

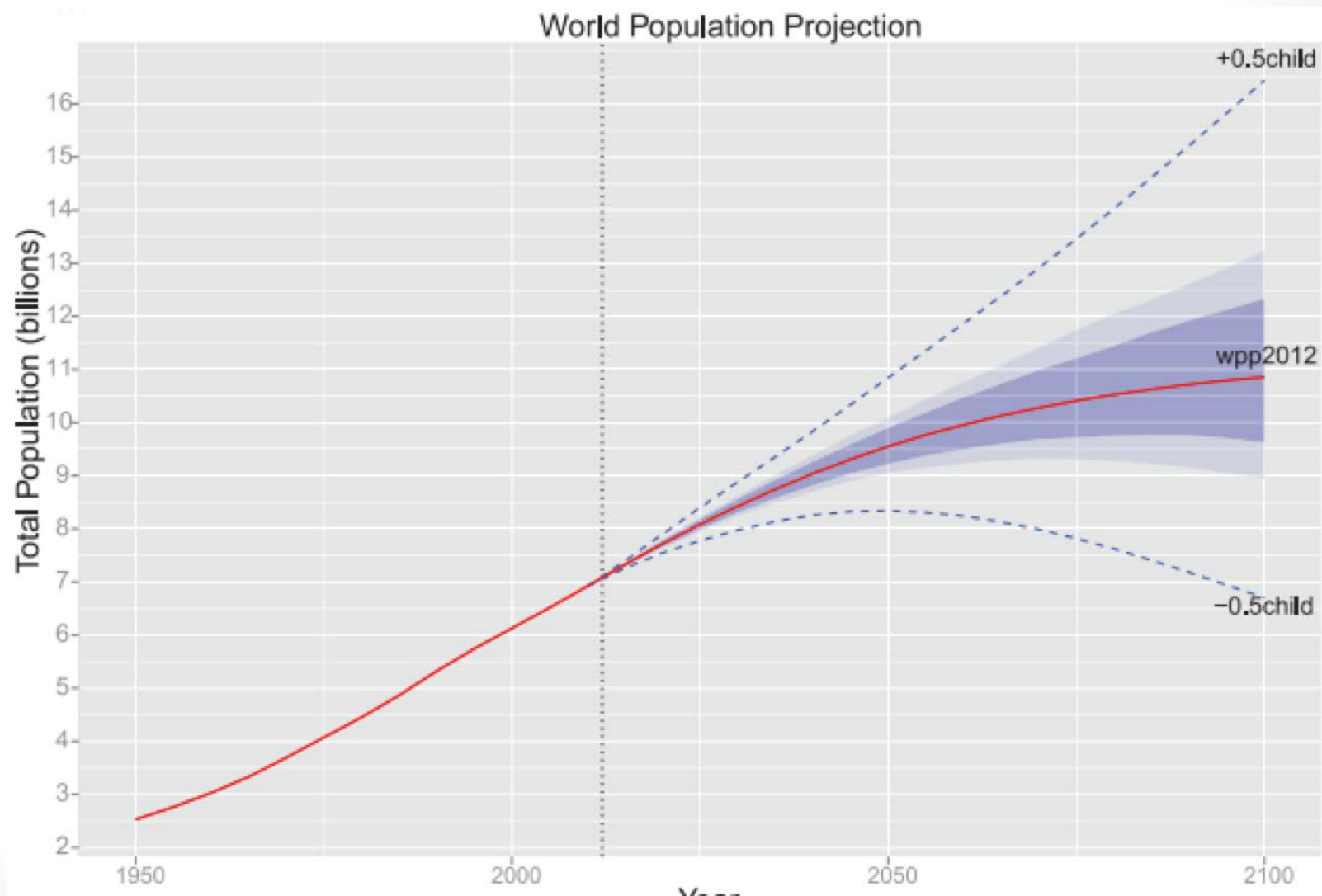
# FARM FOUNDATION ROUND TABLE

## The future of meat protein

**Barry Carpenter**  
**CEO & President**  
**June 8, 2017**

