The steaks are high: what approaches work to increase vegetarian sales and reduce meat consumption?

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Why is reducing meat and dairy consumption important?

- Livestock farming is a leading cause of habitat loss, climate change and biodiversity loss
  - Inefficient to feed eg soy to livestock to people.
  - Cows and sheep: release methane, very powerful greenhouse gas and use a large amount of land.

What does a global sustainable diet look like?

Per week:
- 525g beans and legumes
- 350g nuts
- 85g red meat
  ~1.5 sausages
- 200g of chicken
  ~2 portions
- 200g of fish
- 7 glasses of milk

15.5kg of meat per person per year (~17kg to account for food waste)
How much meat do we actually eat?

• Globally, 1961 to 2013:
  • Meat per person, 23kg to 43kg
  • Population, 3 billion to 7 billion

https://ourworldindata.org/meat-and-seafood-production-consumption; FAO data
Imagine you’re in a cafeteria

What might influence the meal you chose?

Health, taste, sustainability, ethics, price, availability, cafeteria layout?
Study setting

• University of Cambridge cafeterias, UK
• Two different interventions: order and availability
• Outcome: % vegetarian main meals sold
• Sales data: >200,000+ individual meal selections
1) Order

• Hypothesis: higher vegetarian sales when vegetarian option is first
• Experimental studies: alternate between **MeatFirst** and **VegFirst**, week by week across 9-week terms
Order: Study 1 – in two settings

Cafeteria A

90 mealtimes; 11,683 meals
p>0.05

Cafeteria B

96 mealtimes; 20,554 meals
p<0.001 ***
5 percentage point increase

Why did order have an effect in one cafeteria but not another?

• Hypothesis: different distances
  • Cafeteria A: shorter distance of 80-90cm. No effect
  • Cafeteria B: longer distance of 180cm. Effect
Order: Study 2, Changing distance at Cafeteria B

Long Distance, 181cm

Short Distance, 67cm

Veg Last

Original layout

Veg First
Order: Study 1&2, Cafeteria B results

Cafeteria B: Long distance (181cm)

96 mealtimes; 20,554 meals
p<0.001 ***
5 percentage point increase

Cafeteria B: Short distance (67cm)

87 mealtimes; 20,224 meals
Complicated results
Under a short distance, VegFirst does not increase sales
Press coverage

The trick to making cafe diners eat less meat: Place the veggie options at least six feet in front of the meaty ones

- Six-foot gap is key to getting people to opt for plant-based foods in canteens
- UK scientists found veg meal sales soared when six feet in front of meaty meals
- Pure human laziness means we tend to choose food options that are closest to us

By JONATHAN CHADWICK FOR MAILONLINE
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Canteens should place veggie options six feet closer to diners than the meaty dishes if they want to reduce the planet's unsustainable desire for meat, a study reveals.

In university college canteens, UK researchers found sales of plant-based dishes shot up by up to 40 per cent when they were closer to the diners on entry, with a 6 foot gap before reaching the meat options.

Researchers suggest this may be because hungry diners are willing to accept 'the first bite within eyeshot' and are subconsciously put off by the additional effort required to seek out meat.
Tracking individuals

• Diners pay for meals with their university cards
  • Can track anonymised individuals
  • Using previous data: divide diners into quartiles based on how often they choose vegetarian meals
  • Statistically much more powerful
2) Availability

- **Hypothesis**: increasing the proportion of vegetarian options would increase vegetarian sales

- **Two cafeterias**
  - Naturally varied number of vegetarian and total options served

<table>
<thead>
<tr>
<th>Option</th>
<th>Monday lunch</th>
<th>Tuesday lunch</th>
<th>Wednesday lunch</th>
<th>Thursday lunch</th>
<th>Friday lunch</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>VEGETARIAN/VEGAN</td>
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<tr>
<td>2</td>
<td>VEGETARIAN/VEGAN</td>
<td>MEAT/FISH</td>
<td>VEGETARIAN/VEGAN</td>
<td>MEAT/FISH</td>
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<td>3</td>
<td>MEAT/FISH</td>
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<td>4</td>
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<tr>
<td>Vegetarian availability</td>
<td>67% (2 in 3)</td>
<td>50% (1 in 2)</td>
<td>50% (2 in 4)</td>
<td>25% (1 in 4)</td>
<td>33% (1 in 3)</td>
</tr>
</tbody>
</table>
Availability results

- Doubling veg availability 25% to 50%: \(~15\) percentage point increase in vegetarian sales.

- Overall sales remained about constant.

