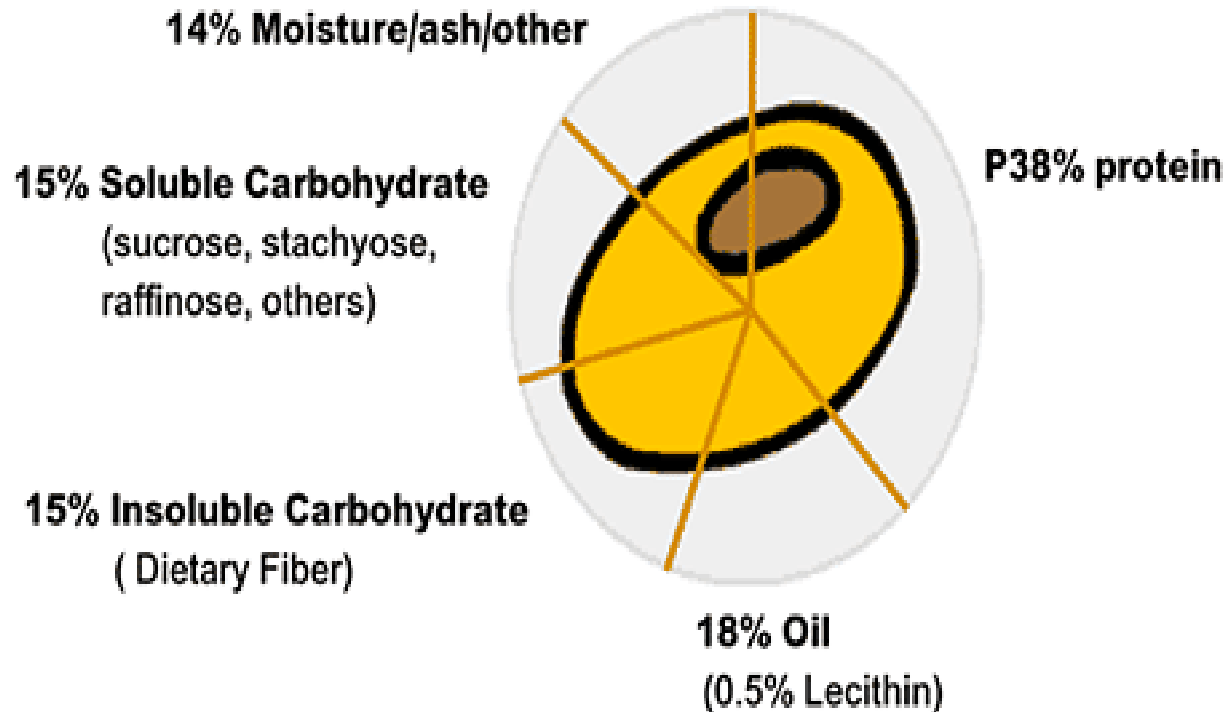
- Honduras, Guatemala, Haiti

Asia

- Pakistan
- Exploratory work in Vietnam, Bangladesh



What's In a Soybean?



How Is Soy Unique?

- High in protein- soy is the only plant protein that is equivalent to animal protein
- High in fiber
- Soy contains all nine essential amino acids required by the human body
- Low in saturated fat (bad fat)
- Has no cholesterol
- Contains omega-3 fatty acid (good fat)



The Many Forms of Soy

- Textured soy protein
- Soy isolates
- Whole soybeans
- Soy flours
- Soy concentrates
- Soy oil



Textured Soy Protein

What is it?

- Textured soy protein is made from extruded soy flour. It is a meat analogue. It is sold dried in various forms and then re-hydrated.

Nutritional Data

- 50% - 70% protein
- 270 calories per 100 grams



Textured Soy Protein

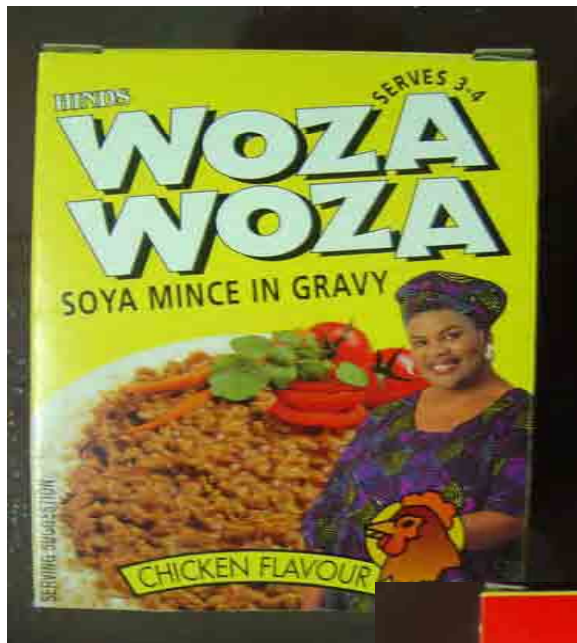
How is it used?

- Used in stews, ground meat patties, samosas, sausages, chili, sauces, etc.

Benefits

- Requires no refrigeration in its dry form, making it ideal for kiosks and shops in rural areas
- Short cooking time
- Can be spiced to meet different ethnic tastes
- Takes on the flavor of other foods
- Widely used as a meat extender

Textured Soy Protein



Textured Soy Protein



Soy Protein Isolate

What is it?

- Powdered ingredient formed when protein is removed from defatted soy flakes. “Soy protein isolates contain the greatest amount of protein of all soy products.”