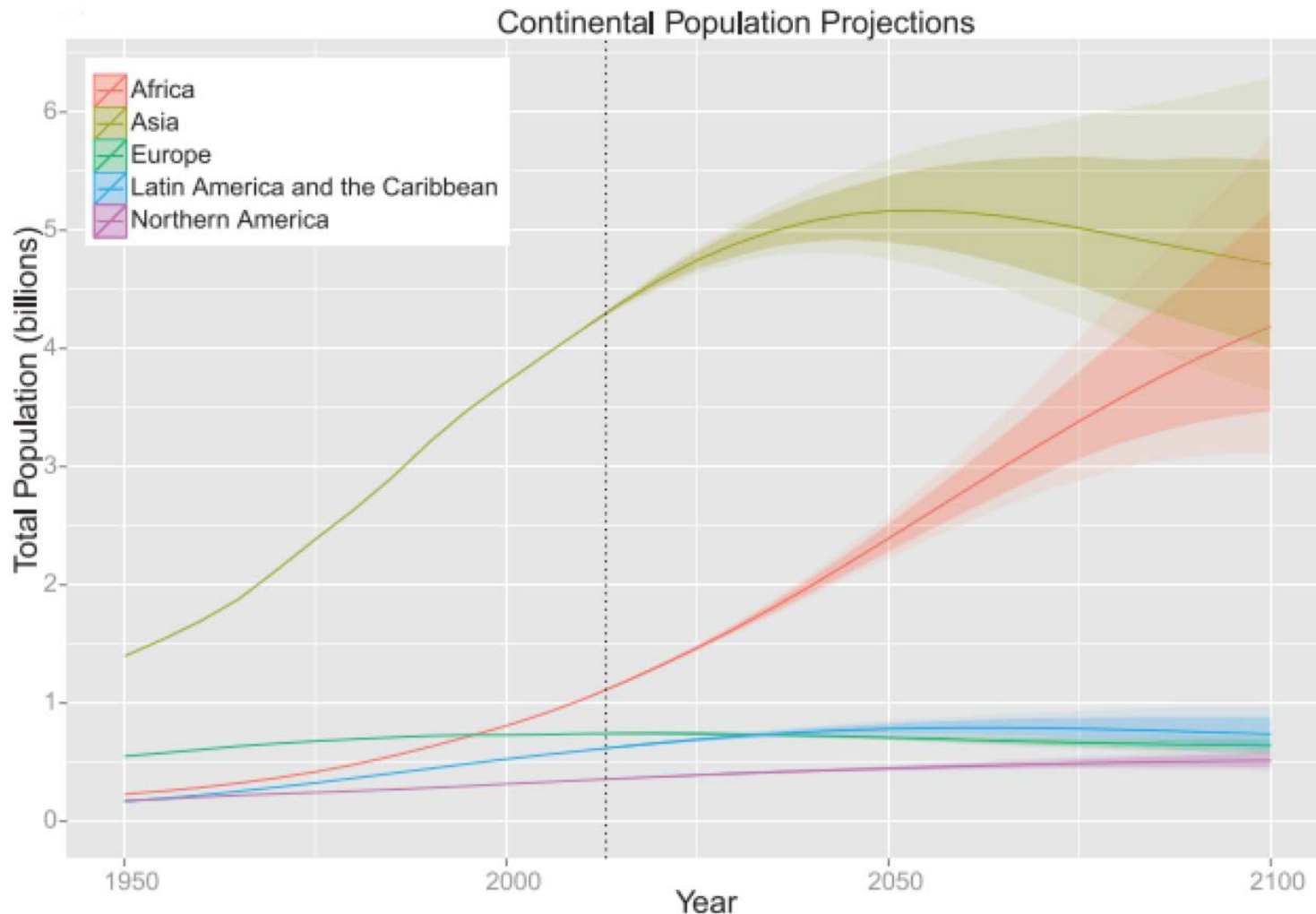


# 9 billion by 2050



Patrick Gerland et al. 2014. World population stabilization unlikely this century. *Science*. 346. DOI: 10.1126/science.1257469

