Today’s Focus:
Using Soy in Food Products: Challenges and Opportunities

- Current Use of Soybeans for Food in the World
  - Whole Soybeans
  - Soy Protein Ingredients
- Market Drivers
- U.S. Soyfoods Market
- Challenges & Opportunities
The Soybean

- Soybeans form the base of a new food platform for the 21st Century
- The soybean’s wide range of functional properties and high nutritive value makes it the perfect ingredient for a wide array of food and nutritional products
- Worldwide, soyfood sales are estimated to be worth over $100 billion and growing at 5% to 10% annually
- Soy protein sales are nearly $3 billion worldwide

Soybeans are such a versatile food source and ingredient, they could be called the 21st Century Food Mimic
The Soybean’s Composition Makes it One of the Most Perfect Foods for Health

- On a moisture-free basis, the soybean contains approximately:
  - 40% Protein
  - 22% Fat
  - 25% Carbohydrates
  - 8% Dietary Fiber
  - 5% Ash (minerals)

- And a virtual pharmacy of powerful phytochemicals including:
  - Isoflavones
  - Sterols
  - Saponins
  - Protease inhibitors
  - Anti-oxidants
  - Tocopherols (Vitamin E)
  - Lecithin

And There are Plenty of Soybeans

Soybean production has increased 500% during the past 40 years making it the world’s largest protein and oil crop

- The forecast for 2006 world production was 234 million MT
- Over the past 5 years, world production has increased at an average rate of over 4.9% per year
- There are enough soybeans to give every man, woman and child on the planet 30 kilos each per year - equivalent to 30 grams of protein and 15 grams of oil per day
Using Soy in Food Products: Challenges and Opportunities

Drivers for Increased Production
As the world population grows, so does its need for food

- As economies grow, demand for meat and other animal proteins rises, creating an even greater need for protein meal for feed
- Vegetable oil is also needed for cooking and, now to an increasing degree, for biofuels
- Whole soybean use will also continue to grow, although the demand for processed soy proteins will grow more quickly due to modernization of the food industry and the ease with which soy proteins can be incorporated into a variety of different foods

Most Soybeans are Crushed
Rising demand for animal feed and vegetable oil drive "crush" demand

- On average, 85% of annual soybean production is “crushed” into meal and oil
- An estimated 6.4% of annual production is processed directly into food either as whole soybeans of full fat flours or powders, while 2.0% was crushed and processed into defatted proteins

Average yearly use of soybeans for the last 5 years

- Soya Crush for Feed & Oil: 84.7%
- Seed & Farm Feed: 6.6%
- Direct Food: 6.4%
- Soya Crush for Protein: 2.0%
Using Soy in Food Products: 
Challenges and Opportunities

World Soybean Supply & Disposition

**Overall world supply has been growing at 6% per year**
- The use of soybeans for “crush” is also growing at 4.9% per year
- The use of whole soybeans for food is growing at 3.9% per year

<table>
<thead>
<tr>
<th>Year</th>
<th>Supply</th>
<th>Disposition</th>
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<tbody>
<tr>
<td></td>
<td>Beg. Stocks</td>
<td>Crush</td>
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<tr>
<td>2000/01</td>
<td>27.8</td>
<td>146.5</td>
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<tr>
<td>2001/02</td>
<td>30.8</td>
<td>158.3</td>
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<tr>
<td>2002/03</td>
<td>33.3</td>
<td>165.5</td>
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<tr>
<td>2003/04</td>
<td>43.7</td>
<td>163.7</td>
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<tr>
<td>2004/05</td>
<td>38.8</td>
<td>175.7</td>
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<tr>
<td>2005/06</td>
<td>48.5</td>
<td>184.5</td>
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<tr>
<td>2006/07</td>
<td>53.8</td>
<td>194.9</td>
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**Soy Protein is Becoming Increasingly Important in the Human Diet**
- Soy protein consumption is rising annually around the world
- Due to its place in the value chain, it will always be a lower cost protein than animal

