HOW SUSTAINABILITY AND HEALTH INTERSECT IN GLOBAL FOOD SYSTEMS

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Disclosure Slide

• I am the director of the Arrell Food Institute, which is funded by the University of Guelph and the Arrell Family Foundation.

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• I am a scientific advisor for the Weston Seeding Food Innovation program.

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“In the next 40 years, humans will need to produce more food than they did in the previous 10,000 put together.”
THE STATE OF FOOD SECURITY AND NUTRITION IN THE WORLD 2017
Food Supply (dietary calories / person / day)

1990  2015
Hungry Planet
by Peter Menzel and Faith D’Aluisio
What we should be eating (Harvard's Healthy Eating Plate Model)

- Fruits & Vegetables: 49%
- Milk & Milk Products: 8%
- Meat & Alternatives: 20%
- Oils & Fats: 3%
- Cereals and Starches: 20%

What we are actually producing (According to 2011 FAO)

- Milk and Milk Products: 4%
- Meat & Alternatives: 11%
- Oils & Fats: 11%
- Fruits & Vegetables: 11%
- Sugar: 16%
- Cereals and Starches: 47%

KC, and Fraser, et al. Under review.
Dietary Servings / day

| Category          | Recommended
<table>
<thead>
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<tbody>
<tr>
<td>Sugar</td>
<td>10</td>
</tr>
<tr>
<td>Dairy</td>
<td>15</td>
</tr>
<tr>
<td>Proteins</td>
<td>5</td>
</tr>
<tr>
<td>Oils and Fats</td>
<td>15</td>
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<tr>
<td>Fruit and Veg.</td>
<td>10</td>
</tr>
<tr>
<td>Grains</td>
<td>5</td>
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Recommended and Produced servings.
Land use implications of better diets (today)

- Less land
- More land

- Pasture
- Livestock Protein
- Plant Protein
- Fruits & Vegetables
- Milk
- Whole grains
- Oils & Fat
- Sugar

-130% -100% -70% -40% -10% 20% 50% 80% 110% 140% 170% 200%
Pasture versus arable

• When we only consider arable land, switching to the Harvard Healthy eating plate would **save us 51 million ha of land.**

• However, much of the world’s protein comes from pasture land and if we keep producing the same amount of meat and dairy on pasture then **we’d need an extra 458 m ha of land.**
Land use implications of better diets (in the future)

![Graph showing total land required (Million ha) from 2011 to 2050 with lines for BAU, HHEP (existing meat ratio), and HHEP (low meat ratio).]
GHG implications of better diets (today)

Fruits & Vegetables: Less GHG
Plant Protein: Less GHG
Livestock Protein: More GHG
Milk: More GHG
Whole grains: Less GHG
Oils & Fat: Less GHG
Sugar: Less GHG
Bottom line on GHGs

Greenhouse Gas Emissions (GT CO2e/y)

- Current situation based on FAO 2011 Data
- HHEP diet for current population
- HHEP diet for 9.5 billion people by 2050

Animal Protein
GHG implications of better diets (in the future)
Key results

• Switching to a “healthier” diet will reduce the amount of arable land we need.

• But unless we also increase the amount of plant-based protein this transition will also result in more total land used and more GHGs.

• If we switch to the “healthier diet” and reduce the % of meat in our diet we can save land, reduce GHGs and be healthier.
Crickets require 12* less feed and 13* less water than cattle
Pigs produces 10 - 100 * more GHGs per edible kg as mealworm.

Quorn causes 5 times less GHGs than beef and 1.5 times less than chicken.
Interesting... Add cloves and cinnamon to insect protein. Yum. Sustainable food supply available anywhere. Bugs.
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