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PRELNOR

VALUE ADDITION GUIDE FOR 8 PRIORITY CROPS IN NORTHERN UGANDA

You can start value addition at home



2019

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LIST OF ACRONYMS

PRELNOR	Project for the Restoration of Livelihoods in the Northern Region
PMU	Project Management Unit
NARO	National Agricultural Research Organisation
ZARDI	Zonal Agricultural Research and Development Institute
IEC	Information, Education and Communication
IFAD	International Fund for Agricultural Development
DAO	District Agricultural Officer
GoU	Government of Uganda
ILRI	International Livestock Research Institute
PVC	Polyvinyl chloride
BPA	Bisphenol A. (BPA)
UNBS	Uganda National Bureau of Standards
ASAP	Adaptation for Smallholder Agriculture Programme.
tsp	Tea spoon

BACKGROUND

The Project for the Restoration of Livelihoods in the Northern Region (PRELNOR) is a Government of Uganda (GoU) project financed by an IFAD loan, an ASAP grant, the Government of Uganda, and the beneficiary contribution. This project is being implemented by the Ministry of Local Government . The overall goal of the project is increased income, food security and reduced vulnerability of poor rural households in the project area.

The major constraints to enhancing agricultural production and productivity in the Northern Agro Ecological zone of Uganda include; limited hands-on knowledge and skills on production, post-harvest handling and value addition technologies.

In order to improve delivery of extension services to farmers, there is need to provide technical information on value addition for each priority crop to support the extension agents and farmers. It is upon this background that the idea of developing this guide on value addition was conceived.

This manual was developed during the PRELNOR write shops to support Agricultural extension agents to convey timely, consistent and correct messages to farmers.

1.0 INTRODUCTION

Value addition

What is value addition?

This is the process of transforming a product from its original form to a more valuable state, preferred in the marketplace. Many raw produces have basic value in their original state. For example, maize harvested in the garden, becomes more valuable by grinding and packaging it into maize flour and maize bran.

Benefits of value addition

1. Improved nutrition security through food availability and increased accessibility
2. Increased shelf life of the products. Therefore, increasing accessibility throughout the year and stability of access to food in the household
3. Increased revenue. Any addition adds a percentage of increased financial value to the produce and has the effect of improving the incomes of the local farmers.
4. Leads to healthy and more productive communities: Use of nutrient rich foods fed to young children and the community, increases the productivity and the health of the population.

5. Value-addition can create more employment through increased food chain players such as producers, retailers, wholesalers, processors, distributors. This leads to improved livelihood.
6. Improves economic growth: Through marketing quality value added products both locally and international markets earns income and foreign exchange to the economy.
7. Conserves the environment: Reduces food waste and food losses to the environment, improves soil fertility and conserves moisture, reduced deforestation.

Status of value addition in Uganda

In Uganda, majority of agricultural supplies are marketed in their raw form, hence losing the opportunities for higher earnings and generating employment.

According to the 2012 World Bank Report, the value of Uganda's value added products in 2011 was standing at $ 3,870,911,000, while that of Tanzania stood at $ 5,780, 320,210. In East African region, Kenya has the highest agricultural value added standing at $ 8,346,408,890 in 2011.

While trying to add value to their commodities, farmers tend to use traditional methods while agri business entrepreneurs use modern methods or machinery due to the advantages in speed, efficiency and ability to handle big quantities.

Rice, simsim, millet, sorghum and ground nuts are traditionally either pounded or ground on stones as a process of value addition before domestic consumption. Families would only

process whatever quantities were needed for a particular period for consumption. Traditional methods have the advantage of avoiding wastage but requires labour, takes more time and is gender biased with women doing all the processing.

With the advancement in technology, the methods and processes of value addition has improved with business people able to process in bulk for sale to consumers who might not be in position to grow and process their own food. Machinery have advantages of ability of processing huge quantities at once, using less time with by products further used for animal or chicken feed.

The main constraints that face Uganda's agro processing industry include among others, the high operational costs mainly due to the high prices of imported fuel, high electricity costs, spare parts, and unavailability of appropriate processing machines among others.

However, despite such constraints, agro processing has a tremendous potential for increasing income through value addition and increasing shelf life and access to food security through establishment of small scale agro processing enterprises and rural based industries.

PRELNOR has published a series of the different stages of ensuring successful value addition on agricultural produce for 8 selected crops that include; cassava, Maize, Beans, Sesame, Sorghum, Soybean, Rice and Groundnuts. The stages include; agronomic practices, Postharvest handling and marketing.

During Production, identification of crop varieties, site selection, land preparation, seed selection, plant spacing, soil nutrient management, pest management, harvesting, postharvest handling and marketing

were comprehensively packaged to be easily understood by the farmers and agricultural extension officers.

Thus, this publication lays more emphasis on processing, branding and flexible packaging with the intention of bridging the existing gap in knowledge on affordable and available technologies in value addition among farmers.

Food loss

Food loss occurs from the stage of harvesting to the stage of marketing to consumers in the post-harvesting chain. It occurs as a result of both qualitative and quantitative food loss. Quantitative food loss can be defined as the food loss which occurs as a result of weight loss, spillage of crops, attack of moulds and pests etc. Qualitative loss is defined as the food loss which occurs as a result of nutrient loss, undesirable change in taste, texture, presence of excreta of birds, rodents etc. and contamination by mycotoxin.

The causes of food loss and waste occur during harvesting, transportation, drying, processing, storage, distribution/marketing and consumption.

Food safety

Food safety is a scientific discipline describing handling, preparation, and storage of food in ways that prevent food-borne illness. The occurrence of two or more cases of a similar illnesses resulting from the ingestion of a common food is known as a food-borne disease outbreak, Food safety; organizes your process to produce safe food, avoids poisoning of customers and saves the business in the long run.

Value addition as a solution to food security and improved nutrition

Value addition reduces the losses of food through preservation and processing into other products with extended shelf life. This ensures that the products are available throughout the year even when they are out of season. This also ensures proper utilization of food through ensured food quality through reduced contamination.

Utilization of by-products like processing of cassava peels to animal feed, use of maize cobs to make briquettes (fuel for domestic use), bean straws can be used as mulch and organic manure, rice and sorghum straws can be used as fodder.

Value addition can be used as key step in improving the nutritive value of food through processing methods such as composites and fortified foods. This can include starchy staples fortified with legumes such as soybean to improve on the protein content of the composites.

PROCESSING

Food processing is the transformation of agricultural products into food, or from one form of food into other forms. Food processing includes many forms from grinding grain to raw flour for home cooking to complex industrial methods used to make convenience foods.

Food processing can be classified in to 3 categories, namely; Primary food processing, Secondary food processing. Tertiary food processing.

Primary food processing turns agricultural products, such as raw maize grain to popcorn, roasted form or into something that can eventually be eaten. This category includes ingredients that are produced by traditional processes such as drying, threshing, winnowing, and milling grain and shelling nuts. It also includes extracting and filtering oils, canning food, preserving food, among others.

Contamination and spoilage problems in primary food processing can lead to significant public health concerns. However, many forms of processing contribute to improved food safety and longer shelf life before the food spoils.

Secondary food processing is the everyday process of creating food from ingredients that are ready to use. Baking bread, regardless of whether it is made at home, in a small bakery, or in a large factory, is an example of secondary food processing. Making wine, beer, and other alcoholic products are traditional forms of secondary food processing.

Tertiary food processing is the commercial production of what is commonly called processed food. These are ready-to-eat or heat-and-serve foods, such as crisps, fries, grain flour like sorghum, soybean, and millet among others.

BRANDING AND FLEXIBLE PACKAGING

What is branding of agricultural produce?

Branding is the process of creating a unique name and image for a product in the consumers' mind, mainly through advertising campaigns with a consistent theme. Branding aims to establish

a significant and differentiated presence in the market that attracts and retains loyal customers. Image is not just physical appearance but also the taste of the packaged product. The objectives of branding include; Engaging consumers, Develop distinctive products, Target diverse markets, Leverage limited resources and Build on existing infrastructure.

The different types of branding are;

	Purpose	Examples (substitute names with local brands)	Ownership	Legal device
Producer brands	Distinguish between different products and their producers	• Chiquita bananas • Jablum coffee • Plantation Reserve sugar	Typically primary producers or processors	Trademark
Varietal brands	Distinguish between different varieties of product type	• Pink Lady apples • Tender stem broccoli • Zespri kiwi fruit	Typically the owner of the variety in question	Trademark with associated patent
Geographical brands	Distinguish products through their geographical origins	• Darjeeling tea • Champagne • Idaho potatoes	Typically public sector bodies or regional associations	Geographical Indicator or Appellation of Origin
Certification brands	Distinguish products through ethical or social standards	• FairTrade • Rainforest Alliance • Organic	Typically certification bodies	Trademark

This illustrates the main different types of brand with relevant commodity examples. Producer brands: Allow consumers to distinguish between, often very similar, products. Chiquita bananas are a good example of how this has been done for a basic agricultural commodity.

Varietal brands: Allow consumers to distinguish new varieties of product from existing varieties. A good example of this is the Pink Lady brand (Cripps Pin k).

Geographical brands: Allows consumers to distinguish products based on their specific origin. Darjeeling tea is a good example of a brand registered as a 'Geographical Indicator (GI).

Certification brands: Allow producers to distinguish between products based on generic ethical, social or environmental standards. Fairtrade is a good example of a certification brand.

1.3.1 Packaging solutions

Packaging is one of the elements that creates quick distinction of branded agricultural products. Therefore, selection of the nature of the packaging material package varies from protection of the product, distinct shape, colour, convenience, meeting Global Standards for Packaging and Packaging Materials, among other factors should be considered during packaging of agricultural produce.

What form of packaging is more suitable for your agricultural product?

Commonly used packaging materials are mainly metal cans, plastic bags, green paper and several other materials. Below makes a simple comparison of the packaging form of agricultural products:

Metal Cans



Sealing form: two layers sealed. Outer plastic cover + inner layer (foil film or metal lid)

High hardness of metal cans, performance for anti-extrusion and

moisture-proof, ease of transport and storage. The cans are made of metal with the best quality and durability, the inner layer sealing is completely sealed, while the hard metal lid has better sealing performance than foil film, especially the performance of anti-extrusion in transport. However, the cost of producing metal cans is also relatively high. Besides, metal cans are mostly filled with nitrogen when packaging.

Flexible Plastic Bags





Sealing form: Heat seal

Flexible plastic bag is also a common form of packaging. In view of the maturity/superiority of flexible packaging and packaging technology, sealing and barrier properties are not difficult to achieve.

Rigid containers

Rigid containers include glass and plastic bottles and jars, cans, pottery, wood, boxes, drums, tins, plastic pots and tubes. They all, to varying degrees, give physical protection to the food inside that is not provided by flexible packaging.

Some rigid containers are strong, because of the high amount of material used in their production, hence expensive than flexible packaging. Some types of rigid packaging have the advantage of providing a perfect airtight hermetic seal.