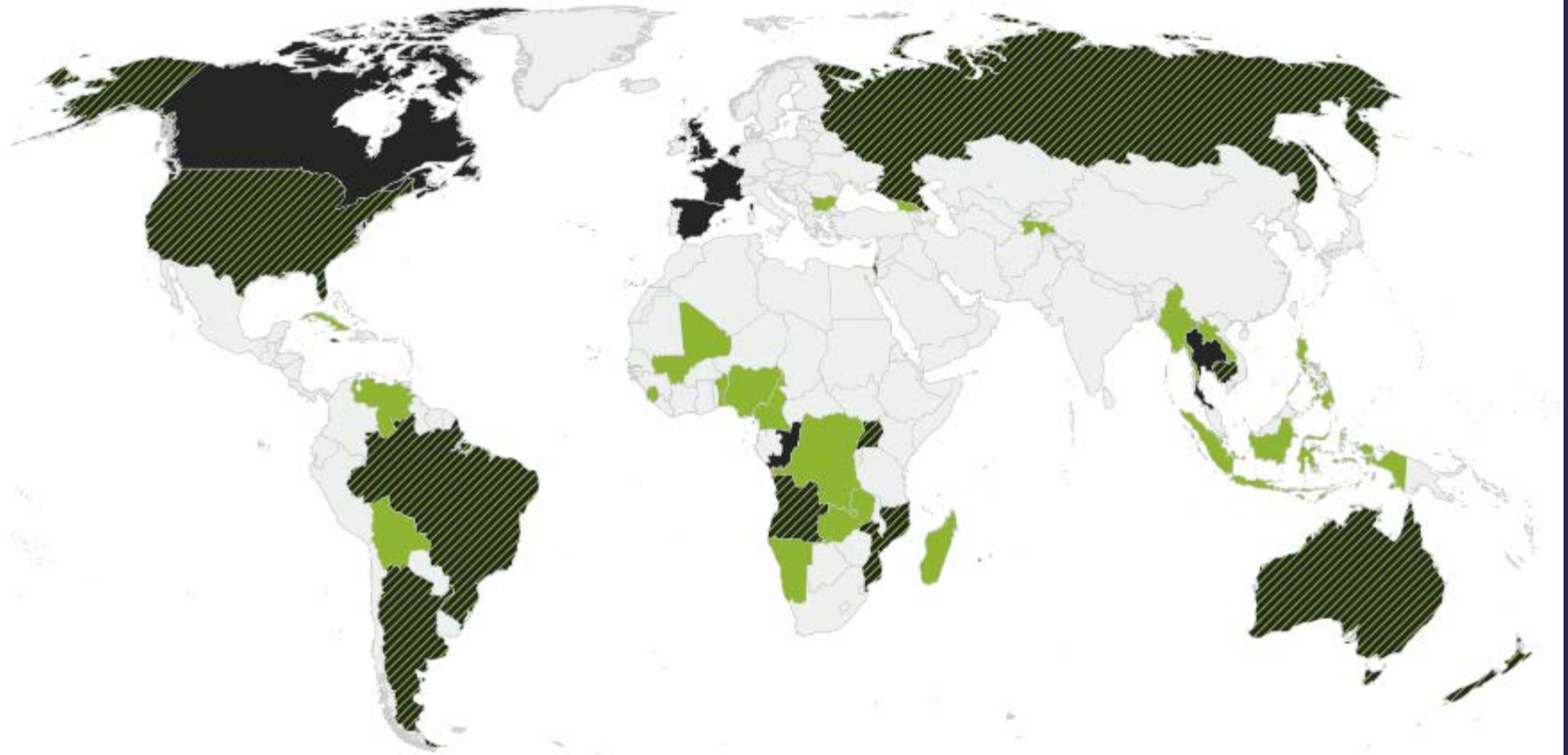
# 9 billion from where?



Patrick Gerland et al. 2014. World population stabilization unlikely this century. *Science*. 346. DOI: 10.1126/science.1257469

## China's Global Food Print

■ Food investments    ■ Land acquisition    ■ Food investments and land acquisition



Note: Land investments are since 2006, agriculture since 2005.

Source: The Heritage Foundation, GRAIN.org

# How to Feed the World

By MARK BITTMAN

The New York Times

Published: October 14, 2013



**HOW**  
TO FEED THE WORLD  
**2050**

# Feed the World

A FIVE-STEP PLAN TO

It doesn't have to be factory  
farms versus small, organic ones.  
There's another way.

