Sustainable Protein
Nourishing the Population while Protecting the Environment

Matthew Roberts • CSO at Natures Bounty (NBTY)

May 3, 2016
Oak Brook, Ill., USA
Sustainable Protein
Nourishing the Population while Protecting the Environment

• The Burning Platform: The Situation, Measuring Impact

• Agriculture & Nutrition: Understanding Protein Availability & Quality, Investment Trends

• The Consumer: Simple, Clean, Local is helping to drive the search for alternate protein sources.

• Solutions: Increased Agricultural Yield, Bringing land and sea-based resources on line. Pre-qualified Protein “Cassettes”
19 Billion Chickens

- Total World Land Area = 13,000 mio ha
  - Other Land: 4093
  - Forest: 3952
  - Meadow/Pasture: 3406
  - Arable: 1562

- 12% Arable land
- 26% land area for grazing and 1/3 arable land for feedstock
- Meat consumption averages 34kg globally (90kg in USA)
- Meat consumption to double by 2050
- 70-100% more food needed by 2050
- 6kg of plant protein = 1 kg of meat (85% of protein wasted)
Measuring Impact

Removing the animal from protein production chain simultaneously and powerfully addresses four major problems attributable to livestock

<table>
<thead>
<tr>
<th>Human Health</th>
<th>Climate Change</th>
<th>Global Resource Use</th>
<th>Animal Welfare</th>
</tr>
</thead>
<tbody>
<tr>
<td>16%</td>
<td>+51% of Global Greenhouse Gas Emissions driven by livestock rearing and processing</td>
<td>29% Water footprint of animal production as % of all agriculture</td>
<td>66 Billion Land animals slaughtered every year for food</td>
</tr>
<tr>
<td>21%</td>
<td>Increased Cancer risk</td>
<td>45% Global surface area for livestock systems</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Increased Heart Disease risk</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1) “Risks associated with processed meats.” Archives of Internal Medicine. 2012.
5) FAOSTAT
Global Population Growth and Changing Diets Bring Urgency to Our Innovation

From 1985-2011, the diet shift in China has been remarkably different than that in Africa

Africa & China: The Differing Meat and Cereals Diet Shift¹

1) FAOSTAT
In 1945, half the world was malnourished. Today 10 – 15%

1 billion people have protein deficient diets

Precision agriculture can help even small farmers

Food price volatility is the new normal

In past 50 years food production doubled but only 9% increase in arable land

<table>
<thead>
<tr>
<th>Crop</th>
<th>Production Mio Tonnes</th>
<th>Area Mio Ha</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wheat</td>
<td>670</td>
<td>220</td>
</tr>
<tr>
<td>Rice</td>
<td>720</td>
<td>164</td>
</tr>
<tr>
<td>Maize</td>
<td>880</td>
<td>185</td>
</tr>
<tr>
<td>Soybeans</td>
<td>250</td>
<td>110</td>
</tr>
<tr>
<td>Pulses</td>
<td>70</td>
<td>75</td>
</tr>
</tbody>
</table>
- Inflation adjusted prices for corn, soy, wheat are half what they were 50 years ago
- Low protein score results from lack of one or two amino acids
- Most staples are also deficient in micronutrients (Vitamin A; Iron & Iodine)
- Indian diets are heavily plant based but little corn

<table>
<thead>
<tr>
<th>Crop</th>
<th>Protein %</th>
<th>Quality Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maize</td>
<td>9.4</td>
<td>42</td>
</tr>
<tr>
<td>Rice</td>
<td>7.1</td>
<td>54</td>
</tr>
<tr>
<td>Wheat</td>
<td>10.3</td>
<td>36</td>
</tr>
<tr>
<td>Soybeans</td>
<td>36.5</td>
<td>86</td>
</tr>
<tr>
<td>Cassava</td>
<td>1.3</td>
<td>-</td>
</tr>
<tr>
<td>Kidney Beans</td>
<td>23.6</td>
<td>68</td>
</tr>
<tr>
<td>Egg</td>
<td>13.6</td>
<td>100</td>
</tr>
</tbody>
</table>
Plant Protein Quality

- **Multiple Factors in Animal vs. Plant Protein quality**
  - PDCAAs: Most plant proteins have lower values
  - Fiber content: Increased fiber may decrease protein absorption
  - Anti-nutrients: phytates, trypsin-inhibitors, etc

- **Leucine Threshold Theory**
  - Minimal amount of leucine may be needed to effectively stimulate muscle protein synthesis
  - High intakes of plant proteins (>40g rice or pea protein) result in similar effects on lean muscle and strength compared to whey protein
  - Unproven if equal amounts of rice/pea vs. whey at lower intakes would result in similar benefits
It’s the last or latest “unexplored” area of a food product’s nutritional statement...