Symbol	Description	
1 PETE	Clear tough plastic such as soft drink, juice and water bottles.	
2 HDPE	Common white or coloured plastic such as milk containers and shampoo bottles.	
3 V	Hard rigid clear plastic such as cordial bottles.	
4 LDPE	Soft flexible plastic e.g. squeezable bottles such as sauce bottles.	
5 PP	Hard but flexible plastic such as microwave ware, takeaway containers, some yoghurt/ ice cream/jam containers, hinged lunch boxes.	
6 PS	Rigid, brittle plastic such as small tubs and margarine/butter containers.	
7 OTHER	All other plastics, including acrylic and nylon. Examples include some sports drink bottles, sunglasses, large water cooler bottles.	

https://www.quora.com/What-is-food-grade-plastic

Know the code. On the bottom of plastic food storage containers, you'll find a tiny triangle with a number (resin identification code) ranging from 1 to 7. These numbers indicate the type of materials used for making the plastic. In general, the safest choices for food use are numbers 2, 4 and 5. Code #1 plastic is also safe to use, but it is made for single use.

The American Academy of Pediatrics recommends avoiding plastic containers with codes 3, 6 and 7. Plastic number 3 contains vinyl or polyvinyl chloride (PVC), 6 has polystyrene and 7 can contain various plastics, such as Bisphenol-A (BPA). The containers made with codes 3 and # plastics leaches chemical into the food.

Foods that are highly acidic or that contain alcohol or fats can leach plastic additives from the packaging or container into the food.

- The use of BPA has been banned in baby bottles, sippy cups and in the packaging of infant formulas. However, its use in other food and beverage containers continues to be monitored and is currently considered safe by the U.S. Food and Drug Administration. Many BPA-free plastic food and beverage containers are available today, allowing consumers to minimize their exposure to it.

Environmentally Friendly Carton



Sealing form: heat seal or glue seal

Many foreign brands packaged in environmentally friendly carton, such packaging environmentally more friendly, simple and low cost.

However, moisture resistance is not good. In the storage and transportation is also very prone to crush injury and other packaging issues. When unsealed, the protection of the nutrient content is greatly reduced.

Components and different shapes of folding and flexible packaging of agricultural produce



Folding carton packaging products for food and beverage



Flexible Packaging

Pouches

These are small bags such as a Packet (container), teabag,

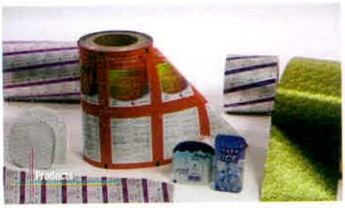
money bag, sporran, fanny pack, etc. Pouches can be tailor-made and environmentally flexible packaging for a huge variety of food stuffs and confectionery.



- These include high quality laminates with registered conceal and hot filled laminates for juices.
- **Types of pouches,**



Shrink sleeves



Bleeding foils



Limitless Customized options from Emirates Printing Press

SOME OF THE MACHINES THAT MAKE POUCHES			
Waterline POUCHING machine gives a huge variety of pouches to choose from			
	Proval pouches	Zipper pouches	Posing's pouches
			
	Side gauze pouches	Box pouches or 3d bottom pouches	3 side casted pouches

Shrink sleeve machine produces Shrink sleeve in pieces and raw form



Shrink sleeve in pieces



Shrink sleeve in raw form

Printing

Printing is the activity or business of producing writing and images on paper or other material with a machine.

Branding in form of packaging and labels can also be achieved by printing on a wide range of materials. Such materials include; paper, plastic, aluminum tins/ cans, films, foils. The quality can be enhanced with lamination and die cuts. A die cut also helps in achieving different shapes of labels and packages. Before registering a print, the artwork with specifications must be conceptualized and laid out either by hand craft of computerized design programs like adobe creative suit.

Below are some of the methods of printing on paper and pouches.

How to print on paper

Step 1:

Product package designing

This is the connection of form, structure, materials, color, imagery, typography, and regulatory information with ancillary design elements to make a product suitable for marketing.

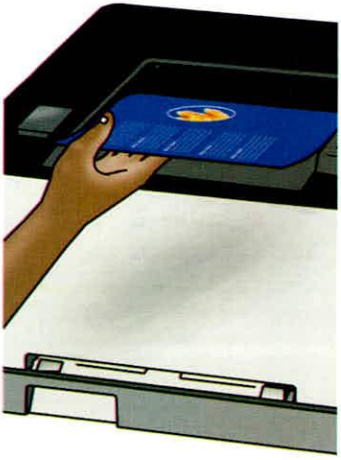


Using a computer, the Product designers use their design skills and technical knowledge to improve the way that existing products work and look or designing entirely new products.

Step 2:

Printing

When you print something, your computer sends a vast stream of electronic data to your laser printer. An electronic circuit in the printer figures out what all this data means and what it needs to look like on the page. It makes a laser beam scan back and forth across a drum inside the printer, building up a pattern of static electricity. The static electricity attracts onto the page a kind of powdered ink called toner. Finally, as in a photocopier, a fuser unit bonds the toner to the paper.



Step 3:

Die cutting

This involve separation of the design from the rest of the paper. Different shapes of boxes and labels/stickers can be achieved. A die cut machine is used for cutting.



Step 4:

Assembling

For boxes, the cut out paper is manually assembled into a box form.



Step 5:

Packing

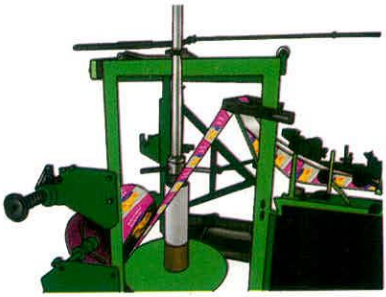
Weigh and fill the package with appropriate well prepared product.



Pouch printing and making machine

Step 1:

A roll of printed material is set on the machine.



Step 2:

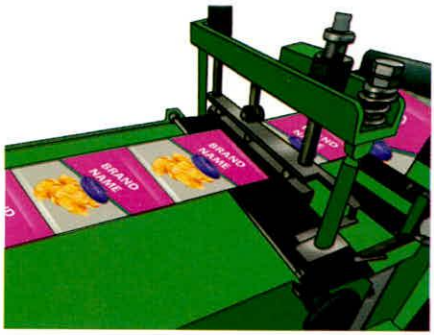
The machine folds it into a pocket.

The pocket is properly sealed at the sides, creating a hollow section where the product will be stored.



Step 3:

Pouches can be sealed at the bottom and cut in to single pieces ready for packaging or rolled back as a continuous strip of Shrink sleeves.



Step 4:

FINAL pouch ready for packaging. However, single pieces are convenient for manual packaging using hands.



Pouch packaging machine for continuous strip Shrink sleeves in pieces

Step 1:

Fix the pouch to be filled by the feeder.



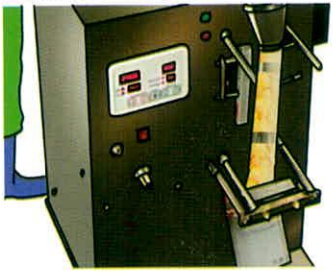
Step 2:

Pour crisps into the feeder.



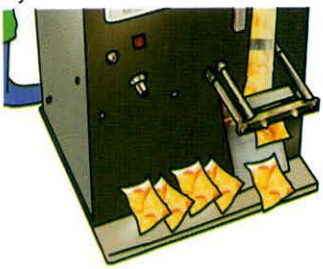
Step 3:

The machine automatically takes weight and seals off the top and bottom of the pouch.



Step 4:

The fully filled and sealed pouch is separated by automated cutting by the machine.



Sealing

Sealing means fasten or close securely. Sealing is the surface-to-surface joining technique of materials using a substance which usually is of a different type, and which adheres to the surfaces of the two adherents to be joined, transferring the forces from one adherent to the other. The substance used for sealing is known as a sealant or sealer.

How to use a mini portable handy plastic bag heat sealing machine



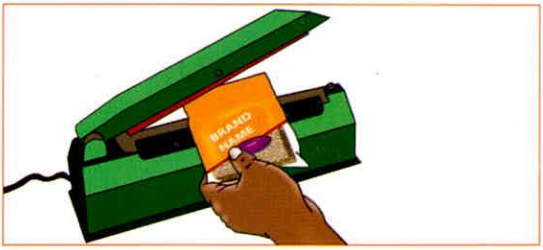
Step 1:

Insert the product in package.



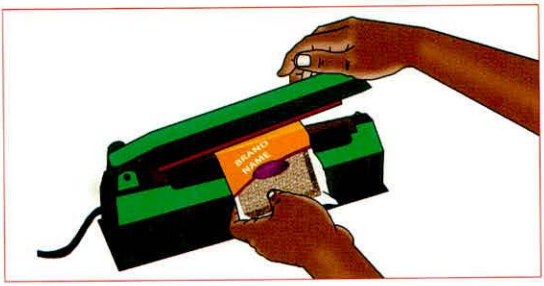
Step 2:

Place the package at the heated sealing point.



Step 3:

Gently exert pressure on the handle to seal the package.



Step 4:

Release back the handle and remove the package.

The packet is now sealed



Step 5:

FINAL PRODUCT appropriate for export.



How to use a Continuous Sealing Packing Machine



Specifications

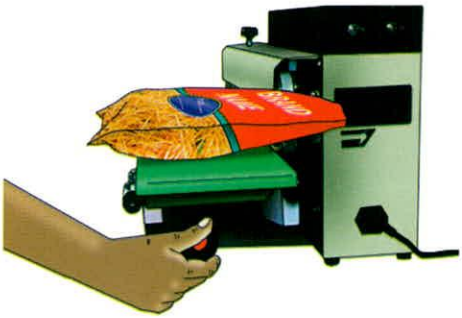
Step 1:

Place the loaded package on to the sealing rollers on the machine.



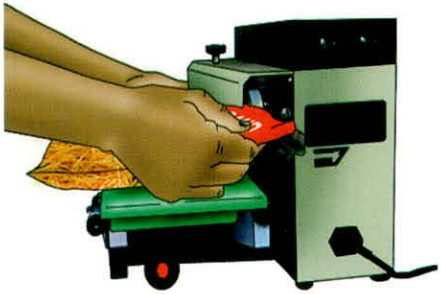
Step 2:

Switch on the machine to let the rollers move.



Step 3:

Close the opening of the package and place on the rollers in motion.



Step 4:

Continuously place the packages on the rollers for continuous sealing. The speed of the rollers can be increased.



Step 5:

Final Sealed Product



Crop	Nutritional Benefits	Health Benefits
Cassava	• Good source of carbohydrates and starch • Good source of fiber, as well as a few vitamins and minerals • Cassava leaves are a source of proteins and vitamin C	• Cassava in its whole form is high in resistant starch, which is known for its role in preventing certain metabolic conditions and promoting gut health. • Cassava is gluten, cholesterol and fat-free
Maize	• It is a good source of carbohydrates and starch • When consumed whole, it contains a fair amount of fiber • It is a low fat food • Good source of unsaturated fatty acids • Corn may contain a fair amount of several vitamins and minerals	• It is a low glycemic index food when eaten whole • Some maize varieties contain a number of bioactive plant compounds, some of which may boost your health like anthocyanins

Beans	• They are a good source of protein in the diet • Rich in vital nutrients such as iron, zinc and folate and magnesium • When consumed whole, they are rich sources of fiber	• Beans are rich in a type of antioxidants called polyphenols • Consuming beans reduces the chances of non-communicable diseases such as cancer, stroke, and cardiovascular diseases • Important in the control of Diabetes and glucose metabolism • Enhance gut health by improving intestinal barrier function, and increasing the number of healthy bacteria
Sesame	• Good Source of Fiber • Nutritious Source of Plant Protein • Rich source of manganese, zinc and magnesium • Good Source of B Vitamins	• May Lower Cholesterol and Triglycerides • Rich in Antioxidants such as Vitamin E • May aid in hormone balancing during menopause
Sorghum	• A good source of carbohydrates in the diets • Source of dietary fiber	• It is gluten free • Contains phytochemicals which lower the risk of colon cancer • Contains properties that can promote cardiovascular health and lower cholesterol • Sorghum may protect against diabetes and insulin resistance

Soybeans	• High in fibre • High in protein • Low in saturated fat • Cholesterol free • Lactose free • A good source of omega-3 fatty acids	• Lowered blood pressure • Improvements to blood vessels, such as greater elasticity of artery walls • Reduced risk of osteoporosis • Protection against various cancers, including those of the breast, colon, prostate and skin
Groundnuts	• Good source of protein • Good source of unsaturated fats • Peanuts are an excellent source of various vitamins and minerals, including niacin, manganese, folate • Rich source of vitamin E	• Contain various bioactive plant compounds and antioxidants • They are very filling and can be considered an effective component of a weight loss diet

Quality assurance and Certification by UNBS and other agencies.