BY Jonathan Foley

PHOTOGRAPHS BY George Steinmetz  
AND Jim Richardson



NATIONAL GEOGRAPHIC MAGAZINE

# Four Steps to Feeding the World in 2050

October 16, 2012



THE WORLD BANK

IBRD • IDA



# FEED THE FUTURE

The U.S. Government's Global Hunger and Food Security Initiative

# Changing....



**PRODUCTION**

**LIFESTYLE**



A word cloud visualization of terms related to diet and health. The words are arranged in a circular pattern, with 'Vegan' and 'Mediterranean' being the largest and most central. Other prominent words include 'meat', 'plantbased', 'reduce', 'vegetables', 'disease', 'risk', 'cancer', 'diet', 'like', 'water', 'protein', 'lower', 'consumption', 'evidence', 'grains', 'fiber', 'amount', 'lung', 'energy', 'pancreas', 'limit', 'people', 'sources', 'estimated', 'limited', 'week', 'food', 'going', 'compared', 'Americans', 'budget', 'many', 'char'. The colors of the words vary, including shades of red, orange, yellow, green, blue, and purple.

**“...The harms factory farming causes are global in nature: Bacteria resistant to antibiotics do not recognize borders, nor does climate change, and health care systems everywhere will struggle to meet the challenges of rising chronic diseases. Eating animals may have been crucial to our survival in the past. But now, it’s killing us...”**

