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# SOY in BAKING

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# Functions of Soy Flours in Bakery Products

- Facilitate greater water incorporation
- Improve dough handling and machineability
- Improve moisture retention
- Improve crust color development
- Prolong freshness and storage stability
- Bleach crumb color to produce white bread
- Functions much like nonfat dry milk in bread and rolls, at about half the cost
- Retard fat absorption by donuts
- Improve cake tenderness and crumb structure
- Improve nutritional quality



## Sample Turkish Bread Formula with Soy Flour

| Ingredients                        | Control | Soy flour added |
|------------------------------------|---------|-----------------|
| Flour, kg                          | 100.00  | 100.00          |
| Water, lt                          | 58.00   | 62.00           |
| Yeast, lt                          | 5.50    | 5.50            |
| Salt, kg                           | 1.40    | 1.40            |
| Improver, kg                       | 1.00    | 1.00            |
| Defatted soy flour –<br>PDI 70, kg | -       | 3.00            |



# Water Binding

- ❖ Defatted soy flour, corelated with PDI
- ❖ Add 1.5 L water Per kg of soy flour
- ❖ Improves
  - Crumb body
  - Crumb resilience
  - Crust color
- ❖ Use in bread and rolls, donuts and sweet goods



*Stauffer, C.E., 2001*

# Dough Conditioning



- ❖ Enzyme active soy flour
- ❖ •Lipoxygenase makes fatty acid hydroperoxides, which:
  - Interact with gluten
  - Increase gluten strength
  - Improve mixing tolerance
- ❖ •Bleach flour pigments

*Stauffer, C.E., 2001*

# Bread Moisture Retention-Shelf Life

✚ Decreases bake loss by 2-2.5%

Regular bread – 18% bake loss

Bread with soy flour – 15.7% bake loss

✚ Increase bread moisture improves shelf life

Regular bread – 32 to 33% moisture

Bread with soy flour – 35.3 to 35.9% moisture

*Stauffer, C.E., 2001*

# Soy Products Used in Bakery Foods

- Defatted Soy Flour
- Low Fat Soy Flour
- High Fat Soy Flour
- Full Fat Soy Flour
- Lecithinated Soy Flour
- Soy Grits
- Soy Concentrate
- Soy Isolate
- Soy Bran



# Soy Products in Bakery Foods



- ❑ Soy products have been used in the bakery for more than 70 years.
- ❑ The first application was enzyme-active soy flour for crumb bleaching (1934).
- ❑ This is still used in baking today, although more for its ability to improve dough strength and handling properties than for a whiter crumb.
- ❑ During the 1950's and 1960's, nutritionist sought to increase the adequacy and amount of dietary protein in developing countries.



# Soy Products in Bakery Foods



- ❑ Soy fortified grain products were seen as one way to accomplish this, and much work was done on incorporating soy into bread and pasta.
- ❑ Soy protein is relatively rich in lysine but poor in methionine; wheat protein is poor in lysine but rich in cystine (which can be substitute for methionine).
- ❑ The total protein in a 90/10 blend of wheat and soy flours has an excellent balance of the essential amino acids.

## Proximate Composition of Commercial Soy Protein Products

| Products             | Protein<br>% | Fat<br>% | Moisture<br>% |
|----------------------|--------------|----------|---------------|
| Flours and grits     |              |          |               |
| Full fat             | 41.0         | 20.5     | 5.8           |
| High fat             | 46.0         | 14.5     | 6.0           |
| Low fat              | 52.5         | 4.0      | 6.0           |
| Defatted             | 53.0         | 0.6      | 6.0           |
| Lecithinated         | 51.0         | 6.5      | 7.0           |
| Protein Concentrates | 66.2         | 0.3      | 6.7           |
| Protein Isolates     | 92.8         | <0.1     | 4.7           |

# Bakery Applications of Various Soy Products

|                         | White bread | Speciality bread | Cakes | Cake Donuts | Yeasteds donuts | Sweet goods | Cookies (biscuits) |
|-------------------------|-------------|------------------|-------|-------------|-----------------|-------------|--------------------|
| Defatted soy flour      | X           | X                | X     | X           | X               | X           | X                  |
| Enzyme active soy flour | X           |                  |       |             |                 |             |                    |
| Full fat soy flour      |             |                  | X     | X           |                 | X           |                    |
| Lecitinated soy flour   |             |                  | X     | X           |                 |             | X                  |
| Soy concentrates        |             | X                |       |             |                 |             |                    |
| Isolated soy protein    |             |                  | X     | X           | X               |             | X                  |
| Soya fiber              |             | X                |       |             |                 |             |                    |

# Selected Functional Characteristics of Soy Protein

(United Soybean Board)

| Functional property          | Protein form used             | Food System              |
|------------------------------|-------------------------------|--------------------------|
| Emulsification               |                               |                          |
| Formation                    | Flour, isolates, concentrates | Bread, cake              |
| Prevention of fat absorption | Flour, concentrates           | Flour, concentrates      |
| Water absorption             |                               |                          |
| Uptake                       | Flour, concentrates           | Bread, cake, pasta       |
| Retention                    | Flour, concentrates           | Bread, cake              |
| Dough formation              | Flour, isolates, concentrates | Baked goods              |
| Cohesion                     | Flour, isolates               | Bread, cake, pasta       |
| Elasticity                   | Flour, isolates               | Baked goods              |
| Color Control                |                               |                          |
| Bleaching                    | Flour                         | Bread                    |
| Browning                     | Flour                         | Bread, pancakes, waffles |

# ASA-IM Activities

## Technical Assistance

Soy flour seminars

One-and-one meetings

Baking demos with soy flour





Turkish bread with soy flour



Sandwich bread with soy flour



“Simit” with soy flour, the very first trial in the world





## Happy Bakers with Soy Bread







Thank YOU!