Always submit your product for certification by UNBS and other concerned regulatory agencies.

CONTACT AND SERVICES OFFERED BY FLEXIBLE PACKAGING SERVICE PROVIDERS.

Branding, product design and packaging

CONTACT ADDRESS

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The manual has both excerpts and adapted text from the longer paper "Branding agricultural commodity chains: the development case for adding value through branding" which can be found at www.iied.org/pubs/16509

Unit 2 Cassava

How to add value on cassava

Some of the products include; Cassava crisps, Cassava flour, Baked Cassava loaf bread, Greens (sauce/ food), Industrial brew, Local brew, Transforming cassava peels into animal feeds

Cassava crisps

Step by step pictorial description



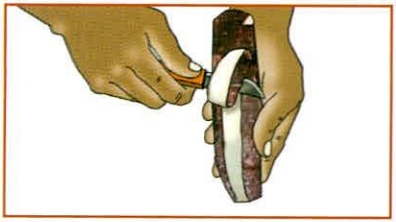
Stage 1

Wash un peeled cassava to remove all the soil.



Stage 2

Remove the cassava cortex/ peelings



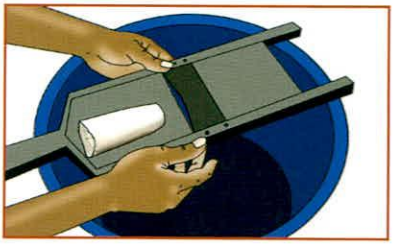
Stage 3

Wash the second time after peeling



Stage 4

Prepare the cutter by placing it on top of the container to cut and collect the sliced small cassava pieces.



Stage 5

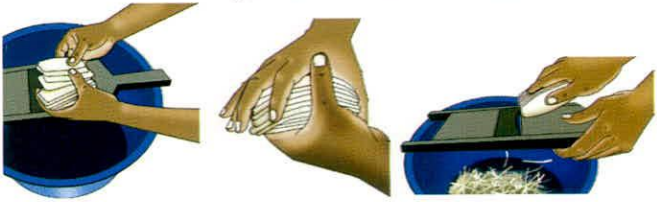
Push back and forward to cut small

Different shapes can be achieved

- Rectangular shapes
- Slices



- Stick shapes: Rectangular big shapes can be sliced further into stick form. Rearrange and slice from the sides.





- Circular and oval shapes. Using a cutter, slice a piece of cassava at an angle.



Stage 7

Frying using cooking oil or baking



Stage 8

Apply appropriate spices

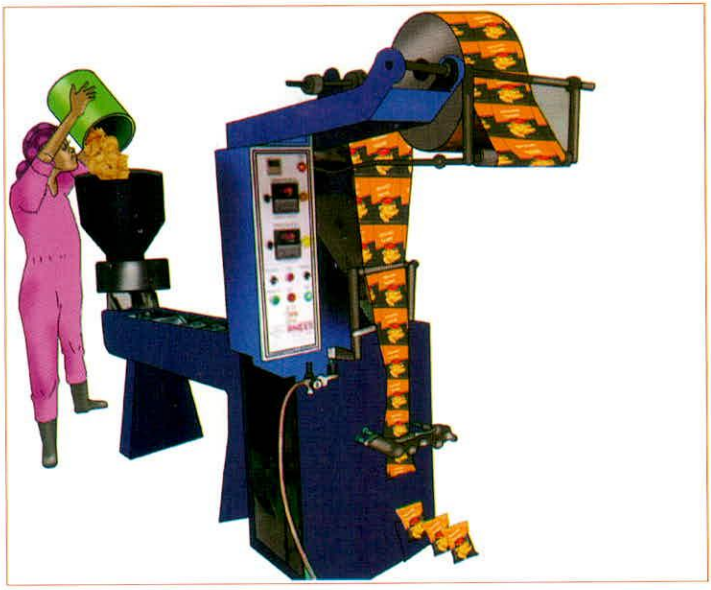


Stage 9

Labeling and packaging can be done manually. For beginners, Weight and other measurements can be taken using measurement equivalents like spoons, cups etc.



Alternatively, CASSAVA CRISPS can be Packaged using a motorized machine



Name of other machines and specifications



Namkeen Packing Machine

Rs 2.5 Lakh/Unit Get Latest Price

Product Video

Automation Grade-Automatic

Pouch Capacity-10-50 grams, 50-200 grams, 200-400 grams

Capacity (pouch per hour) -500-1000, 1000-2000

Machine Power -0-1 HP

Cassava flour

Step by step pictorial description





Stage 1

First wash and peel.

Ensure appropriate post harvesting practices like proper drying of cassava as a raw material. This also prevents contamination.





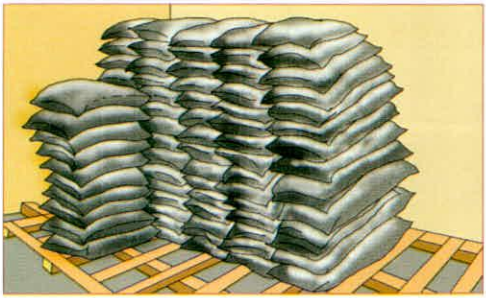
Stage 2

Grind flour using the available technology like diesel engine or electricity powered harmer mills.



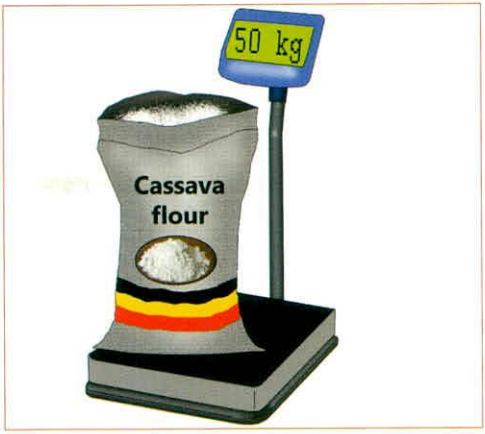
Stage 3

Store milled flour in gunny bags and on a raised platform.



Stage 4

Take weight using a weighing scale.

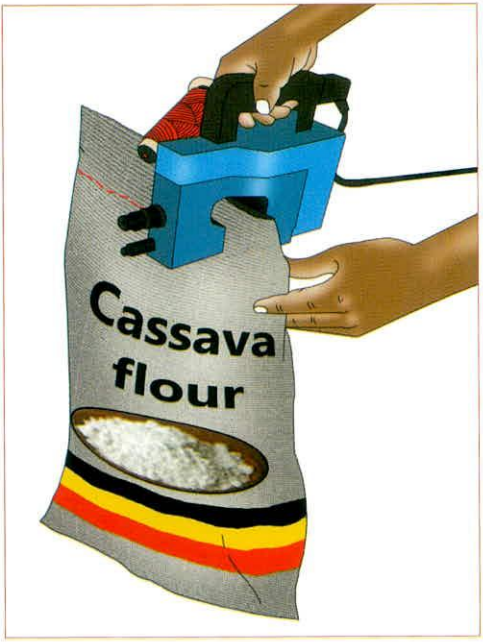


Stage 4

Stitching using a Bag closer machine (Keestar KP-2700 Ultralight Portable Bag Closer) or any other appropriate automated technology.

Or

To package powder form products in smaller quantities, in sachets and pouches, the 5 KW Sachet flour Packing Mild Steel Machine can be used.



Baked Cassava loaf bread

Explore other related products like cakes, flat bread/chapati etc.

Materials needed:



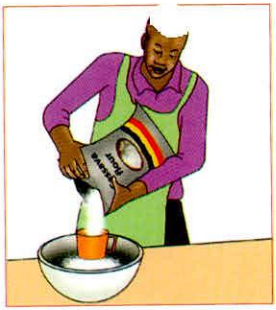
Step by step pictorial description





Stage 1

Measure 2 cups of cassava flour



Stage 2

Half a cup of coconut sugar, 1 table spoon of baking powder and cinnamon and mix all the dry ingredients together. Then crack 1 egg, 2 table spoons of olive oil and add mix with half a cup of milk. Add fruits or nuts of your choice for a fruity taste and flavour. Add another half of milk to soften the mixture. However, other cassava related products can also be mixed with a relative proportion of wheat and other ingredients.



Stage 3

Mix the ingredients until the dough is ready.



Stage 4

Smear little oil inside the baking pan, then pour dough into it.



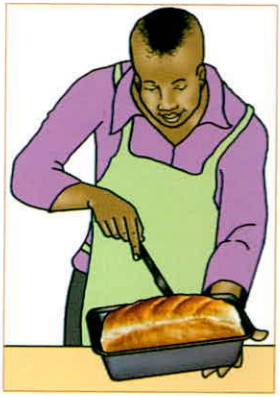
Stage 5

Place the filled pan on the tray and lay in the oven that is already set at a temperature 50 degrees.



Stage 6

Wait for 35 minutes, the bread will be ready. Scoop out bread using a bread scooper of a blunt knife



Greens (sauce/ food)

Fresh ground chopped cassava leaves

Step by step pictorial description





Stage 1 Collect the leaves	
Stage 2 Remove the leaves from the stalk	
Stage 3 Wash thoroughly with clean water.	

Stage 4 Pound to crush the leaves.	
Boil with preferred spices and stir until ready.	
Ready for eating	

Frozen and packaged fresh ground cassava leaves.

Step by step pictorial description



Stage 1

Prepare cassava leaves by removing separating the stalk from leaves and also wash appropriately.



Stage 2

Use a mortar and pestle, a blender or any other technology available.



Stage 3

Sieve to eliminate excess water content.



Stage 4

Ready for frozen storage, cooking or packaging





Using Fresh Pack Pro Vacuum Sealing System Food Vacuum Sealer to package greens

How to use a vacuum sealer



Stage 5

Fill the package with fine blended cassava leaves



Stage 6

Open and fix a filled polythene package in Vacuum packaging machine.

Stage 7

Cover back the opening of the package and press the start button for the machine to suck out all the air and seal.



Stage 8

Finished well packaged vacuum products.



If you are into greens and succulent meat, you need only 8 seconds to vacuum seal your bag to lock in the juicy goodness - whether it is chicken, fishes or beef steak.

Vacuum sealed food can preserve food for 2 to 3 times longer and retain freshness, taste, colour and nutrition longer.

Most suited for ingredients, cooked food, and even regular household items.

When you vacuum seal food, air, micro-organisms, germs, dust, pollutants are kept outside the food sealing packs, slowing food degradation and extending food freshness by at least 2 to 3 times.