<table>
<thead>
<tr>
<th>Year</th>
<th>Animal Protein</th>
<th>Soy Protein</th>
<th>% of Protein</th>
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<tbody>
<tr>
<td>1995</td>
<td>26.7</td>
<td>2.2</td>
<td>8.2%</td>
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<tr>
<td>2000</td>
<td>28.2</td>
<td>2.4</td>
<td>8.4%</td>
</tr>
<tr>
<td>2002</td>
<td>28.7</td>
<td>2.5</td>
<td>8.5%</td>
</tr>
<tr>
<td>2005</td>
<td>30.9</td>
<td>2.8</td>
<td>9.4%</td>
</tr>
<tr>
<td>2010</td>
<td>33</td>
<td>3.3</td>
<td>10.7%</td>
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</table>
Soy - The Complete Plant Protein

Provides all 8 needed essential amino acids

- High quality - PDCAAS® score between 0.95 and 1.00 - higher than most meat products
- Versatile: meat and dairy alternatives, snacks, cereals, bars and baking
- Can be easily extracted from the whole soybeans using natural, non-chemical water processes
- Advances in technology has made possible a variety of protein products from crushed soybeans:
  - Soy flour
  - Isolate soy protein
  - Soy protein concentrate

* Protein Digestibility Corrected Amino Acid Score

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Soy Protein Ingredients & Processing

- Soy proteins are derived from defatted soybean meal or flakes after the oil has been extracted from the whole soybean by solvent extraction or by pressing

<table>
<thead>
<tr>
<th>Constituent</th>
<th>Full-Fat Soy Flours &amp; Grits</th>
<th>Defatted Flours &amp; Grits</th>
<th>Soy Protein Concentrates</th>
<th>Isolated Soy Protein</th>
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</thead>
<tbody>
<tr>
<td>Protein (N x 6.25)</td>
<td>38 - 42</td>
<td>52 - 54</td>
<td>62 - 69</td>
<td>86 - 87</td>
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<tr>
<td>Fat</td>
<td>18 - 20</td>
<td>0.5 - 1.0</td>
<td>0.5 - 1.0</td>
<td>0.5 - 1.0</td>
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<tr>
<td>Crude Fiber</td>
<td>7 - 10</td>
<td>2.5 - 3.5</td>
<td>3.4 - 4.8</td>
<td>0.1 - 0.2</td>
</tr>
<tr>
<td>Ash</td>
<td>4 - 5</td>
<td>5 - 6</td>
<td>3.8 - 6.2</td>
<td>3.8 - 6.8</td>
</tr>
<tr>
<td>Moisture</td>
<td>5 - 8</td>
<td>6 - 8</td>
<td>4 - 6</td>
<td>4 - 6</td>
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<tr>
<td>Carbohydrates</td>
<td>28 - 32</td>
<td>30 - 32</td>
<td>19 - 21</td>
<td>3 - 4</td>
</tr>
<tr>
<td>(by difference)</td>
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<td></td>
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</table>
Processing soybeans or proteins into foods

- There are a number of means of classifying foods made from the soybean including the following:
  - Soy-based dairy alternatives (primarily water processed)
    - Processed from whole soybeans or soy proteins
      » Includes soymilk, tofu and other
  - Soy protein-based foods (primarily from dry ingredients)
    - Processed from whole soybeans or soy proteins
      » Includes meat alternatives, energy bars, snacks, cereals, baked goods and powders
  - Soybeans as beans (dried and fresh)
    - Processed from whole dry or fresh soybeans
      » Includes products made from both dried beans and fresh green soybeans

Soy-based dairy alternatives
(Aqueous Extraction/Wet Processing)
Soy protein-based foods
(Solvent or Mechanically Extracted or Dry Ground Ingredients in Food)

Soybeans as beans
Process
Harvest (Dry or Green) & Clean — Blanch, Freeze, Roast, Can, etc.
Soyfood Markets Around the World

Around the world, soybeans are used in thousands of food products as a key ingredient and to provide a complete protein as well as a healthy fat and valuable phyto-nutrients.

In Asia, use of soybeans include:
- Tofu, soymilk, miso, soy sauce, tempeh, meat, fish and poultry alternatives, natto and a wide range of other specialty foods

In North America, soyfoods are used in both traditional and modern applications:
- Tofu, soymilk, tempeh, miso, as well as new products such as Americanized meat alternatives, frozen dinners, functional beverages, energy bars, soy snacks, soy nuts and ice creams
Soyfood Markets Around the World

- In other Western nations such as Europe and Australia, soymilk, meat alternatives and cultured soya products dominate. Leading countries include the U.K., Netherlands, Belgium, Germany, France, Italy and Spain.

