Industry Change: 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
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 \( \sim 8\% \) 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 \( 2X \sim 3X \) 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

- 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 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

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<tr>
<th>US 2014 Meat and Poultry Sales = $212B</th>
<th>Target ~$10-20B (assuming 5 to 10% conversion)</th>
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<td>US 2014 Ripple Effects = $864B</td>
<td>Additional downstream markets</td>
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Market for Meat Alternatives

- **Estimated** $5.17B by 2020 at a CAGR of 6.4% from 2015
- Increasing Consumer demand means that alternatives to meat could claim up to 33% of the world’s protein market by 2054
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)

Others:
- Impossible Foods
- FoodsKraft (Boca)
- Kellog (Worthington) Pulmone (Wildwood)

Lab grown meat

- Modern Meadow
  - Founded in 2014
  - $10M funding in Series A
  - Currently focusing on producing lab grown leather and working to produce lab grown meat

Others:
- Dr. Mark Post, a professor at Maastricht University, Netherlands produced a five-ounce hamburger using lab grown meat
  How it works (video)
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