Vacuum sealing prevents oxidation, thus food and household items sensitive to air and humidity can be preserved longer.

Industrial brew





Local brew

Step by step description	Step 1
	Cassava is washed, peeled and dried on a clean surface **Step 2** The dried cassava is ground into flour

Step 3

The cassava flour is mixed with clean water to form a thick paste and placed in air tight container or buried in a pit with polyethene sheeting and allowed to ferment for 7 days.

Step 4

The fermented paste is removed and roasted until it is brown and then dried.

Step 5

The dried roasted staff is placed in the container and appropriated quantity of water added as well as ground sorghum yeast flour and allowed to settle.

After 1 day, water and ground sorghum yeast is added and allowed to ferment for 2-3 days

Step 6

The mixture is then put in a distillation chamber to produce local waragi

Transforming cassava peels into animal feeds

Cassava peels are byproducts of cassava processing recognized as a potential feed source. Thus there is a potential to concert millions of tons an environmental problem into a viable resource on feed production.

The International Livestock Research Institute (ILRI) in Ibadan, Nigeria, recently developed a technology to process fresh cassava peels into high quality cassava peel products with better shelf life and nutrient profiles acceptable to the feed industry.

The main factors contributing to the rapid development of this technology are that the processes involved are quite simple, using machinery and techniques that cassava processors are already aware of, and wide dissemination through multiple media and visits of the potential entrepreneurs to the ILRI pilot processing plant at Ibadan.



Stage 1

Traditionally drying is done on bare floor for a period of 2 to 3 days in a dry season. Peels dried in this manner are not marketable at their potential prices. Due to quality concerns related to contamination by aflatoxins, improper drying and poor storage. Use of plastic sheets, tarpaulin and clean cemented surfaces is recommended.

As a result, farmers do not have access to processed peels of desired quality in sufficient quantities



Stage 2

Cassava peels for processing should be free from contamination. Fresh peels should be used as when they ferment, become soggy and slippery. Making it difficult to grate.



Stage 3

Sort out stumps large tubers, soil and other foreign material. These must be removed before gating to protect the processing machine from damage.



Stage 4

Once sorted, the peels are grated to produce a possible size to facilitate deep watering and drying. Peels are hard to grate, they have to be grated 3 times to achieve the size.



Stage 5

Grated peels must then be parked in standard woven plastic bags in small quantities of 8 to 12 kgs. The bags are then folded half way and stuck one above the other in a metal frame for pressing.



Stage 6

A desired stacking height leaves space for inserting a hydraulic jack. Wooden plunks are used to separate the stacked bags and the jack to ensure uniform application of pressure. The application of pressure through the jack results in to rapid water loss

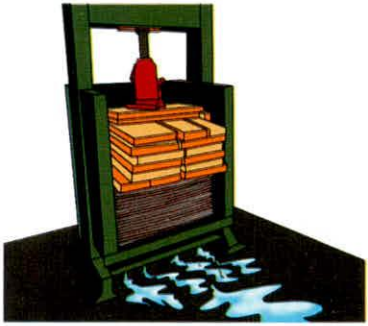


Stage 7

Pressed bags are then allowed to stay overnight to ferment.

The result is an intermediate product called the cassava cake with 30% to 42% moisture content.

It can be stored for 7 days without spoiling.



Stage 8

To produce dried mash, intermediate cassava peel cake is lessened by grating.



Stage 9

Sieving separates the loose cake from a coarse fraction higher in fiber, low in energy content into a fine fraction, low in fibers but with high energy content. This results in to a fine and coarse mash.



Stage 10

Processed mash is then dried for 6 to 8 hours, by spreading on commonly available clean drying surfaces like concrete slabs and plastic materials.



During rainy days, the drying material can be toasted on a metal pan.



Stage 11

Once dried or toasted, the material should be between 10-20 % moisture content. And can be baged for a period of 4-6 months without any spoilage.

All machines and processing areas should be kept clean to prevent fungal contamination and ensure quality.





Other products include; Cassava chips, Roasted cassava, Gari (Dried grated cassava prepared as posho or bread), Dried cassava, starch.

Unit 3 Maize



How to add value on maize

Some of the products include; Roasted maize, Crunchy hard corn, Cornflakes, Maize flour, Loaf of bread baked from maize flour, corn meal flat bread, Maize puff corn snacks (gorillos)

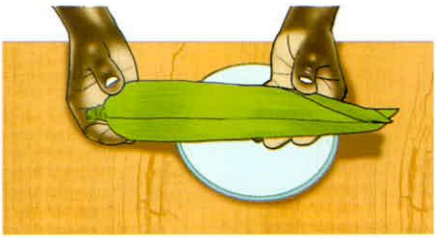
Roasted maize

Step by step pictorial description



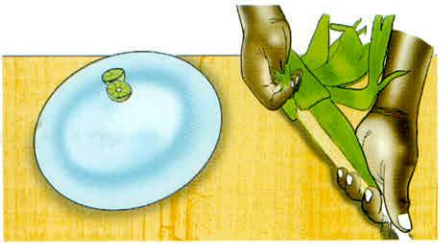
Stage 1

Harvest mature fresh maize cobs from the garden



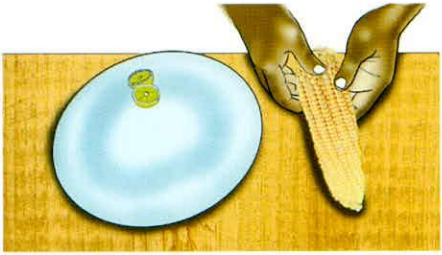
Stage 2

Remove the husks from the cob



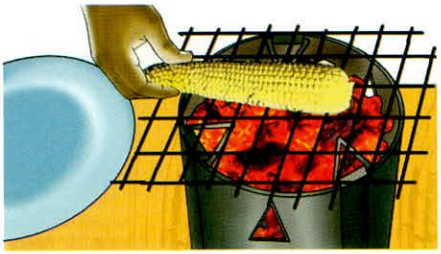
Stage 3

Maize cob ready for roasting



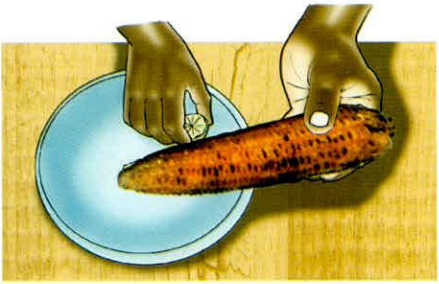
Stage 4

On moderate fire, roast by turning the maize cob until it uniformly changes to brown.



Stage 5

When ready, the product is fit for sale. At this point, some clients prefer smearing with lemon juice to supplement the taste.

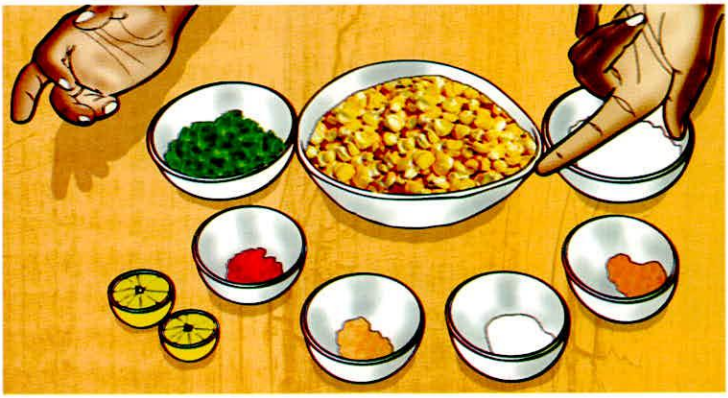


Crunchy hard corn

How to prepare hard corns?

Ingredients

- 2 cups of sweet corn
- 4 table spoons of corn flour
- Half tea spoon full of cumin powder
- Salt to taste
- Half tea spoon full of chaat masala
- Half tea spoon full of red masala
- Juice from half lemon
- Oil for frying
- Water for boiling corn



Step by step pictorial description







Step 1

Soak dried maize seeds overnight and cook them in a pressure cooker for 30 minutes. Add salt to boiling water, Add the corn, using a sieve, drain out all excessive water.



Step 2

Add corn flour when the seed still have moisture and mix. This helps the corn flour to stick to the corn.

Perfectly dry them well.



Step 3

Toss in maize seeds



Step 4

Now the maize seeds are ready for frying.

Heat a non-stick pan and add olive oil. Drop a piece of corn to test whether the oil is ready. The maize seed produces bubbles and floats.



Step 5

Roast maize seeds over high heat shaking the pan occasionally until crunchy and golden. Remove from the oil when ready by shaking off the oil



Add lemon juice and sprinkle salt and chili powder and other desired spices and mix.



Step 6

Packaging

Cornflakes

Corn flakes, or **cornflakes**, are a breakfast cereal made by toasting flakes of corn (maize). Corn flakes are a packaged cereal product formed from small toasted flakes of corn,

usually served cold with milk and sometimes sugar. Since their original production, the plain flakes have been flavoured with salt, sugar and malt, and many successive products with additional ingredients have been manufactured such as sugar frosted flakes and honey & nut corn flakes

Finally, the corn grits are cooked with lightly sweetened malt flavoring (made by extracting the flavor components from barley and corn) and then partially dried. They are then rolled out to become a flake ready for toasting.

How to Make Homemade Cornflakes

1. Set an ungreased metal skillet over medium heat. Sift thin layer of cornmeal into skillet.
2. Fill a spray bottle with water and spray the cornmeal until it is moistened but not soaked.
3. Without touching the cornmeal mixture, let it cook slowly until water is halfway evaporated; immediately sift sugar over the top, if using.
4. Store in airtight container for up to 2 weeks

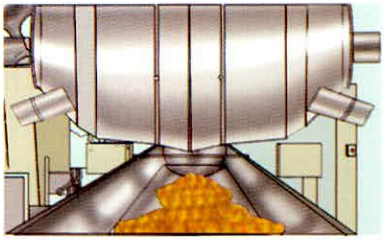
European Quality Manufacturing Equipment Corn Flake Small Making Machine Corn Flakes Breakfast Cereal Machine Production Line

Step by step pictorial description



Stage 1

The corn kernels are cooked for 2 hours and 20 mins



Stage 2

Then warm kernels are ground by the machine to make the cereal recipes.



Stage 3

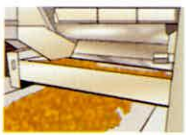
The ground corn is placed in a drying unit, an important step before they are cooked again.



Stage 4

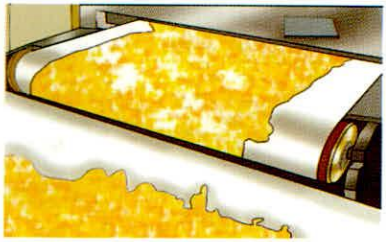
To give them a nice flat shape, the corn kernels are crushed on a flake roller. 2 rollers turn opposite each other and kernels fall in the constricted space in between them.





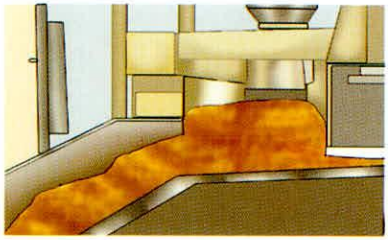
Stage 5

The conveyer spreads the cornflakes away and transports them to the oven.