- In the developing world, such as Africa, Latin America and India, dry textured soy protein is used widely as a low cost meat alternative, while soymilk in liquid and powdered form is becoming more popular.

Soyfood Market Drivers

Food processor’s need for functional ingredients, consumer desire for healthy foods and the need to reduce food costs, all help to drive the demand for soyfoods and soy protein.

Health Benefits:

- In 1999, the U.S. FDA approved a soy protein health claim that allowed foods containing 6.25 grams of soy protein per serving to state that they are “heart healthy” foods.

- Other benefits being researched include cancer prevention, bone health, kidney health and weight management due to the satiety of proteins.
Soyfood Market Drivers

**Low Cost:**
- Soy protein ingredients, by virtue of their being lower in the value chain, will always be less expensive than animal-based ingredients

**Functionality:**
- Extremely versatile and functional, soy proteins can easily be formulated into many existing food products as a nutritional enhancement, low-cost extender, emulsifying agent, or to improve texture and extend shelf-life

Regional Market Drivers

**In North America, Europe and other Western countries:**
- **Broader availability of soyfood products**
  - Larger food companies have entered the market and expanded product lines
  - Soyfoods are available in mainstream supermarkets and restaurants
- **Increased consumer interest**
  - Trend away from meat and toward vegetable protein products
  - Increased awareness of diet and health connection
Regional Market Drivers

In Asia:
- Strong history of traditional use
- Available as fresh and local products
- Developing food industry will include more soy proteins
- Growing economies will allow for greater food expenditures

In the Rest of the World:
- Large North American and Euro market stimulates interest worldwide
- Need for basic low-cost protein foods
- Government supported programs provide basic nutrition to school children and others
- Widely available, ample supplies and easy to process

U.S. Soyfoods Market
The U.S. Soyfoods Market
Market Matures in U.S. after 2% drop in 2005

- After more than 20 years of steady growth, many soyfood categories level off or shrink
- Saturation of markets, reduction of shelf-space and competing food trends take their toll
- Questioning of soy’s health benefits may also be reducing consumer appeal
- Availability and growth in organic meat and dairy may have lessened the “need” for hormone- and/or antibiotic-free dairy or meat replacements


U.S. Soyfoods
Percent of 2006 Sales By Major Product Categories

Retail sales of soyfoods grew to $4 billion in 2006
- Soymilk Beverages have moved into the number one position in soy with 22% of total sales in 2005, while Energy Bars have dropped to the number 2 slot with 17% of the total.
- Following are Soy-based Meal Alternatives at 14%, Meal Replacements at 12% and tofu at 6%.
Soymilk Beverages

- Soymilk is one category that continues to show strong growth, with overall sales up by 7.2% in 2006 to hit $892 million.
- Plain and flavored products are available in both aseptic and refrigerated packages with the chilled products having 80% of the shelf-space.
- The market is heavily dominated by 2 brands and an assortment of Private Label products.

Soy-based Meat Alternatives

- This $568 million category saw 2.5% growth in 2005 due to increased sales in large mainstream outlets and foodservice.
- Products are available in both the refrigerated and freezer case and can be found in burger, cutlet, mince, sausage, steak, bacon, poultry, fish and entrée presentations.
Soy-based Energy Bars

- Energy bars, once the leading soyfood product category is contracting, with a 2.4% drop in sales in 2006 to hit $692 million.
- Many brands compete for attention in a market that seems to be shifting to sweeter, more candy-like snack food iterations.

