New Developments in Soy Value Added Products

Suresh Itapu, Ph.D.
US Soybean Export Council

Outline

- Health products
- Meat Analogues
- Dairy analogues
- Sports Nutrition
- Food Ingredients
- Traditional Snacks
- Animal Nutrition products
- Soy Protein and Sustainability
- Conclusion
Soy protein innovation and opportunities in Asia

- **China** leads for soy protein use in new F&B.
- **But India, Southeast Asia are also growth hubs.**
- China: 42%
- North Asia: 26%
- Southeast Asia: 27%
- Emerging Asia: 1%

Butler, 2019

Established key segments for soy proteins across Asian markets:

- **North Asia**
  - Bakery: 8%
  - Meat, Fish & Eggs: 28%
  - Ready Meals & Side Dishes: 41%
  - Snacks: 14%

- **SEA**
  - Bakery: 9%
  - Meat, Fish & Eggs: 40%
  - Ready Meals & Side Dishes: 19%
  - Snacks: 10%

- **India**
  - Bakery: 7%
  - Meat, Fish & Eggs: 37%
  - Ready Meals & Side Dishes: 13%
  - Snacks: 37%

Note: North Asia: Hong Kong, Japan, South Korea, and Taiwan
Southeast Asia (SEA): Indonesia, Malaysia, Philippines, Singapore, Thailand, and Vietnam
Emerging Asia: Bangladesh, Vietnam, Nepal, and Sri Lanka

Innovations in Asia 7% of launches tracked with soy proteins by category per geographic market (2014-2018). Innova Database.
Protein Status in India

- Prevalence of protein deficiency is very high in India
  - More than 90% vegetarians and 85% non-vegetarians
  - GAP in availability of pulses and milk
  - Leading to growth and development problems

- Protein quality deficiency
  - Cereals contribute more than 70% protein
  - Cereals have relatively low digestibility and quality

- Globally protein demand will increase by 70% by 2050
  - Indian requirement will be even higher
**Health Products**

- Disease specific products
  - Heart health
  - Diabetic
  - Bone health
  - Women’s health
  - Child nutrition
- Bioactive peptides
  - Bioactive peptides may be present in independent entities or encrypted in the native protein.
  - Act as regulatory compounds with hormone like activities and have number of heath benefits
    - Antimicrobial
    - Antihypertensive
    - Cholesterol-Lowering
    - Anti-type 2 diabetes mellitus
    - Immunomodulatory
    - Antioxidation
  - Lunacin, a food derived peptide with anticancer bioactivity

**Meat Analogues**

- Growing trend across the globe
  - Meat alternatives are perceived as significantly more healthy, more unique, more environmentally friendly and more natural than conventional meat products
- Challenges
  - Meat alternatives must work to improve their tasty and indulgent image as they score significantly lower than meat products on the high impact purchase intent drivers “tasty” and “indulgent”.
US: meat substitutes by format, instant reaction and purchase intent, Jan 2017-May 2018

Beyond Meat, Gets Spicy, Fresh & Frozen
High Protein Reconstituted Rice

- Rice kernel reconstructed from broken rice using extrusion technology
- Improve nutritional composition
  - Protein, Vitamins, Minerals
- Adding value to low cost by-products
- High Protein Rice
  - Improvement in quantity and quality
- Low Glycemic Rice
  - Reconstituted rice has lower glycemic Index (GI) than regular rice
  - Better management of blood glucose
  - Lower insulin levels in the blood
  - Reduces overweight

Diabetes in India

- Indians and South Asians have high risk of diabetes
- India is home to the world’s largest number of diabetics (~73 mil.)
- India will have more than 80 mil diabetics by 2030
- Nearly 90% of these individuals have type 2 diabetes
- There may be more undiagnosed cases
Market Potential for Low Glycemic RCR

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<th>2020</th>
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<td>Diabetics in Indian (million)</td>
<td>75.00</td>
<td>77.78</td>
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<td>83.64</td>
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<td>Rice eating population (65%)*</td>
<td>48.75</td>
<td>50.55</td>
<td>52.42</td>
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<td>Targeted diabetic population</td>
<td>1.00%</td>
<td>3.00%</td>
<td>7.00%</td>
<td>12.00%</td>
<td>19.00%</td>
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<tr>
<td>Target diabetic population for RCR</td>
<td>0.49</td>
<td>1.52</td>
<td>3.67</td>
<td>6.52</td>
<td>10.71</td>
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<td>Rice consumption MT/day (200 gm/cap)</td>
<td>98</td>
<td>303</td>
<td>734</td>
<td>1,305</td>
<td>2,142</td>
<td>2,923</td>
<td>3,637</td>
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<td>LG RCR consumption MT/day (100 gm/ cap)</td>
<td>49</td>
<td>152</td>
<td>367</td>
<td>652</td>
<td>1,071</td>
<td>1,462</td>
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<td>LG RCR consumption TMT/year</td>
<td>17.7</td>
<td>55.3</td>
<td>133.9</td>
<td>238.1</td>
<td>390.9</td>
<td>533.5</td>
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<td>SPC/SPI @ 5% inclusion MT/Year</td>
<td>890</td>
<td>2,768</td>
<td>6,697</td>
<td>11,906</td>
<td>19,548</td>
<td>26,673</td>
<td>33,192</td>
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Soymilk and Dairy Analогues