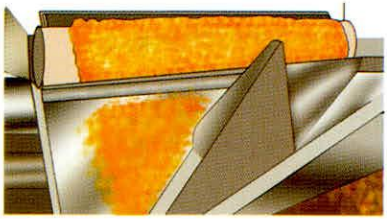
Stage 6

The oven



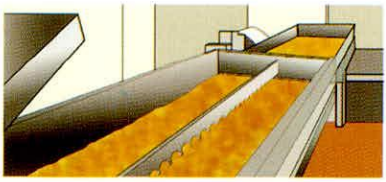
Stage 7

They are shaken to make sure that they are uniformly grounded. The flakes exit the oven well grounded

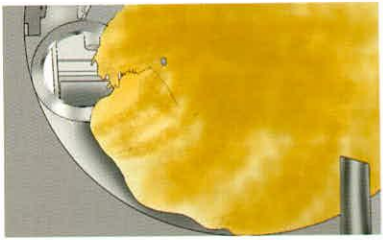


Stage 8

This vibrating conveyer sorts the flakes and retains only the right sized ones



The drum mixes the flakes and mixes them with a sweet solution at a 230 degrees centigrade



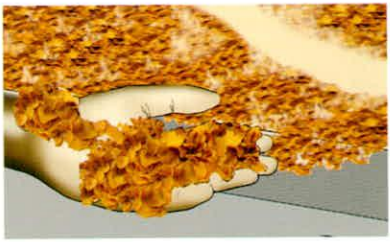
The sweet solution is dried and uniformly spreads the roasted flakes on the canvas



Next, the cereals are placed in this rotating drum and vitamins spread on the flakes by a series of jets



The breakfast cereal is now finished and heads towards the packaging side



This packager fills the bag with cereal to produce 40 to 45 bags a minute.



Maize flour

Milling is the crucial step when the germ and the bran layers are removed to produce an edible kernel. After careful inspection, each kernel is split and put through a series of wetting, sifting and rolling steps to create flaking grifts.

Step by step pictorial description



Stage 1

Maize grain is first dried and cleaned to ensure elimination of dust and other foreign material



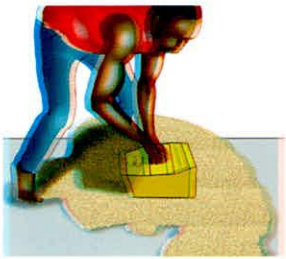
Stage 2

Collect the grain and pour little water to soften the seed coat.



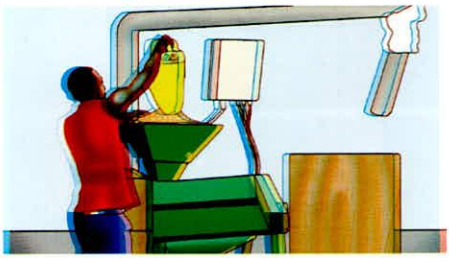
Stage 3

Mix until the water is evenly distributed on the maize grain.

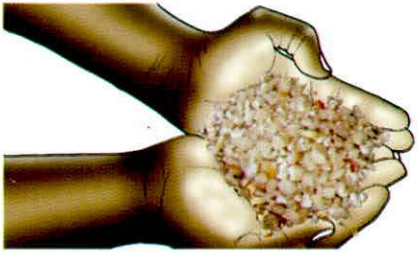


Stage 4

Pour the soaked grain in to the hauler machine for extraction of maize bran and press the starting button

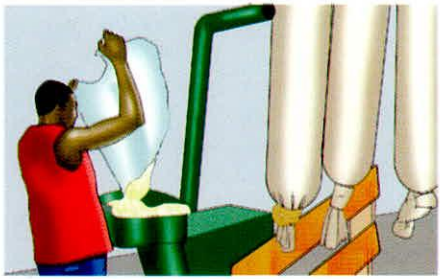


This hulled grain is poured back in to the huller until the desired grade and quality is attained.



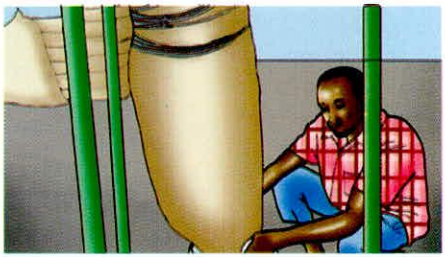
Stage 5

Feed the machine with well dried, clean hulled maize.



Stage 6

Collect flour



Stage 7

Weigh and package the miled flour in appropriate quantities.



Stage 8

Stitching



Loaf of bread baked from maize flour

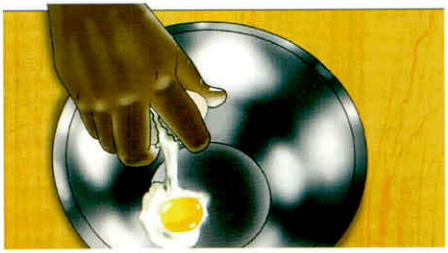
Step by step pictorial description





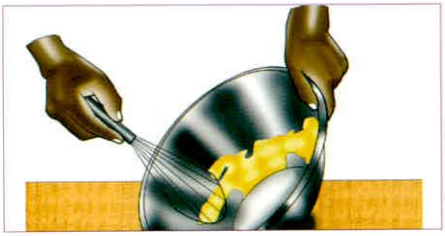
Stage 1

Prepare a clean dish and crack an egg



Stage 2

Use a whisker to whisk the cracked egg until the York and egg white merge



Stage 3



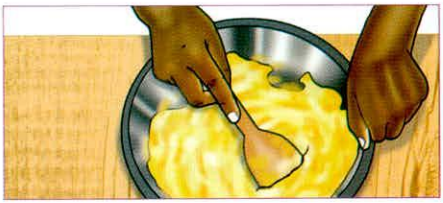


Add one cup of corn flour, 4 spoon full of baking powder and sieve, to the whisked egg. Add one table spoon of salt, one cup of sugar, 1 cup of yellow corn meal, 1 cup of milk, virgin oil and other preferred ingredients.





Stir the ingredients into fine dough.

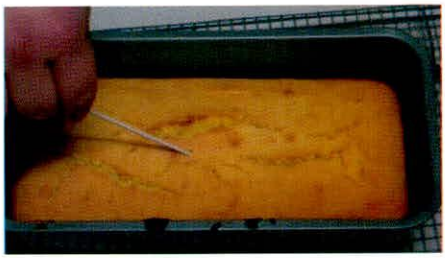


Smear/spray the tray with a layer of oil and fill with dough.





Place in the oven at a temperature of 50 degrees c and wait for 25 minutes. To check whether it is ready, used a wooden stick to gently Pearce the bread. If it comes out clean then the dread is ready.



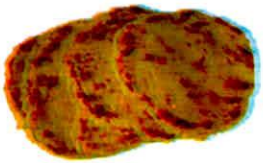
Package for marketing

Chapatti made from maize flour (corn meal flat bread)

Makki ki roti is a type of flatbread popular in North India (Punjabi Cuisine). It is mostly made in the rural parts of Punjab. Makki means maize in Punjab. It is served with Sarson da saag (a curry made from mustard leaves). It can be also served with any green leafy vegetable curry such as palak paneer. It is generally consumed more during winters.

It is made of yellow maize flour and whole wheat flour. The taste of preferred added spices enhances the flavor of the roti. The maize flour is gluten free and that makes it difficult to make the rotis. The rotis when cooled becomes a little chewy to eat. Hence to overcome this, add a little of whole wheat flour and oil. That will make the rotis soft and easy to handle while making them.

Instructions



Stage 1

In a bowl, take maize flour, whole wheat flour, oil, turmeric powder, asafoetida and salt.



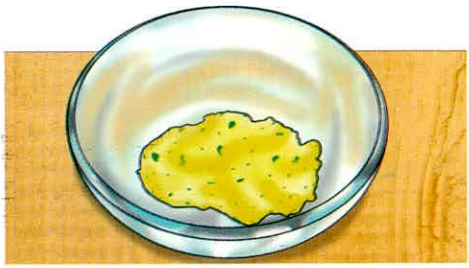
Stage 2

Mix them well with the help of your fingertips till you get bread crumb like texture.



Stage 3

Add warm water as required and knead into a semi soft dough. Cover the kneaded dough with damp cloth and let it rest for 20 minute.



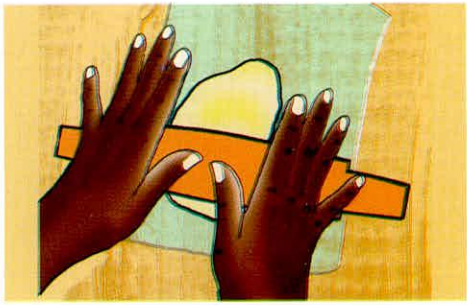
Stage 4

Make 12 balls from it . Take a ball. Flatten it , sprinkle some carom seeds over it and press it with fingers. Now dust the flatten ball with wheat flour .



Stage 5

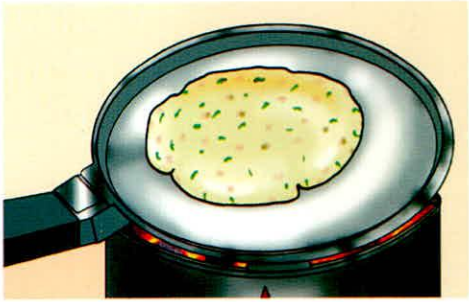
Roll a cirlce out of it. It should be around 4-5 mm in thickness.



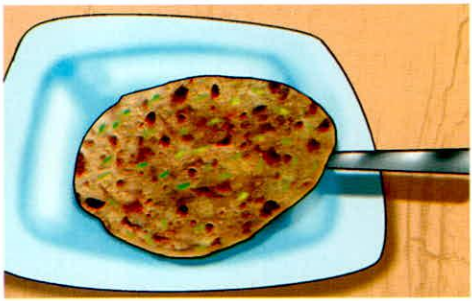
Stage 6

Heat a flat pan or tava and place the rolled roti on it.

Flip it. Roast it on both sides till you get golden spots on it on a medium heat.



Remove from pan and apply ghee over it. Similarly, make other rotis from it and apply ghee and serve hot.



Maize puff corn snacks (gorillos)

Puffcorn or **corn puffs** are puffed or extruded corn snacks made with corn meal and baked. Products by the name of puffcorn (instead of the more generic term corn puffs) in particular can be made to look similar to popcorn, although the latter is made from whole grains.

Step by step pictorial description

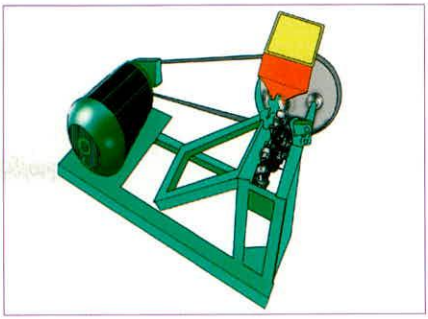






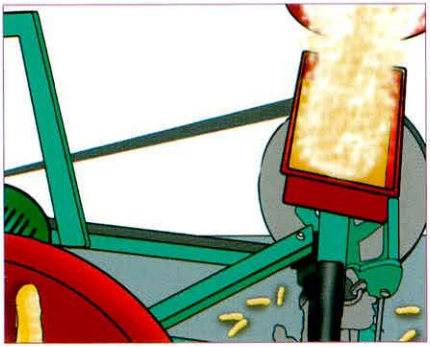
Stage 1

Set the puff and pour the corn meal in a snack extruding machine. Many different shapes of snacks can be produced.