Tofu

- Over the past few years processors have been adding flavors and pre-cooking tofu by baking, frying or smoking to create new, ready-to-eat and easy-to-prepare products.
- One of the objectives was to get new consumers to try tofu; the other was to hold on to soy consumers who have many other new soy offerings to choose from.
- Although the flavored tofu category is growing, in 2006, overall sales of tofu dropped slightly 3.0% to $250 million.
Even with the market slowdown, new products keep coming

- Despite the slow down in growth, marketers continue to develop and introduce new soyfood products
- Organic products continue to dominate many categories and make up the bulk of the new product releases
- Mainstream food channels account for over 70% of sales for most categories
- Now more products in mainstream market than in natural food stores

Soy-based SKUs in the U.S. Market, 2003 - 2005

Emerging & Evolving Product Categories

- Frozen and ethnic entrees of ready-to-eat foods
- Meat alternatives as complete meals
- Tofu as a prepared ready-for-meal ingredient or even as a snack
Emerging & Evolving Product Categories

- Soymilk based yogurts
- Soymilk yogurt drinks and snacks
- Nondairy frozen desserts
- Snacks made from soynuts, soy flour and textured soy

Emerging & Evolving Product Categories

- Soy-protein enhanced cookie or candy bar
- Soy Crisps from leading snack food companies
- Soy-based functional drinks and beverages
“Macro Trends” are larger consumer-oriented changes driving growth, while “Micro Trends” are usually smaller subsets.

Macro trends such as “healthy eating” are supported by an array of micro trends that change position often, or vanish:
- Low-carb foods
- Fat-free or low fat
- “All Natural”
- Anti-oxidant enriched
- Soy-based
- Organic
- Non-GMO

Sometimes, micro trends become macro like low-carb and then burn out, others may be longer lasting, like organic.
Soy is now Micro, not Macro

Soyfoods had been their own “macro trend” for 10 years, but now are just a “micro trend” within ‘healthy eating’

- Marketing a product as containing “soy” as opposed to being a “delicious,” “protein” or “energy” food, may put it in last place as a food choice for new consumers looking for these qualities in a product (perception is that soy doesn’t taste good)
- Imitation or substitute foods often lack authenticity that consumers crave — organic meat and dairy products may be seen as more “real” to consumers (remember fat is okay now, especially if organic)
- Organic foods are a broad category being embraced even by Wal-Mart, creating legitimacy and high demand.
- Have we become ‘soy-turated’? How much soy can a person eat?

Consolidation of the marketplace has reduced some of the creative energy

Since 1999, the category has seen Kraft, Kellogg, ConAgra, Dean Foods, Nestle, Coca-Cola, Danone, Unilever, Hain-Celestial and others make sizable purchases of virtually all of the leading brands in soyfoods

- Although many new products are entering the marketplace supported by improved R&D and distribution, relatively little advertising is being done and few bold moves are being made
  - Larger companies move conservatively and are replacing slower moving products with new packages and flavors
  - Little use of new technologies to create true market innovations
  - Repositioning (such as what White Wave did with Silk) is seen as risky and may even compete with other core brands and markets (why sell soy-meat in the meat case if you are a meat company?)
  - Smaller companies with new ideas find it hard to get shelf space
The Changing Retail Environment

Food marketing has been going through its own transformation and food products need to move with those trends, not against them:

- More sales concentrated in Wal-Mart and other mass merchandisers (tighter margins mean you better be efficient)
- Convenience in package function, size and ease of use required (time for a new, improved tofu package?)
- Retail space, particularly in produce, is tight due to bagged salad and chopped vegetables… is it time to get into soy-based, nondairy creamy dressings?
- Changing demographics require continually evolving product design, flavors, line extensions and cross-branding considerations

Recommendations

- Stay authentic in flavor and presentation
- Use organic ingredients when possible
- Look at new packaging to stimulate new uses
- Ask yourself how you use products that you are familiar with and deliver them to the market just that way
- Be bold in repositioning and be the first player in a new space — support it heavily
Recommendations

- Study micro trends other than ‘soy’ that lead the ‘healthy eating’ macro trend
- Be sure your products don’t just taste good - they better be great!
- Consider acquiring companies that offer meal solutions other than yours to round out your product portfolio
- Be real, daring and stick with it… perhaps you will create, and thus “own” the next leading micro, or even macro, trend

Remember, we are already in the future...

“Kicking and screaming will the foolish be dragged into the 21st Century”
Thank you!

You can find more information on the soyfoods and soybean industry in the
Soya & Oilseed Bluebook

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Visit Soyfoods.org for health and related information from the Soyfoods Association of North America

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