- Is a aqueous extract of soybeans
- Closely resembles dairy milk in appearance & composition
- Has highest amount of protein, Iron, Unsaturated fatty acids & Niacin
- Excellent alternate for lactose intolerants
  - High incidence (40%)
  - Very high incidence of lactose malabsorption (27-70%)*
    - Inability to digest lactose
      - Due to deficiency of lactase
- It is considered as a healthy food as, it is cholesterol free and has phytochemicals
- Is the easiest way to add soy to the diets
Why Soy Dairy Analogues - Economics

• Health Benefits
  • Heart health, Cancer, Osteoporosis, Diabetes, Cholesterol free

• Economic Benefits
  • Low production cost compared to dairy products
  • One kg soybean
    • 7-8 lit of milk/flavored milk
    • 1.40 kg tofu
    • 7-8 lit curd/yogurt
  • Ideal project for unemployed youth
    • No formal education required

Soy Yogurt

• Good quality acceptable yogurt can be made with soymilk
  • Salt, sugar
• Can be made the same way as dairy yogurt
• Soy-based yogurt and cultured milks are growing world over
Ice Cream & Frozen Dessert

• Low fat and cholesterol free
• Healthy alternate to ice cream
• Very economical
• Excellent acceptability

Economic Benefits
• Soy Protein is one of the cheapest sources of protein
• Production cost of soymilk is almost 40% less than dairy milk
• Vegetable fat, one of the main ingredients, is economical than dairy fat
• Higher overrun

Marketability
• High protein ice cream possible
• Cholesterol free ice cream
• Healthy ice cream – positive perception
• Increased awareness for health foods

Soy-Cream Cheese

• Place a clean muslin in a colander.
• Place the colander in a bowl that is large enough to hold it.
• Add the soy yogurt to the lined colander and wrap the towel over the top to cover (or use a plate).
• Leave this to drain for about 5 hours in the refrigerator. (If you want a thicker consistency, leave it longer).
• Store your finished cream cheese in a resealable container in the fridge.
Sports Nutrition products

- Promotes Lean Body Mass/Muscle Mass
- Soy Protein Can Enhance Muscle Mass Synthesis
- Soy Protein Can Increase Lean Mass
- Better digestion/absorption
  - Soy protein is digested at a different rate compared to whey protein and casein, which may help prolong the delivery of amino acids to muscles
- Good Amino Acids profile
  - The BCAAs are critical for several reasons:
    - Glutamine helps maintain cell hydration and may attenuate the decrease in blood pH.
    - Arginine may enhance blood vessel function and may help maintain a strong immune system.
  - Soy protein contains 30% more glutamine and 300% more arginine than whey.
- Antioxidant Properties
  - Improves antioxidant status
  - Raises plasma antioxidant capacity
- Soy with whey and casein will promote performance
  - More recent work has shown that intact high-quality proteins such as whey, casein, or soy are effectively used for the maintenance, repair, and synthesis of skeletal muscle proteins in response to training

Processed Food Ingredients

- Replacement of Expensive Ingredients
  - Whole Egg
    - Eggs can be fully or partially replaced using lecithinated defatted soy flour
    - Studies at AIB demonstrated about 25% reduction in raw material cost
  - Skim Milk Powder (SMP)
    - Defatted soy flour (60%) and sweet dry whey (40%) can replace SMP
  - Egg White
    - Enzyme treated soy isolate can replace egg white
    - Can whip to as much as twice the volume of egg whites but will not set when heated.
    - 75% replacement of egg albumen can yield similar product
  - Oil
    - Reduction of oil absorption in fried products
      - Traditional snacks
      - Instant noodles
- Increased functionality
  - Fermentation
  - Enzyme hydrolysis
Protein and Cereal Bars

- Consumer demand for on-the-go nutrition has seen the explosion of the snack bar market in recent years.
- Whether it’s a cereal, energy or sports bar, today’s ever increasing challenge is to create “good-for-you products” that deliver great taste and natural health benefits.
- Soy protein plays a very important role in providing ingredients for these products.
- Protein isolates and cereal flours can be extruded to make protein crisps to provide texture, taste and nutrition delivery to these products.

Traditional Snacks

- Increasing interest in health foods
- Healthy traditional snacks
  - Bhujia, murukku
  - Extruded
  - High protein, low fat
- Soy nuts
  - Far less expensive than traditional nuts
  - Soy nuts can be found in a variety of flavors, including chocolate-covered.
  - High in protein and isoflavones, soy nuts are similar in texture and flavor to peanuts.
Animal Nutrition Products

• Today, animal nutrition cannot be imagined without the use of soy products such as PSC
• Can be used in
  • Calf feed
  • Swine/pigs feeds
  • Pet foods
• In aquaculture, substitute fish meal
  • Enzyme treated SPC
• Poultry Nutrition products
  • Fermented Soybean meal

Soybean and Sustainability

• Soybean is highly sustainable protein crop for protein and oil
• Rich source of protein and oil
  • Excellent nutritional and health benefits
• Highly resistant for adverse environmental conditions
• Perfect solution for the mankind with decreasing natural resources like water and land
Conclusion

• Soy protein ingredients have been leading plant based protein applications in food and beverage industry.
• Great opportunities for plant based products esp. meat alternatives
• Consumers tend to be more health oriented paving the way for healthful innovations. Soy protein fits very well in this category.
• But innovation is also moving in more of an indulgent direction.
• Innovation is focusing on functionality, indulgence, and new hybrid products.
• Functional ingredients continue to grow in the processed food industry.
• Excellent opportunities for dairy analogues.
• Scope for modified protein products in animal nutrition.
• Soy protein is the solution for growing protein demand.