PROTEIN
Consumer Trends, Delivery and Sustainability
Christine Pelkman, PhD
Senior Scientist
Campbell Soup Company
Transformation of protein
Mr. Breakfast
Special K Cereal | MrBreakfast.com
1959 Special K Cereal Advertisement

Walmart
Kellogg’s Special K Fruit & Yogurt Cereal, 19.1 oz
Protein and the low-carbohydrate diet

- No starch, sugar, beer or potatoes
- Only meat, fish, vegetables and wine
Current consumer trends

10 Key Trends in Food, Nutrition & Health 2017

- Wide range of sources used to define enduring trends in the marketplace

- PROTEIN: Number 6
- Natural sources preferred
- An ingredient that’s also a benefit
  - Health Halo – range of beliefs from providing energy, recovery, to firmer body, weight loss and healthier skin and hair
Protein trend overlaps with other trends

Not sufficient to focus on one trend in isolation

10 Key Trends in Food, Nutrition & Health 2017

1. Plant-Based
2. Protein
3. Sportification
4. Personalisation
5. Inflammation
6. Snackification
7. Good Carbs, Bad Carbs
8. Fragmentation & Premiumisation
The vegetarian athlete
Desire for natural sources of protein from dairy, meat and fish is still strong

- Meat consumption ↑ 5% in 2015 (U.S.)
- Vegetable protein also increasing but meat predominates
**Consumer trends – Snacks**

- **Strong growth in jerky, yogurts and cheese snacks**
  - Eg. P3 (Kraft Foods) ↑ 60% to $101M in 2016

- **Added protein to foods (cereal, bread and snack bars) more accepted in the U.S. than other countries**

- **Snack legumes – plant-based and protein trends**
Consumer trends – Dairy & Alternatives

- Dairy sources predominate

- Younger consumers concerned with digestive problems avoiding dairy

US Household Penetration of Dairy-Free Milks

Dairy-Free Cheeses, Yogurts, and Desserts on the Rise

Source: Spins/Nielsen Homescan Data/Food Navigator
Formulation challenges for protein

- **Snacks, bars, bakery**
  - Water binding – hydration of the protein
    - Water binding of fiber
    - Hardening over time
  - Flavor – whey cleanest flavor – often used in bars
    - Bread – blend of protein – wheat, whey and soy
    - Add gluten

- **Beverages**
  - Can be gritty and astringent
  - Viscosity can mask
  - Heat stability can be problematic
  - Higher-dose, more off notes
    - Higher whey content – cardboard note (aldehydes); foaming
Sustainability

- Protein sources for sustaining human populations – animal vs plant

**Chart:**

- Annual worldwide demand for plant-based and animal proteins (in millions of tonnes/year)

- Usable protein per acre of farmland (measured in lbs)

**Source:** BIPE based on FAO data

**Water Efficiency in Production (measured in gallons per ton):**

- Soy
- Eggs
- Chicken
- Pork

- Beef

**Data:**

- Soy: 2,500 gallons
- Eggs: 3,200 gallons
- Chicken: 4,500 gallons
- Pork: 5,900 gallons
- Beef: 20,700 gallons

**Notes:**

Animal sources – poultry vs beef

**U.S. Meat Consumption per Person by Type, 1909-2012**

- Poultry
- Beef
- Pork

**GLOBAL DEMAND FOR MEAT**

2005 vs. 2050

<table>
<thead>
<tr>
<th>Meat Type</th>
<th>2005 (in tonnes)</th>
<th>2050 (in tonnes)</th>
</tr>
</thead>
<tbody>
<tr>
<td>BEEF</td>
<td>64M</td>
<td>106M</td>
</tr>
<tr>
<td>MUTTON</td>
<td>13M</td>
<td>25M</td>
</tr>
<tr>
<td>PORK</td>
<td>100M</td>
<td>143M</td>
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<tr>
<td>POULTRY</td>
<td>82M</td>
<td>181M</td>
</tr>
<tr>
<td>EGGS</td>
<td>62M</td>
<td>102M</td>
</tr>
</tbody>
</table>

Source: Food and Agriculture Organization of the United Nations, ESA Working Paper No. 12-05, p. 131
Plant sources – soy predominates

- Soy and wheat top the global market
- Future growth from diversified sources?