Nutritional data

- 90% protein
- 380 calories per 100 grams

Soy Protein Isolate

How is it used?

- Meat products, special nutrition products (sports nutrition, dairy products for hospital patients), snacks, weaning foods, drinks, etc.

Benefits

- High protein content- “a little goes a long way”
- Used for binding purposes
- Water absorption- results in juicier meat
- Takes on the flavor of other foods

Whole Soybeans

What are they?

- The beans taken from the pods of the soybean plant.

Nutritional Data

- 36-38% protein
- 416 calories per 100 grams



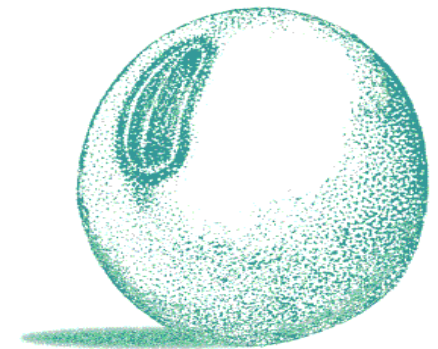
Whole Soybeans

How are they used?

- Soy nut butter
- Soymilk- can also be made from defatted soy flour. Soymilk is used in the production of soy yogurt, desserts, and soy cheese.
- Soy coffee
- Edamame- green vegetable soybeans
- Tofu & Soy sauce
- Value added soy ingredients

Benefits

- High in protein
- Contain no cholesterol



Whole Soybeans



Soy Flours

3 types

- Full-fat
- Defatted
- Lecithinated
- We will focus on defatted and lecithinated

What is it?

- “Soy flour is made from roasted soybeans ground into a fine powder.”

Soy Flours

How are soy flours used?

- Breads
- cookies
- biscuits
- rolls/ buns, donuts
- cakes
- fortification of pasta/ noodles
- cereals
- infant foods
- drinks, etc.



Soy Flours

Functional Properties

- **Water Binding**
- **Bread moisture retention**
- **Dough conditioner**
- **Emulsifier**
- **Shortening**
- **Protein supplementation**

Water Binding

- All types of soy bind water
- Add 1.5 L water per Kg of soy flour
- Improves –
 - Crumb moisture
 - Crumb resilience
 - Crust color
- Use in bread and rolls, donuts, sweet goods

Bread Moisture Retention

- Add 3% soy flour and 5% water
- Decrease bake loss by 2 - 2.5 %
 - Regular bread- 18% bake loss
 - Bread with soy flour- 15.7 % bake loss
- Increase bread moisture (extended shelf life)
 - Regular bread 32% to 33% moisture
 - Bread with Soy flour 35.3% to 35.9 % moisture

Emulsification

Using lecithinated soy flour

Partial replacement of egg and milk in layer cakes

- 3% replaces $\frac{1}{4}$ of egg and milk solids
- 6% replaces $\frac{1}{2}$ of egg and milk solids

Increases water retention (extends shelf life)

Defatted Soy Flour

Physical Specifications

- Moisture- 8% maximum
- Protein-50%Minimum
- Fat 1% Maximum

70 PDI Defatted Soy Flour

- Type most often used in baking
- Economical- addition of soy flour enhances profitability

More dough yield (3kg soy flour+ 5L water)

- Lower dough cost
- Increased shelf life

Lecithinated Soy Flour

Promotes

- Stabilization
- Antioxidation
- Spattering control

Puff pastry

- Increase crust color
- Increase tenderness
- Use at 3-6% levels

Deep-fried pastries

- Decrease fat absorption
- Increase tenderness
- Use at 2-4% levels

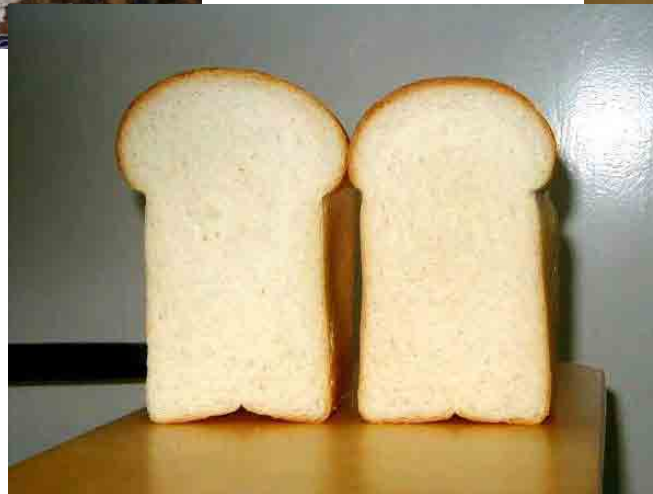
Why Add Soy to Baked Goods?

- ❖ Increase dough yield (extra income)
- ❖ Improve product quality (flavor, texture , color, shelf life)
- ❖ Increase healthfulness (improve protein quality, health benefits)
- ❖ Help the baker and consumer (win/win)

Soy Flours



Soy Flours



Looking for More Info?

- www.soybean.org
- www.soyfoods.org
- www.talksoy.com
- www.wishh.org

Thank You!

Mary Kanyingi
P.O. Box 33202
Nairobi 00600
Kenya
Mobile 0722-785334
mkanyingi@kenyaweb.c
om

Shannon Ward
5506 S. Branch Rd.
Fredericksburg, VA.
++1-410-570-0716
Wishhdc1@yahoo.com