Peanut Further Processing

Hot Topics on Peanuts
2011 Georgia Peanut Tour September 27, Bainbridge, GA

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College of Agricultural and Environmental Sciences
<table>
<thead>
<tr>
<th>Category</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Crush for oil</td>
<td>18%</td>
</tr>
<tr>
<td>Export</td>
<td>18%</td>
</tr>
<tr>
<td>Loss</td>
<td>10%</td>
</tr>
<tr>
<td>Food Use</td>
<td>54%</td>
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Food use
- Peanut Butter 52%
- Snack Peanuts 20%
- Peanut candy 25%
- Miscellaneous 3%
List of Products

- Peanut Butter
  American Phenomenon
- Roasted nuts
  In-shell, shelled
- Peanut Confections
  Candies
  Desserts
  Bakery Sweets
George Washington Carver

- Developed Peanut & Soybean products that revolutionized southern agricultural economy
- His research developed:
  - 300 products from peanut &
  - 105 ways of preparing peanuts for human consumption

An Educator, Farmer
Agricultural/Food Scientist
Carver’s way of using peanuts

Used peanuts 105 ways in:

- Soups, puree, bread, candy, cheeses, coffee, cookies
- Deserts – Cakes, pudding, ice-cream, frappe
- Main courses – Cutlets, patties, sausage, omelet, macaroni, stuffing, etc.
- Snacks – Wafers, bars, donuts, salted peanuts, etc.
GENERAL PRINCIPLES APPLICABLE TO PRODUCT MANUFACTURING

**Procurement**

- Raw Materials & Ingredients
- Specifications
- Quality Assurance agreement with the suppliers
- Verification Method agreement
- Receiving quality inspection & control
Factors that affect Quality in Production
- Production Equipment
- Defined Processes and Procedures
- Measurements (In-process monitoring and control)
- Qualified Personnel
- Environments

Use of Statistical Tools
These are integral part of process control

Use of Automated Process Control
Peeanuts - Preharvest factors

Seed
Cultural practices
Plant diseases
Insect damage
Aflatoxin production
PRI NCIPLES APPLICABLE TO PEANUT PRODUCT MANUFACTURING - Continued

Peanuts-Postharvest factors
Physiological maturity
Harvesting techniques
Moisture content
  At harvest ~ 40 to 50%
  After in-field curing - 25%
  After final drying <10%
Shelling - may cause mechanical damage
Storage
  Unshelled peanuts <10% moisture
  Shelled peanuts < 7% moisture
Peanuts - Post Processing Factors
Storage temperature
Packaging
High barrier
- Glass
- Metal
- Composite/laminated polymeric films
Low oxygen
- Vacuum
- Inert gas environment
- Oxygen scavengers
PEANUT PRODUCTS/ PROCESSES

1. Dry (Air) Roasted Nuts
2. Fry Roasted Nuts
3. Honey Roasted
4. Coated Nuts
5. Peanut Oil
6. Peanuts as Ingredients
7. Peanut Butter
PEANUT PRODUCTS AND PROCESSES - CONTINUED

Peanut Oil
Mechanical Process – crushers and expellers
Solvent Extraction Process – using hexane

Peanuts as Ingredients
Used in manufacturing of
Confectionery
Breakfast cereals
Bakery products
Extruded snacks
Peanut milk, cheese and yogurt etc.
PEANUT PRODUCTS AND PROCESSES - CONTINUED

Ingredients could be in various forms
Chopped nuts, whole nuts or halves
Peanut protein products

<table>
<thead>
<tr>
<th>Product</th>
<th>Protein Content</th>
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</thead>
<tbody>
<tr>
<td>Peanut meal/flour</td>
<td>&lt; 70%</td>
</tr>
<tr>
<td>Concentrate</td>
<td>70 - 85%</td>
</tr>
<tr>
<td>Isolates</td>
<td>&gt; 85%</td>
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</tbody>
</table>

(Details for manufacturing given in Woodroof (1983))
Classification of peanut meal and flour

Meal – particle size >100 microns

Flour – particle size <100 microns

- Full fat meal/flour 50% fat
- Partially defatted 0.2 to 50% fat
- Defatted <0.2% fat

(Defatting may be by mechanical pressing, solvent extraction or combination of the two)
PEANUT PRODUCTION/ CONSUMPTION IN THE US

Food use

Peanut Butter 52%
Snack Peanuts 20%
Peanut candy 25%
Miscellaneous 3%
PROCESSING STEPS

Roasting
Blanching
Grading Sorting
Grinding
Deaeration
Chilling and Filling
Packaging
Roasting

Extremely variable step.

A number of factors affect the consistent production of same degree of roast.