***-New York Times, May 21, 2017***



# Lifestyle



Ellen Kanner, Contributor  
soulful vegan author/advocate

**HUFFPOST**

## Meatless Monday: Living the Mediterranean Life

05/08/2017 07:40 am ET



Opinion » Political Op-Eds | Social Commentary

## Go vegan, save the planet

By George C. Wang

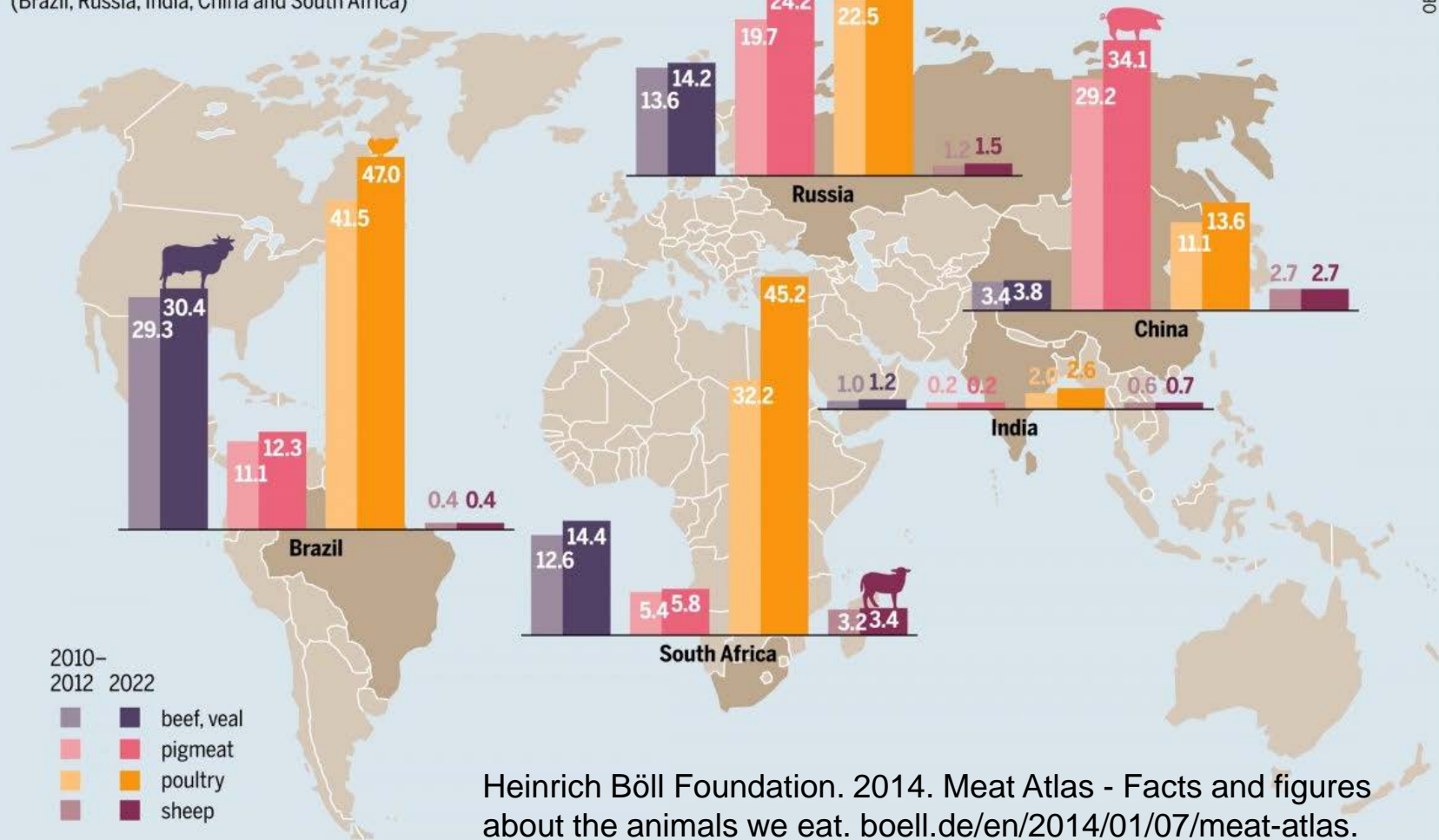
🕒 Updated 8:29 AM ET, Sun April 9, 2017

“...we may overlook an important contributor to the **climate crisis: our food systems** and the daily food choices we make...”

## Demand in the developing world is rising steeply

Meat consumption per capita, kilograms, average 2010–12 (estimate), and 2022 (forecast), in the BRICS countries (Brazil, Russia, India, China and South Africa)

OECD/FAO



# ...Meat consumption is forecasted to rise.

# PRODUCTION

**LAB  
GROWN  
MEAT**



[globalmeatnews.com](http://globalmeatnews.com)

**3-D  
PRINTING**



[washingtonpost.com](http://washingtonpost.com)

**PROTEIN  
BASED  
ALTERNATIVE**



[agweb.com](http://agweb.com)

**TRADITION  
WITH  
ADAPTATION**



[herfordbeef.org](http://herfordbeef.org)

# Lab grown meat

“...growing meat in labs would cut down on the **land required** to produce steaks, sausages and bacon by **99 percent** and reduce the associated **need for water by 90 percent...**”

*-Washington Post, May 2, 2016*

Zaraska, M. 2016. Lab-grown meat is in your future, and it may be healthier than the real stuff. Washington Post Online; May 2, 2016.



# Lab grown meat

- **What is it?** Stem cells from a cows shoulder were used to start the culture.
- **Who makes it?**
  - Dutch scientists: \$330,000
  - Russian gov. \$50,000/kg
  - Memphis Meats: \$18,000/lb



WashingtonPost.com

Zaraska, M. 2016. Lab-grown meat is in your future, and it may be healthier than the real stuff. Washington Post Online; May 2, 2016.

Zaraska, M. 2013. Lab-grown beef taste test: 'Almost' like a burger. Washington Post Online, August 5, 2013

Vorotnikov, K. 2017. First Lab Grown Meat in Russia. Global Meat News.

# Lab grown meat

- **Advantages**

- Cut back on 99% of land needed and 90% of water needed for meat production
- Sterile— no pathogens

- **Disadvantages**

- Nutritional analysis has not been conducted
- Consumer acceptable



WashingtonPost.com

Zaraska, M. 2016. Lab-grown meat is in your future, and it may be healthier than the real stuff. Washington Post Online; May 2, 2016.