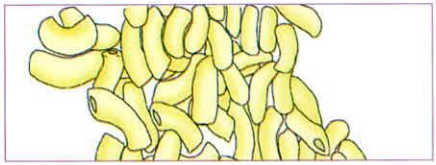
Stage 2

Slowly release the cornmeal into the machine for extrusion of puffs.



Stage 3

Add spices and fry with cooking oil.



Stage 4

Package using appropriate and available technology suitable for the market.



Other products include popcorn, maize for animal feed.

Unit 4 Beans



How to add value on beans

Some of the products include; Packed raw dried beans, Frozen cooked beans, Cooked tined beans, Beans flour, Bean soup, bean cakes

Packed raw dried beans

Bean grain can be packaged for food. For starters, manual dominated approaches can serve as an alternative. However, automated machine could be more effective.

Step by step pictorial description

Stage 1

Ensure good agronomic and post-harvest practices



Stage 2

Clean and sort



Stage 3

Drying on appropriate surfaces.



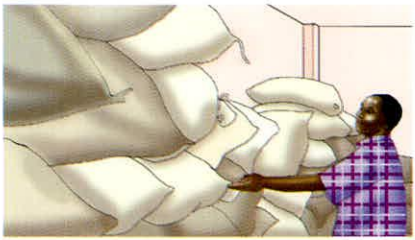
Stage 4

Application of appropriate storage pesticides and always monitor the quality of the stored bean seed.



Stage 5

Package for storage and marketing in large and small quantities



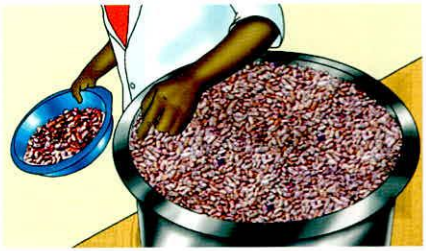
Frozen cooked beans



Stage 1

Preferred beans are collected for processing.

Start by sorting, washing and then soaking



Stage 2

Boil the beans the following morning for about 1 hour 30 minutes at 100° c.



Stage 3

Add salt depending on quantity.



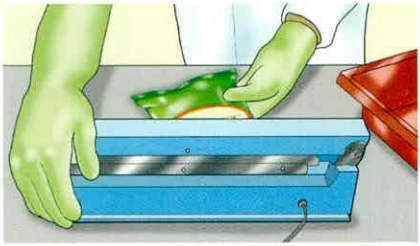
Stage 4

Remove the boiled beans from the kettle / Boiler, spread them on the tray and then take them to the blast freezer



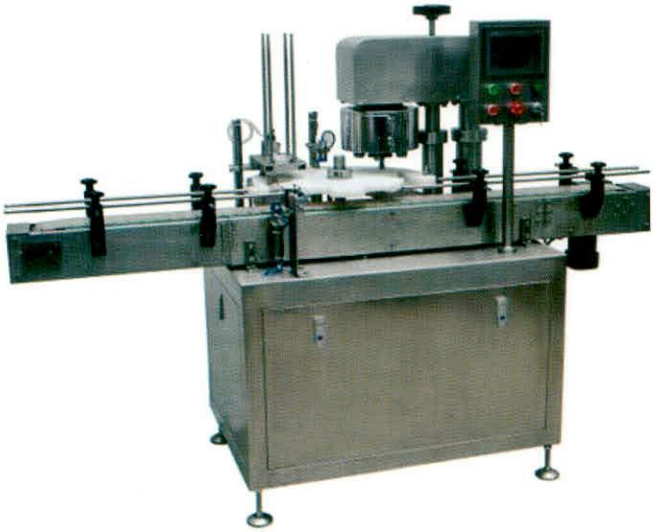
Remove from the freezer and pack in different weights. Seal off the package





Cooked tined beans

Using a Round Can Vacuum Nitrogen Tin Sealing Machine



Power: 4.0 Kw

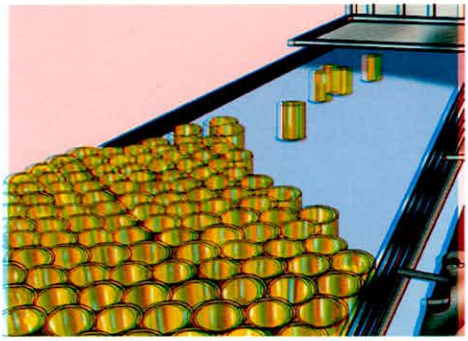
Model Number: PP172-CS04-011





Stage 1

Prepare branded tins from tin producing companies



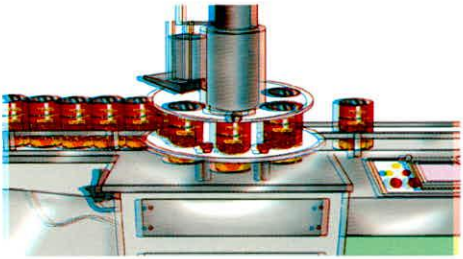
Stage 2

Place the tins in the Round Can Vacuum Nitrogen Tin Can Sealing Machine for automatic fill of the tin with the boiled spiced beans



Stage 3

Fix the tins in the sealing machine or any of the wide variety of steel packaging technology.



Beans flour

Dried beans can be grounded into bean flour manually by using machines.



Stage 1

Collect good variety beans

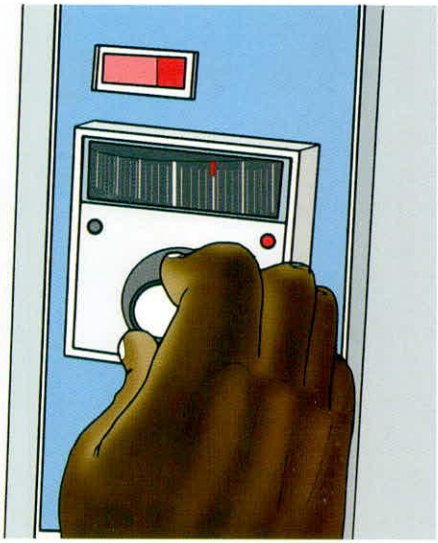


Stage 2

Dry the beans on a clean surface for about 3-4 hrs on a sunny day or dry in the oven for drying at 80° C for 2hrs using the GU-6 infrared Food oven or any appropriate technology. This temperature helps to dry and not to cook the beans

Use beans peeling machine to remove the seed coat

Or the dried beans are directly taken for milling into flour.



Stage 3

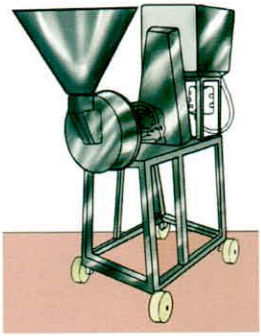
The bean flour from the mill is then taken to the extruder to cook and produce pellets.





The bean pellets are then taken into the final mill to be milled into flour using the dry bean grinding machine.

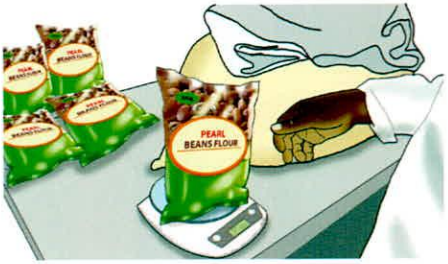




Stage 4

Package for sale.







Bean cakes

Bean can also be made into Cakes.

How to Make bean cakes

To make bean cakes, you need to first of all remove the bean coats.

Ingredients you need for bean cakes

You need only 5 ingredients to make bean cakes :

- 1 cup of Beans (black-eyed or brown beans)
- 2 chilli peppers (optional)
- 1 medium onion
- Salt to taste
- Vegetable Oil for frying

Tools you will need:

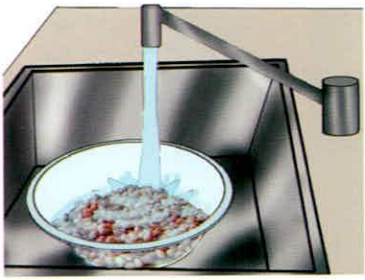
- Blender
- Mortar and Pestle

Step by step pictorial description

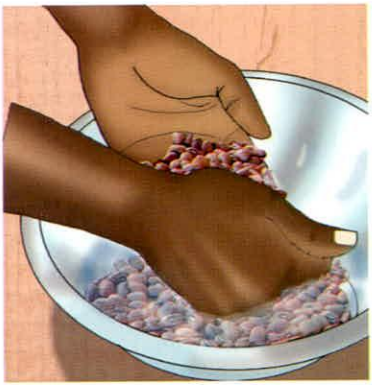


Stage 1

- Soak the beans in water for 2 hours to make it soft enough for your blender.



Remove the beans coat by rubbing the soaked bean seeds together to remove the seed coat. It is important that you do not let salt come in contact with the beans you will use in making till you are ready to fry it. Salt is believed to destroy the leavening property of beans. This is what prevents spattering of the beans batter during frying.



- Add water to allow the peels from the beans to float on water surface. Remove the peels on the surface using a sieve. Repeat the process until all the peels are removed.
- If you will grind it using the heavy duty grinders in markets, it will not be necessary to soak the beans for extended periods of time.



Stage 2

Add water to the cleaned beans. Soak for 2-3 hours before grinding.

Remove water and put the beans in the blender. Cut and add the pepper and onions into desirable sizes.

Put some of the ground beans into a mortar OR blender. Grind the mixture making sure you add as little or no water as possible.

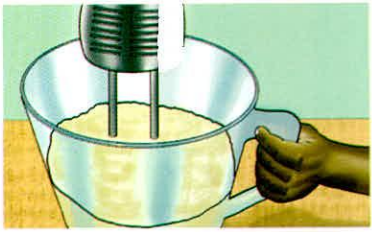
Stage 3

Set some vegetable oil on the cooker to heat up. The oil should be at least 3 inches deep.



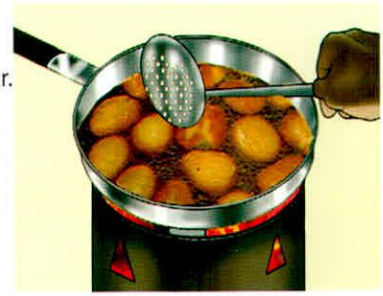
Stage 4

- Once the oil is hot, add the onions and pepper to the beans puree in the mortar. Stir well until the dough is thick doubles in volume.
- Add salt to your taste and stir again. Salt should always be added just before scooping the beans mixture into the oil. If salt stays in the mixture for extended periods of time, it will destroy the leavening property of the beans. This property is what makes the float in the oil and prevent spatter during frying.
- To fry, always deep the spoon in water before scooping the mixture with a table spoon and slowly pour this into the oil. Dipping the spoon a little bit into the water helps reduce spatter.
- Fry the underside till brown and flip to fry the top side too.
- When the balls are brown all over, remove and place in a sieve lined with paper towels.









Important points to note when making

Follow these and you will turn out great.

- Use freshly peeled beans.

- Use a very small quantity of water when grinding.
- Smoothen the mix with mortar and pestle before frying.
- Add salt just before frying.

