Saving the Planet: Sustainable Meat Alternatives

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Thesis

• Meat production is unsustainable at current and projected rates of consumption due to high resource intensity and destructive cost
• This opens a large market for nutritious protein alternatives which can provide comparable taste, texture, and nutrition density
Presentation Summary

• Impacts of industrialized meat production
• Total meat market vs. meat alternatives market
• Current players in meat alternatives space
• Barriers to entry
• Conclusions
Industrialized Meat Production

1 hamburger = 660 gallons of water

Conversion Rate: 6 to 20 pounds of corn to 1 pound of Beef
Mono-cropping & GMO trends
Government Subsidies hide true production cost

Reliance on Hormones and Antibiotics for higher yield
Waste from a farm of 2500 dairy cows = Waste from a city of 411000 people

Additional energy, chemicals & preservatives for processing
Pollution and waste

High demand requires global distribution.
Many heads of cattle feed into a single batch of meat
Diseased animals hard to contain and track

Preservatives & Hormones affect Health & Obesity Rates.
The Numbers

Livestock generates ~8% of GHG emissions

Consumes 36% of the world’s crop calories:
- 1 cal beef requires 11 plant-derived cals
- 1 cal poultry requires 4 cals

Antibiotic-resistant bacteria in meat:
- infects 3.6M annually, killing 1000+
- 62% of samples in one FDA study tested positive for resistant Enterococcus

Meat-rich diets generate a 2X-3X higher “foodprint” over vegetarian diets
This is Unsustainable

Agriculture uses 37% of land mass, 70% of freshwater.

Extrapolating to 2050, we need 63% of land mass, 118% of freshwater.
Market for Meat

<table>
<thead>
<tr>
<th>US 2014 Meat and Poultry Sales = $212B</th>
<th>Assume 5-10% conversion - Target ~$10-20B</th>
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<tbody>
<tr>
<td>Global Market for Wheat and Soy based substitutes</td>
<td>Estimated $5.17B by 2020 at a CAGR of 6.4% from 2015</td>
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<tr>
<td>US 2014 Ripple Effects = $864B</td>
<td>Additional downstream markets</td>
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- The world wide meat industry is dominated by just 10 firms. Given the high levels of government subsidy (e.g. US $22B, OECD $53B) the industry is susceptible to disruption … by both policy changes and individual choice.

- Climate driven disruptions (e.g. in feed supply) could lead to a shock that further drives the market for alternatives Meat alternatives grew to $553M in 2012, 8% growth from 2010 to 2012. Bloomberg reports that VC Funds see increasing promise in lab created eco foods.
Increasing Consumer demand means that alternatives to meat & fish could claim up to 33% of the world’s protein market by 2054.

Source: BIPE based on FAO data
Current Players

### Soy/Plant based

- **Gardein**
  - Founded in 2003
  - Acquired by Pinnacle foods for $155M in Nov, 2014
  - Most popular soy based meat alternative brand

- **Beyond Meat**
  - Founded in 2009
  - $17M funding in 2 rounds
  - Products found in several grocery stores
  - Well known food critics have been fooled ([Bill Gates blog](https://www.billgates.com/blog/2013/05/02/our-meat-and-leaf/))

### Lab grown meat

- **Modern Meadow**
  - Founded in 2014
  - $10M funding in Series A
  - Currently focusing on producing lab grown leather
  - Working on R&D to produce lab grown meat

### Others:

#### Impossible Foods
- FoodsKraft (Boca)
- Kellog (Worthington)
- Pulmone (Wildwood)

#### Others:
- Dr. Mark Post, a professor at Maastricht University, Netherlands produced a five-ounce hamburger using lab grown meat

[How it works (video)](https://www.youtube.com/watch?v=dQw4w9WgXcQ)
Barriers to Entry

- Culture of meat eating and ingrained habits
- Taste and texture of meat - hard to replace
- Understanding chemical composition of meat alternatives
  - FDA regulations compliance
  - Known & unknown health impact
- Political roadblocks by meat industry lobbyists
Conclusions

• Industrialized meat production is unsustainable with growing population demands

• Over time it is natural for a conversion from meat towards sustainably produced alternatives

• Meat alternatives are viable, sustainable and profitable
Q&A

The Way To A Healthier Diet

Caution
Animal Fats, Next 20 Miles

Veggies Save

Artery Narrows

No Turn On Red Meat

Mad Cow Crossing

Vegan On Board

Do Not Pass Gas

GAS, Next Left

Spasm, Next Right

Dead End

Cancer Rd

Diabetes Alley, 1 Mile

Carb Loading Zone

High Cholesterol Slow Down

Beware Of Hot Dog!