1980s: Calories
1990s: Fat, Fibre
2000s: Carbs, Wholegrain
Now: Protein
Plant Based Protein Sales Growth

- Higher sustainability is an attractive feature for many consumers
- Global nutrition market for plant-based ingredients continues to grow

- Alternatives to meat on the rise across all nutrient supplements:
- 41% of adults made some effort to limit/avoid meat in 2013
- The vegetarian retail foods market reached a total of $1.6 billion in sales in 2011 and has been rising
- Four out of five adults are purchasing functional foods and drinks high in protein
Part-time vegetarians seek non-animal protein sources

Levels of vegetarianism across Europe are relatively low, ranging from 4-7%. However, many consumers claim to be reducing their meat consumption, with 31% of Germans, 38% of French and 45% of Italians all claiming to be actively reducing their consumption of, or avoiding, red meat.

Flexitarians,” more consumers are adopting part-time vegetarian diets that encourages the use of non-animal proteins. In the US, only 5% of respondents indicate they are vegetarians, yet 59% report they consume some form of meat alternative, including eggs, at least a few times a week.

Use and interest in plant protein (eg soya, pea) 2014

<table>
<thead>
<tr>
<th>Country</th>
<th>Have eaten</th>
<th>Have not eaten but would be interested in trying</th>
<th>Have not eaten and would not be interested in trying</th>
</tr>
</thead>
<tbody>
<tr>
<td>China</td>
<td>86%</td>
<td>13%</td>
<td>2%</td>
</tr>
<tr>
<td>UK</td>
<td>32%</td>
<td>28%</td>
<td>40%</td>
</tr>
<tr>
<td>US</td>
<td>34%</td>
<td>31%</td>
<td>35%</td>
</tr>
<tr>
<td>Germany</td>
<td>59%</td>
<td>20%</td>
<td>21%</td>
</tr>
</tbody>
</table>

Base: internet users aged 18+ (2000 in US, 1500 in UK, 2002 in Germany) and 3,000 internet users aged 20-49 in China
Source: Lightspeed GMI/QQ Survey/Mintel

Plant proteins most widely used and accepted in China, driven by soy’s long history of use. The familiarity of plant proteins should help increase acceptance and uptake outside of Asia, communicating the nutritional value of plant protein will help increase its appeal.

Note: This is a marketing intelligence report published by Mintel. The consumer research exclusively commissioned for this report was conducted by a Chinese licensed market survey agent (see Research Methodology China for more information).

Plant protein ingredient market overview

The plant protein food & beverage ingredients market was estimated to account for 43% of the total protein ingredients market volume. Overall soy is the leading plant protein in the food & beverage ingredient market, with Pea Protein coming in with strong growth potential.

Source: Frost & Sullivan, Strategic Insight into the Global Plant Protein Ingredients Market, May 20 2012 and 2013 Protein Trends & Technologies Seminar, April 2013
Soy is the Main Plant Protein

Plant-based protein used in food & drink launches with a high protein claim, global, last 2 years (Aug 2012 - July 2014)
Companies seek acquisitions

CPG companies respond to the protein opportunity

- Cargill sold pork business to JBS; acquired EWOS, a Norwegian agriculture business for $1.5 bio
- Monde Nissin buys Quorn for $833 mio
- White Wave buys Vega for $550 mio
- Hormel, Glanbia, Post, Hershey and General Mills have all made moves
- An interesting note - Tyson now speaks of being a “protein” centric business emphasizing brands
Almond milk is a $1.3 bio segment dominated by 3 players – White Wave, Blue Diamond and Califia Farms.

Plant-based beverages (almond, cashew, rice hemp, soy) are 7.5% of dollar sales of milk and growing at 20 – 30%.

Plant-based alternatives are:
- 0.6% Ice Cream
- 0.7% Yogurt
- 0.2% Cheeses
- 1.8% Creamers

Califia just raised $50 mio and has 50 SKU’s and is expanding into adjacent categories.
The Big Consumer Opportunity Drives Private Equity

- Food and Ag Tech attracted $3.5 bio of Venture Capital globally in 2015
- Most of this went to e-commerce and food delivery; 5% into sustainable proteins
- $400 - $500 million invested in Beyond Meat, Hampton Creek and Impossible Foods since 2011, with interest propelled by:
  - Global growth drivers in protein
  - The impact of livestock rearing
  - The product quality gap versus the unmet consumer needs
- Other PE investment areas in protein include yeast and bacteria for applications in animal feed and human food & beverage applications
Acknowledgements

◆ Special thanks to Kristen Grant, Denise Yazak, Cory Davidson, and the NBTY science and technology team.

◆ Brent Taylor (Protein Crops Inc.) and Steve Allen (Digitalis Ventures) collaborated with the author on an earlier version of this presentation