Bean spice cakes

Recipe Details

- Prep Time: 15 minutes
- Total Time: 55 minutes
- Cook Time: 40 minutes

Ingredients

- For Cake
- 1 can (450g) BUSH'S ® Honey Sweet Baked Beans, drained*
- 1 box (500g) spice cake mix
- 3 large eggs
- 1/2 cup water
- 1/3 cup oil
- 1 can (600ml) crushed pineapple, drained well reserving juice
- 1 cup chopped walnuts optional
- For Pineapple Glaze:
- ½ cup powdered sugar
- 1-2 tablespoon reserved pineapple juice
- 1 teaspoon vanilla (optional)



Stage 1

Sort, wash, soak and boil the black eyed beans until they soften



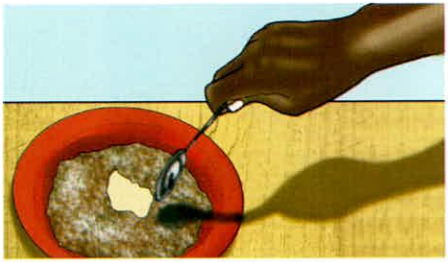
Stage 2

Boil the beans



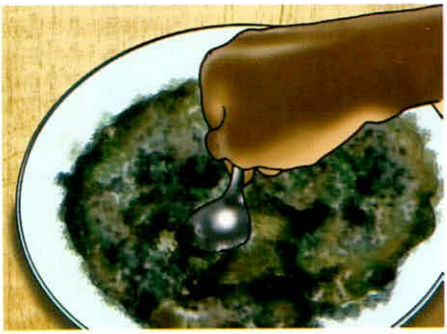
Stage 3

Add sugar, cinnamon, a little salt, butter, and other preferred spices and mix up.



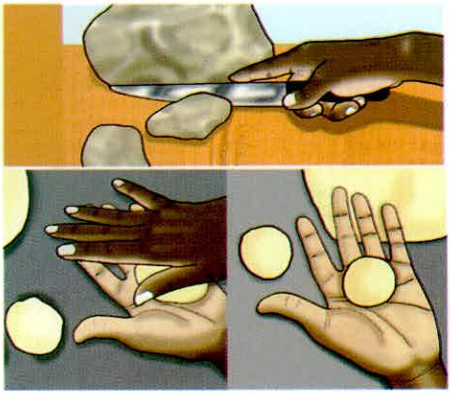
Stage 4

Grind the boiled beans into a food processor, blender or a manual motor to make dough



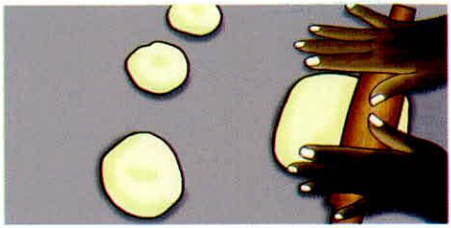
Stage 5

Cut and roll dough made out of wheat into balls



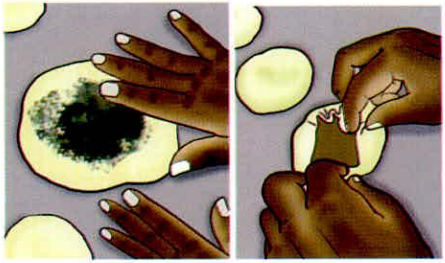
Stage 6

Roll the dough in to flat circular pieces, sprinkle some flour to prevent stickiness.



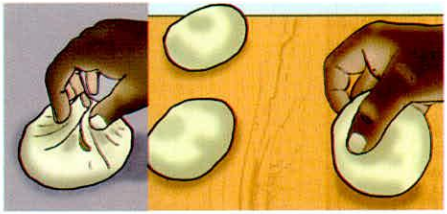
Stage 7

Wrap the bean spice in to the flat circular rolled pieces.



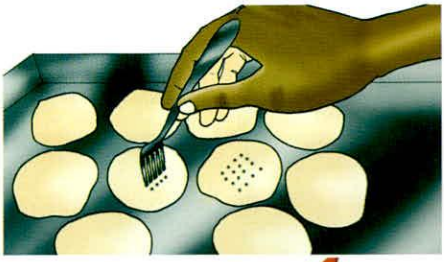
Stage 8

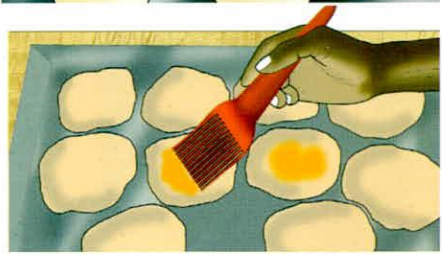
Make the preferred shape to form a cake



Stage 9

Place the cake on baking plates, apply appropriate designs and whisked eggs.





Stage 10

Place in the oven at a temperature of 50 degrees c and wait for 25 minutes. To check whether it is ready, used a wooden stick to gently Pearce the bean spice cake. If it comes out clean then the cake is ready.





Unit 5 Sesame



How to add value on sesame

Some of the products include; Roasted sesame, Sesame rolls, Pasted sesame, Sesame on bread, Sesame oil, Sesame grain beverage/milk

Roasted sesame



Stage 1

Collect clean simsim grain and store as recommended



Stage 2

Wash simsim with water to clean out soil particles and purities.

Stage 3: drying

Dry on a plastic sheet or on recommended clean surfaces.



Stage 4: toasting

Toast on moderate heat for about 30 minutes until ready. Sesame grains are so tiny that you can place them on a dry flat-bottomed pan over medium heat on your stove and begin toasting away.



Cool before packaging or grinding. Heat should be removed from roasted sesame as quickly as possible in order to stop cooking at a definite point and to produce a uniform product.



Sesame rolls

INGREDIENTS

Sesame grains

Jaggery or sugar

Water=1 bowel

Ghee= 1 table spoon

Cardamom-sugar powder= 1 table spoon



Stage 1

Take a full piece of jaggery or sugar and add some water. Melt it completely and keep it aside.





Stage 2

Filter the gaggery or sugar and thicken.





Stage 3

Add one tea spoon full of ghee and Cardamom-sugar powder.



Stage 4

Then add sesame grain and mix



Stage 5

Make sesame balls by rolling the mixture in the hands. Wear kitchen glove to observe hygiene.



Final product.

Different shapes can be achieved.



Sesame Paste (Roasted and raw)





Stage 1

Clean the small sesame butter grinding machine before and after use.



Stage 2

Set and start the machine

Stage 3

Pour the sesame grain in to the hopper of the machine. Here you'll watch your grain go from whole, to powdered to a thick clumpy mass - and eventually, to sesame paste.



Stage 4

Collect the fine sesame paste in a big and clean container



Stage 5

Weigh and package for sale



Sesame on bread



Stage 1

Prepare dough from any flour and ingredients as preferred.



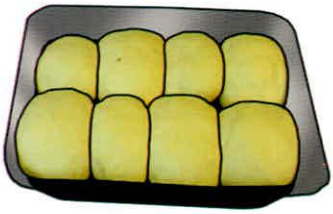
Stage 2

Place the prepared dough on a buttered tray



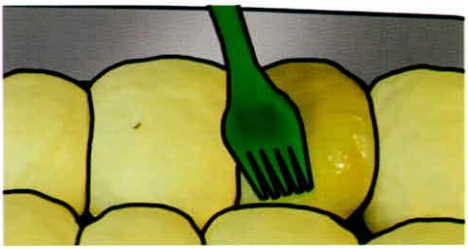
Stage 3

Place the tray with prepared dough in a warm place for 20 to 30 minutes. The dough will increase in size.



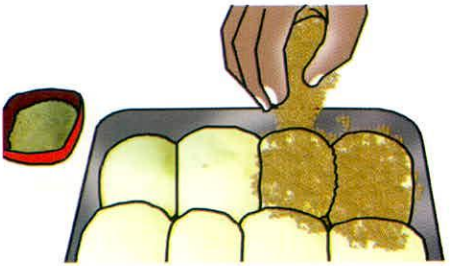
Stage 4

Brush the top with a layer of whisked or beaten raw eggs.



Stage 5

Sprinkle the sesame grains on top and bake at 180° for about 20 to 30 minutes.



Stage 6

The sesame bread is ready.



Sesame oil



Stage 1

Assemble the machine



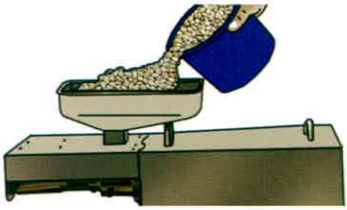
Stage 2

Prepare the sesame by cleaning.



Stage 3

Pour the sesame into the hoper



Stage 4

Collect dripping oil and the residue separately



Stage 5

Package for sale.





Sesame grain beverage/milk

Sesame grain milk has one of the highest amounts of calcium that is easily digestible and the body processes it better than dairy.

Stage 1

Secure and pour One cup of raw (unhulled) dry sesame into the blender.



Stage 2

Add 6 cups of water.

Stage 3

Blend the mixture for 30 to 60 seconds using a high speed blender.



Stage 4

Strain the sesame grain milk using a clean muslin cloth to squeeze out the liquid.



Stage 5

You can add some sweetener, vanilla extract and other preferred ingredients.



Stage 6

Package for storage.

Unit 6 Sorghum



How to add value on sorghum

Some of the products include; Boiled sorghum, Popped sorghum, Sorghum flour, Industrial beer and livestock feeds, Sorghum Flat bread, Sorghum cake/ Sorghum loaf of bread.

Boiled sorghum

Stage 1: Sort the clean sorghum and wash

Stage 2: Put in a sourcepan, add water salt. Then boil for 30-40 mins

Stage 3: Add boiled beans or pounded ground nut

Stage 4: Boil for a few minutes until it is ready to eat

Popped sorghum



Stage 1

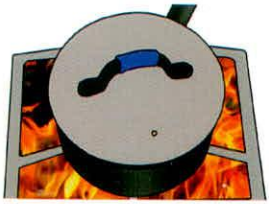
Place the saucepan on medium heat.

You may use or avoid cooking oil. Pour the sorghum seeds in to the hot pan and stir continuously.



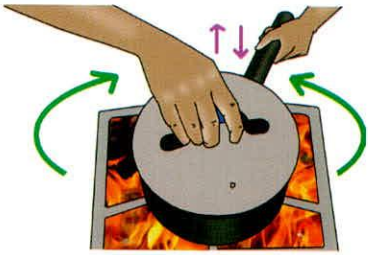
Stage 2

Cover the pan to avoid the popping grain from spreading out side.



Stage 3

Shake the pan to prevent the grains from burning



Stage 4

Popped sorghum



Stage 4

Add spices as may be preferred.



Sorghum flour



Traditionally, our ancestors used to process sorghum meal by pounding in a mortar and crushed on the grinding stone. However, modern grinding machines are available to simplify the task.



Stage 1

Sort the chaff from the sorghum seed



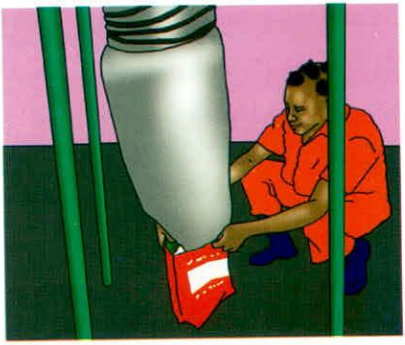
Stage 2

Take to the grinding mill



Stage 3

Collect the flour from the mill



Stage 4

Package for storage and consumption.