- Cultivar
- Seed size
- Moisture
- Roaster type
- Roasting batch size
- Sophistication of process control
- Process time and temperature
Roasting (continued)

On completion of roasting:

Peanuts should be cooled to prevent further roasting

Processed as soon as practical to obtain highest quality butter - To prevent development of undesirable flavors ('stale')
Blanching

Operation to remove skins:
Soot deposited inside the roaster rubs off onto nuts during roasting
Blanching removes soot along with the skins
Soot on the split nuts remain throughout the process affecting the final color of the product
Some processors do not use any splits
**Grading Sorting**

Immature and undeveloped nut
small and shriveled

Moldy - do not split during blanching

Specks in peanut butter
From grinding
    shriveled nuts
    nuts with skin

Completely grinding results:
    excessive bitter taste
Grinding

It can be single stage or double stage.
Double stage is preferable
   Better control of the process, and the product quality
   Uniform distribution of stabilizer and additives

Temp. <180°F (82°C)

Finer grind releases more oil, thus more stabilizer may be needed
Deaeration

Prevents

Formation of streaks/bubbles from air in the packaged product

Removes moisture (improves quality)

Done at 15 - 20 mm of Hg
Chilling and Filling

Formation of crystalline structure

Mouth feel

Viscosity/flow of material for filling
Packaging

Shelf-life

- > 1 yr glass bottles
- < 1 yr in opaque polyethylene

Enhance Shelf-life
- nitrogen flushed
- vacuum packaged
List of Products - Research Done at UGA

- Peanut Butter
- Variety Breads including - White and whole peanut bread
- Cookies, Cakes and Brownies
- Doughnuts and Sweet Yeast Products
- Pies & Frozen Desserts
- Peanut Milk, yogurt and Cheese -type products
- Non-milk Beverages, soups, and gruels
- Peanuts with meats, peanut burgers
- Boiled Peanuts
- Breakfast Cereals
- Peanut noodles
- Peanut Paste/fermented peanut pastes
- Chinese type noodles
- Coated Nuts
- RUTF – Read-to-use therapeutic foods
Commercializing - Peanut Products in the US

- Cracker-coated nuts
- Baked snack chips
- Peanut butter tarts
- Extruded snack puffs

UGA research

Dept. of Food Sci. & Tech 2011 Hot topics - GA Peanut Tour
Low-fat nutritional drink from peanut, soy & chocolate

1. Soy flour
2. Peanut flour
3. Soy protein isolate
4. Ingredients for chocolate syrup

Various formulations were developed incorporating soy and using mixture design.
Peanut punch prepared by visiting scientist from Bulgaria

Peanut Punch made from skim milk, peanut butter, sugar and other ingredients. It can be flavored with chocolate, vanilla, strawberry and other flavors.
Products in Japan

- Peanut snacks
  Roasted, salted, & coated nuts
- Peanut butter
Products in Korea

- Peanut snacks
  - Roasted, salted, & coated nuts
- Peanut confections
Products in Thailand

- Peanut snacks
  - Roasted, salted, & coated nuts
- Peanut candies
- Peanut confections
Products in Bulgaria

- Peanut snacks
  - Roasted, salted, & coated nuts
- Peanut candies
Products in Bulgaria

Peanut candies and confections
Products in Philippines

- Peanut snacks
  - Roasted & salted
  - Flavored/ coated
Products from Philippines
Modified through Peanut CRSP (Collaborative Research Support Program) - UGA Griffin campus

Java sauce using sorted peanuts
Peanut sauce mix using sorted peanuts

Regular (L) and Vitamin A fortified peanut butter (R)
A European market leader in nuts food sector

Three major segments in nut and nut-based products

- Consumer brands
- Private label products
- Ingredients

Ingredients division based at Imko Ingredients (Netherlands and Poland)
Tailor-made and ready to use ingredients for Confectionery, savory snacks, bakery, breakfast cereal, dairy products, ice-cream, meat sauces, and various meat components

Coated and salted peanuts
Popular consumer brands

- Netherlands: ültje
- Germany and Austria: Jack Klin
- France and Italy: Jack Benoit
- Poland: felix, Pittjes
- Western Europe
Roasted groundnuts are eaten with bananas, roasted corn or alone as snacks - GHANA
Groundnut paste on display in Madina Market - GHANA
Some more products in Africa—GHANA

Coated, roasted Peanuts

Groundnut-cake displayed in glass box for sale
Darkowa (made from peanut paste and sugar) - GHANA

Darkowa is moulded in different sizes and sold at different prices.

Darkowa is sold in glass boxes
Groundnut oil processing - GHANA

Water is added to the groundnut paste, a little at a time, and kneaded until oil is extracted.

Extracted oil is boiled, cooled and bottled.
Kulekule/Khebab powder processing - GHANA

- Long strands of kulekule being fried.
- Kulekule is ready to be sold, or pounded and milled to khebab powder.

- Khebab powder on sale at Nima Market.
- Khebab powder is commonly used to flavour barbecue/soye.
Products in other countries

India: Coated peanuts

Uganda – Processing
Peanut Butter

China: Coated peanuts

Indonesia: Coated peanuts
CHALLENGES

- Innovation in Processing technologies for improved efficiency, reduced usage of resources, leading to new and improved peanut products
- Improved raw material - cultivars
- Improved ingredients
- Marketing products to meet consumer acceptability and demands
THANK YOU