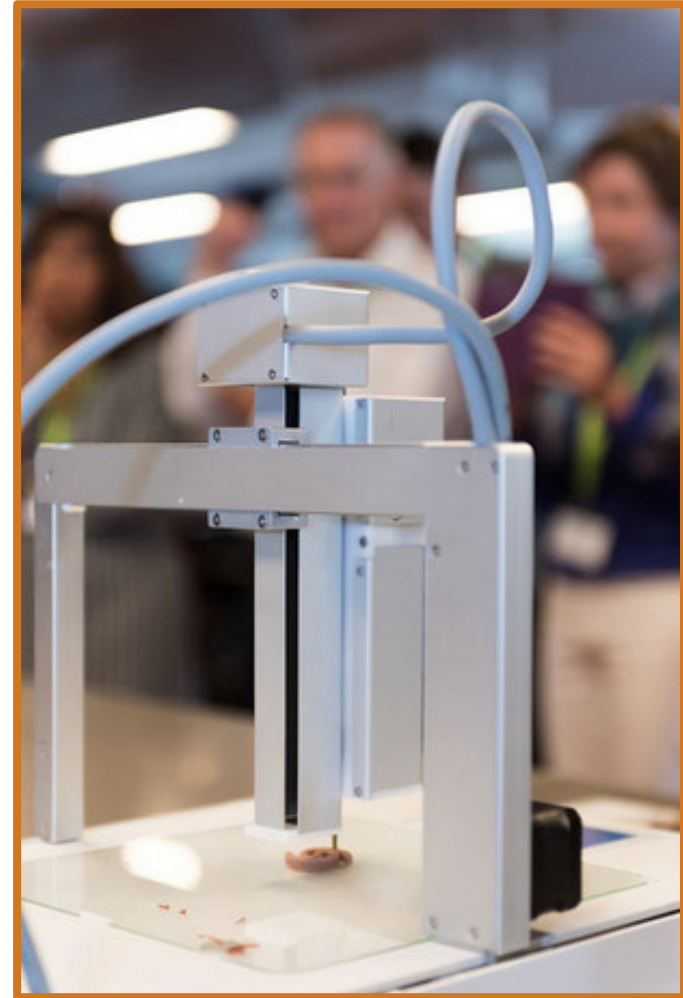
# 3-D printing

“...You could have a sugar ink, fat ink and by using those different ink pots you could **create a food that is catered to a specific calorific [sic] and protein value...**”

*-ABC Australia, Dec 1, 2016*

# 3-D printing

- **What is it?**
  - Printing using a liquefied mix of offal and ground beef
- **Who makes it?**
  - Dutch company named byFlow
  - Just announced at the 3-D food printing conference in May



GlobalMeatNews.com



# 3-D printing

- **Advantages**
  - Maximized by-products
  - Market could include elderly
- **Disadvantages**
  - Cost—down from 250k to 10k for a burger
  - Consumer acceptance
  - Nutrition



[www.3ders.org](http://www.3ders.org)

Rousseau, O. 2017. Australia exhibits 3D printed meat– in pictures. Global Meat News. May 5, 2017. 3D printed beef can create 'more value' for farmers, says Meat & Livestock Australia. [3ders.org](http://3ders.org). May 3, 2017

# Protein-based alternative

“...**Tyson**, the country’s largest meat processor, announced last week that it was investing an undisclosed amount for a **5 percent stake in Beyond Meat**, a company based in El Segundo, Calif., that makes ‘meats’ from **protein sources like soy and peas...**”

*-New York Times, Oct 10, 2016*

# Protein alternative

- **What is it?**
  - Plant-based or insect material designed to look and taste like meat
- **Who makes it?**
  - Quite a few companies:
  - Beyond Meat (CA)
  - Impossible Foods (CA)
  - Field Roast (WA)



[beyondmeat.com](http://beyondmeat.com)

Hoshaw, L. Silicon Valley's Bloody Plant Burger Smells, Tastes And Sizzles Like Meat. National Public Radio. June 21, 2016.

The Economist. The market for alternative-protein products. Economist Print Business Section. Feb 2 2017.

# Protein alternatives

- **Advantages**
  - 36% of millennials embrace protein alternatives vs. 14% of baby boomers
  - Already in food service—e.g. **Yale University**
- **Disadvantages**
  - Limited customer base across demographics
  - Honing the ‘meat taste’



[investorvillage.com](http://investorvillage.com)

Meat and Poultry. Yale first to offer Beyond Burger on campus. April 22, 1017.

Hoshaw, L. Silicon Valley's Bloody Plant Burger Smells, Tastes And Sizzles Like Meat. National Public Radio. June 21, 2016.