Industrial beer and livestock feeds





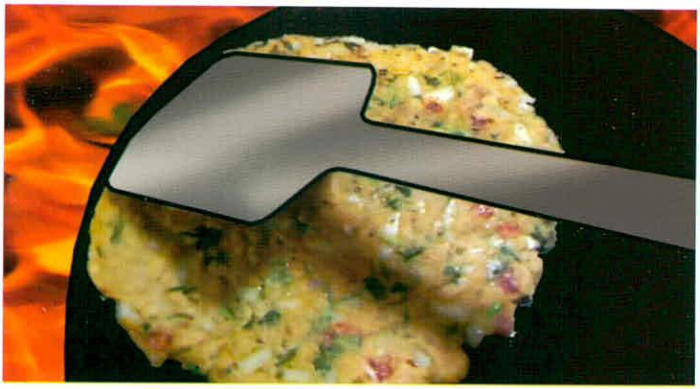
Brewing traditional African beers





Livestock feed is a by-product from the brewing industry.

Sorghum Flat bread



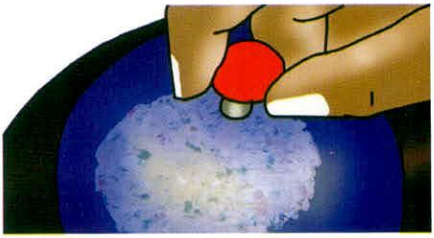
Stage 1

Heat a saucepan and add one cup of water. Add 1 tea spoon of ghee/oil, salt. When water is about to boil, add one cup of sorghum flour.



Stage 2

Cover and let it rest for 5 minutes.



Stage 3

Add one tea spoon full of chopped garlic or green garlic, onions and other preferred spices. Mix the spices with the dough and cover it with parchment paper. This makes it easy to handle the dough.



Stage 4

Now press down gently spreading it in circular or use a rolling pin.



Place on a heated frying pan and spread ghee and flip over gently.

Cover and cook on high flame for 2 minutes for each side. However, the flat bread can also be done without oil or ghee and spices following the same procedure.



Sorghum cake/ Sorghum loaf of bread





Stage 1

Separate the albumen from the egg yolk. 100 g flour, 30g of sugar. Beat the egg mixtures separately.



Stage 2

Add 100 ml of olive oil, milk, 230 g of sorghum flour and stir



Stage 3

Add ground nut and sesame spread a layer of oil in the baking pan and add the dough.



Stage 4

Place in the oven under moderate temperature until ready.



Unit

7 Soybeans



How to add value on soybean

Some of the products include; Soy milk powder, Soy milk beverage, Soy mummies/ Pellets / bagiya, Soy meat/ Soya Chunks, Fried or roasted Soybean

Soy milk powder

Step by step pictorial description





Stage 1

Take half a cup (100g) of soybean and wash them in water.



Stage 2

To remove the seed coat, Add water to washed soybeans and soak them for 12hrs, microwave or boil the soaked soy bean for 2-3 minutes.



Stage 3

Drain the water and pat dry on a cotton cloth. Then sun dry soybean for 2-3 days



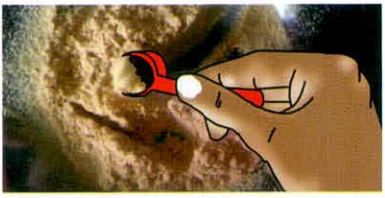
Stage 4

After sun drying, roast the soybean on low to medium heat.



Stage 5

Let the soybeans cool and then grind to make a powder and sieve.



Stage 6

At this stage, the soy bean powder can be spiced, branded and packaged differently depending on the spices and flavors. E.g. soy tea, plain soy powder, vanilla soy, soy sip etc.



Stage 7

Store in an air tight package. To make milk, take 2 scoops of soy milk powder and mix in lukewarm water. Add preferred spices and add the mixture to a pan with 1 cup of hot water.



Stage 8

Strain the milk and it is ready to be consumed.



Soy milk beverage

Materials and tools

20 grams of soy bean, Blender, Filter cloth, Thick bottom pot.



Stage 1

Soak soybean with warm water around 5 to 6 hours until maximum expansion.



Stage 2

Remove the seed coat for better taste.



Stage 3

Put soaked bean in the blender and add clean cold water, then blend.





Stage 4

Filter and squeeze the milk



Package for storage. Simmer until boiling, sometimes stirring to avoid burning.



Soy mummies/ Pellets / bagiya

Ingredients

-150g, soya bean flour
-1/2 tsp salt
-70ml water
Any flavour of choice



Stage 1

1. Mix the salt, soybean powder and keep adding water to form a smooth paste (Add any prefered flavour at this point)



Stage 2

Heat oil in a pan.



Load a sev maker or any other thing you can improvise in your kitchen that will help release the dough in to the oil in thin strips.



Stage 3

Using the sev maker, different product designs can be achieved by changing the sev templates.



Stage 4

Squeeze paste into oil and fry until golden brown.

Cool and drain excess oil using a colander, serve as required

Package for sale.



Soy meat/ Soya Chunks

Ingredients

1 cup of soybean, Salt, Red chilli,other spices, water for soaking or grinding.

Step by step pictorial description



Stage 1

Take a cup of soybean



Stage 2

Soak the soy bean in water overnight



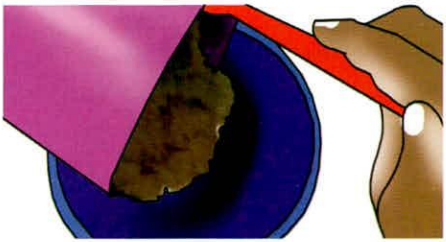
Stage 3

Place in the grinder and add spices



Stage 4

Grind the mixture



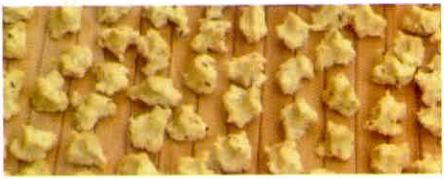
Stage 5

On a plastic sheet, make small pieces of the mixture.



Stage 6

Dry the chunks in the sun for 2 days



Stir fry the pieces, After, this can be made in to stew, pillawo, etc.



Fried or roasted Soya bean



Stage 1

Soak soy bean in water overnight.



Stage 2

Add water, spices and Boil for about 20 minutes



Stage 3

Sun dry for a few minutes or Bake at 140°C for 20 minutes.



Stage 4

Deep fry



Stage 5

Package for sale



Other products include; Soybean sprout etc.

Unit 8 Groundnuts

How to add value on groundnuts

Some of the products include; Boiled ground nut in pods, Roasted ground nut, Coated Peanut, Pound ground nut, Ground nut oil, Ground nut butter, Ground nut cookies

Boiled ground nut in pods



Stage 1

Sort and wash. After washing thoroughly, add water, salt and spices as preferred.



Stage 2

Boil until ready



Stage 3

Dry, package and store in a cool dry place or sale directly for consumption.







Roasted ground nut

Step by step pictorial description



Ingredients

Raw clean ground nut

Salt

Stage 1

Pre heat the pan under medium heat and allow to be hot and pour salt.



Stage 2

Add dissolved salt and shelled groundnuts in the pan and stir. Constantly stir for 6 minutes under medium heat till done and start to change colour. Peeling off the skin is optional.



Stage 3

Using a colander, separate salt from roasted groundnut immediately to prevent further roasting. Then allow it to cool down completely before peeling off the skin.



Stage 4

Rub the roasted seeds between hands to remove the seed coat.



Stage 5

Ready for packaging



Coated Peanut

Ingredients

Dry groundnut seeds.

2 table spoons of plain flour

2 table spoons of sugar

1 egg

Other preferred spices



Stage 1

Pour groundnut in salted boiling water and boil 2 to 3 min.



Stage 2

Take it off the heat and strain it by sieving out water. Sun dry the seeds on a clean dry surface for 20 to 30 minutes until the water is dried out.



Stage 3

Prepare the butter to coat the peanut. Mix the flour, sugar, spices, preferred flavors and the egg. Also set the powder flavor aside.



Stage 4

Pour the peanut into another bowel, add the butter mixture above and mix. Sprinkle the power mixture to separate the seeds before dropping in the oil.



Stage 5

Heat the vegetable cooking oil on a moderate heat to deep fry the Ground nut.

Package for storage and sale.





Pound groundnut







Stage 1: Collect dry clean ground nut

Stage 2: Pound/grind it in a machine

Stage 2: Sieve the pound G/nut

Stage 4: Boil water for 10-15 min. Add the sieve pound groundnut.

Stage 5: Boil for 10 minutes, add salt to taste until it is ready for food.

Ground nut oil (using extract Oil Press Machine)



Stage 1

Assemble the machine



Stage 2

Prepare the groundnut.



Stage 3

Pour the groundnut into the hoper



Stage 4

Collect dripping oil and the residue separately



Stage 5

Package for sale.



Ground nut butter

Step by step pictorial description



Stage 1

Sort and roast groundnuts. Here, broken pieces can also be processed.



Stage 2

When cool, pour in to the milling machine.



Stage 3

Start the machine and collect the peanut butter







Stage 4

Package for sale





Ground nut cookies

Step by step pictorial description



Stage 1

Mix ½ cup (110 g) of unsalted butter

100 g of white egg

100 g of brown sugar

Beat until fluffy.



Stage 2

Add the egg and other spices and beat again until incorporated.



Stage 3

Add creamy peanut butter and beat until smooth and creamy.



Stage 4

Mix 250 g of flour, ½ tsp of baking soda, ½ tsp of salt and stir. Add the flour into the mixture. Beat until combined.



Stage 5

Place the butter in the refrigerator for 30 minutes



Use an ice cream scoop to make equal size balls or roll in to balls with your hands.





Flatten the cookies, using a folk, in a crisscross pattern.





Bake for 10 to 20 minutes in preheated 180c/360c oven. When ready, let cool 15-20 minutes.



Stage 6

Package for storage and sale



Unit 9 Rice



How to add value on rice

Rice Milling, Rice Flour, Rice roll, Livestock feeds, Husks for making building materials

Key products from milling include Husk, Bran and milled rice. Carbonized rice hull is produced from husk for use as fertilizer, building material, insulation material, or fuel. Oil can be got from bran.

To obtain good quality milled rice, quality paddy and a good technology for milling is required:

A moisture content (MC) of 14% is ideal for milling. If the MC is too low or high breakage will occur resulting in low head rice recovery.

Use a moisture meter to determine the moisture content. Visual methods are not accurate enough.

Pre-clean paddy before husking

Use of paddy without impurities will ensure a cleaner and higher quality end product.

Do not mix varieties prior to milling

Different varieties of paddy have different milling characteristics that require individual mill settings. Mixing varieties will generally lead to lower quality of milled rice.

When milling use rubber roll technology for husking

Rubber roll huskers produce the best quality. Engelberg-type or "steel" hullers are no longer acceptable in the commercial rice milling sector, as they lead to low milling recovery and high grain breakage.

Separate all paddy from the brown rice before whitening. Paddy separation after husking will lead to better quality milled rice, and reduce overall wear and tear on the rice mill.

Having at least two stages in the whitening process (and a separate polisher) will reduce overheating of the grain and will allow the operator to set individual machine settings for each step. This will ensure higher milling and head rice recovery.

Install a screen sifter to remove small brokens and chips from the polished rice. Rice with a large number of small broken (or brewer's rice) has a lower market value. The small brokens can be utilized to produce rice flour.

Monitor and replace spare parts regularly turning or replacing rubber rolls, refacing stones, and replacing worn screens regularly will keep milled rice quality high at all times.

2. Rice Flour

- Rice porridge
- Bread
- Cookies
- Cakes
- Pan cakes.

3. Rice roll

4. Livestock feeds

5. Husks for making building materials

6. Briquette









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