**2012 Global Plant Protein Ingredient Share**

- Soy protein concentrate: 27%
- Soy protein isolate: 15%
- Pea: 0%
- Textured soy protein: 14%
- Wheat: 43%
- Others: 1%

Source: Frost & Sullivan analysis. Note: All figures are rounded. The base year is 2011.
Pulses – a sustainable solution?

Food and Agriculture Organization of the United Nations

2016
INTERNATIONAL YEAR OF PULSES
nutritious seeds for a sustainable future

#IYP2016
fao.org/pulses-2016
Pulses – a staple in traditional cuisines

- A staple in human nutrition for thousands of years
  - especially in India, Pakistan, the Mediterranean area and the Near East

- Provide an affordable source of protein, essential micronutrients and B vitamins
  - The protein content is enhanced when pulses are paired with grains (complementary protein).
Slow growth in global production of pulses

- 42 mt 1980 → 70 mt in 2013
- Per capita consumption declined
  - slow rise in recent years
- Developing countries – 80% as food
  - Developed countries – 40% as food
- Acceleration in coming years?
Pulses are affordable and versatile

<table>
<thead>
<tr>
<th></th>
<th>Chickpeas (1 cup)</th>
<th>Ground Beef (80% lean) - ¼ lb</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Cost</strong>*</td>
<td>$0.46</td>
<td>$1.44</td>
</tr>
<tr>
<td><strong>Calories</strong></td>
<td>269</td>
<td>287</td>
</tr>
<tr>
<td><strong>Protein (g)</strong></td>
<td>14.5</td>
<td>19.4</td>
</tr>
<tr>
<td><strong>Fat (g)</strong></td>
<td>4</td>
<td>22.6</td>
</tr>
</tbody>
</table>

*US average 2015
Pulses in developed markets

New Product Launches Utilizing Pulse Ingredients
Growth between 2010-2014

74% GROWTH

Source: Innova Market Insights January 2015

France's Roquette bets on pea protein with Canadian factory

US pea protein market ‘ready to explode’
Incorporating pulses into cereal-based foods like bread and pasta improves the nutritional profile.

Grains + pulses to enhance protein content

- **Table 2**

<table>
<thead>
<tr>
<th></th>
<th>Traditional Pasta 100% DURUM Wheat Flour</th>
<th>Reformulated Pasta 25:75 Lentil/Durum Wheat Flour Blend</th>
</tr>
</thead>
<tbody>
<tr>
<td>Protein Content of Pasta (%)</td>
<td>11.7</td>
<td>14.7</td>
</tr>
<tr>
<td>PDCAAS of Pasta</td>
<td>0.43</td>
<td>0.71</td>
</tr>
<tr>
<td>Reference Amount for Pasta (g)</td>
<td>55</td>
<td>55</td>
</tr>
<tr>
<td>Protein per Reference Amount (g)</td>
<td>6.4</td>
<td>8.1</td>
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<tr>
<td>Daily Value for Protein (g)</td>
<td>50</td>
<td>50</td>
</tr>
<tr>
<td>% DRV</td>
<td>5.6</td>
<td>11.5</td>
</tr>
<tr>
<td>Protein Claim Permitted</td>
<td>N/A</td>
<td>Good Source of Protein</td>
</tr>
</tbody>
</table>

**% DRV = \( \frac{\text{Protein in reference food amount (grams) \times PDCAAS}}{\text{Daily Value for Protein (grams)}} \)**

- % DRV 10.0 to 19.9% “Good Source of Protein”
- % DRV >20.0% “Excellent Source of Protein”

- **6.4 \times 0.43 = 2.75 g = 5.6% DV**
- **8.1 \times 0.71 = 5.75 g = 11.5% DV**
Conclusion

- Protein is a strong market trend
- Increasing global demand for protein
- Sustainability a key element in meeting demand

Future solutions
- Globally sustainable agricultural efforts
- Innovation targeted to local consumer demands