# Tradition with adaption

“Agricultural technology is changing  
... Techniques developed in the  
West—especially genome-based  
breeding that can create crops with  
**special properties almost to  
order—...**”

*-The Economist*

# Tradition with adaption

- **What is it?**
  - Making changes to current agriculture practices
- **Examples?**
  - RFID tags in feedlots
  - Probiotics
  - GPS guided equipment
  - Gene editing



[countrysidenetwork.com](http://countrysidenetwork.com)

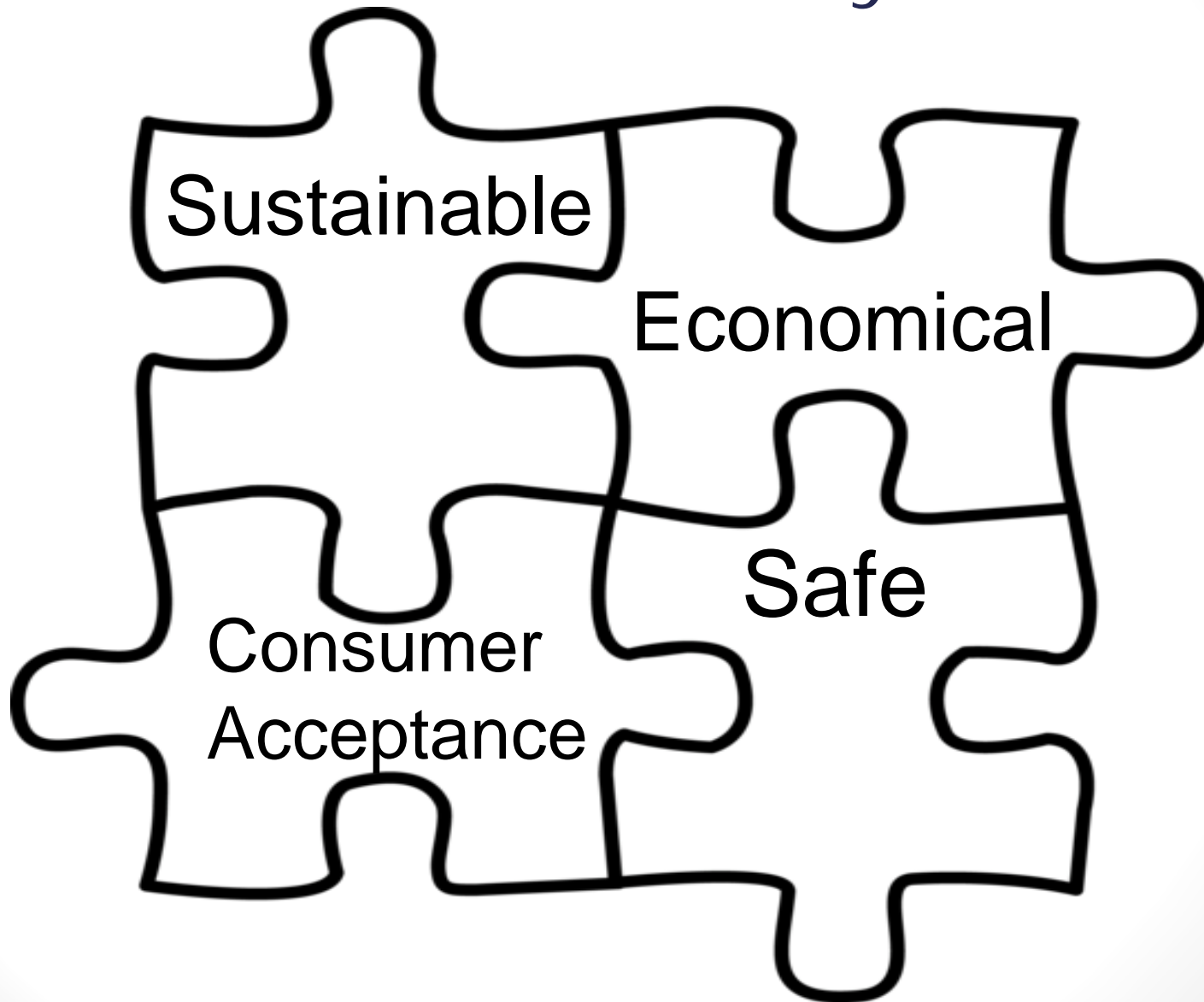
# Tradition with adaption

- **Advantages**
  - Consumer Familiarity
  - Existing infrastructure
- **Disadvantages**
  - Growing public concern of methods
  - Keeping up with demands



[omahasteaks.com](http://omahasteaks.com)

# What's the most likely route?





# Where is Meat Production?

- Alternatives have come and gone, why is meat still here?
- Taste, texture, convenience, diversity, and cost
- Satisfaction for dollar