535 mealtimes; 86,932 meals
p<0.001
Pseudo-R\(^2\)=0.31

Garnett, Balmford, Sandbrook, Pilling and Marteau (2019) *PNAS*
Increasing vegetarian availability → all demographics buy more vegetarian meals

- Individual diners divided into quartiles from Least to Most Vegetarian
- Least Vegetarian quartile: strongest response (interaction term, p<0.05)
Possible discussion

• How does prince influence what we eat? Food prices, taxes

• What about grass-fed beef and sheep?
  • Shouldn’t we be producing food from all the land we can?

• What about food miles and eating locally?

• What about organic food?
Conclusions

• **Reducing meat consumption**: vital in high-income countries to combat climate change and improve human health

• **Placing vegetarian option first**: some contexts increases vegetarian sales by ~5 percentage points but unreliable

• **Doubling availability of vegetarian options**: ~15 percentage point increase in vegetarian sales, effective across all groups of diners
3) Price

- Price is an important influence on citizen food purchases.
- Many calls for meat tax, but none currently in operation.
- Subsidies dominate UK farming profits.

Financial Times (2018) UK farmers prepare for overhaul to farm subsidies after Brexit
Price experiment design

• Cafeteria E: autumn term 2018

• Half way through term:
  • Increased meat option price by 20p £2.52 to £2.72
  • Decreased vegetarian option price by 20p £2.05 to £1.85
Price experiment results

• 106 mealtimes; 5330 meals.
• Small increase in overall vegetarian sales.
• Driven by Most Veg quartile
  • ~12 percentage point increase

Garnett et al (in prep)
Food is glorious

Jack Monroe @BootstrapCook ; Meera Sodha @meerasodha ; Kate Taylor https://cookieandkate.com/
Footprint of different foods

Beef results in up to 105kg of greenhouse gases per 100g of protein, while tofu produces less than 3.5kg

- Cows, sheep, and shrimp (Worst for climate)
- Pigs, poultry, fish
- Tofu, beans, nuts (Best for climate)
Brazilian vs UK beef farms

“It’s like flying over the British countryside and we are in the middle of the Amazon”
What about grass-fed beef?

• Grass-fed beef and lamb is still not good for the climate.

• “The contribution of grazing ruminants to soil carbon sequestration is small, time-limited, reversible and substantially outweighed by the greenhouse gas emissions they generate.”

• Grass-fed \(=\ne\) sustainable. E.g. Brazilian cows on former rainforest

Deforestation/reforestation

Decisions need to be made quickly
The UK's goals for addressing climate change are unlikely to be met without fundamental land reform. Proposed new UK laws on agriculture and the environment mean there is now a one-off opportunity to define a new land strategy.

Nationally, action is required to do the following:
- **26-36%**: Reduction in grasslands and rough grazing by 2050
- **(up to) 1.5 million hectares**: of new woodland to store carbon by 2050
- **(up to) 1.2 million hectares**: for bioenergy crops by 2050

Locally, addressing the risks early could bring multiple benefits:
- Can insulate against rising costs of climate change
- Supports sustainable benefits through long-term resilience
- Protects the natural environment against irreversible decline

53 MtCO$_2$e
Emissions from the agricultural and land sectors* – 11% of the UK’s overall figure (2016). Agriculture likely to be one of the largest emitters by 2050.

How our land is used today
- **31%** Grassland
- **26%** Cropland
- **17%** Rough grazing
- **13%** Forestry
- **8%** Urban & development land
- **1%** Freshwater
- **4%** Other natural

Committee on Climate Change (2018) Land use report infographic
Supply chains and food miles

Food: greenhouse gas emissions across the supply chain

- Beef (beef herd)
- Lamb & Mutton
- Cheese
- Beef (dairy herd)
- Chocolate
- Coffee
- Prawns (farmed)
- Palm Oil
- Pig Meat
- Poultry Meat
- Olive Oil
- Fish (farmed)
- Eggs
- Rice
- Fish (wild catch)
- Milk
- Cane Sugar
- Groundnuts
- Wheat & Rye
- Tomatoes
- Maize (Corn)
- Cassava
- Soymilk
- Peas
- Bananas
- Root Vegetables
- Apples
- Citrus Fruit
- Nuts

Greenhouse gas emissions per kilogram of food product (kg CO₂-equivalents per kg product)

Factors such as transport distance, retail, packaging, or specific farm methods are often small compared to importance of food type.
Cambridgeshire emissions and peat

Figure 4.4: Map of deep peat (dark red) and wasted peat (yellow-orange) in England overlayed with the outline of the ceremonial counties of England. Insert shows the area in Cambridgeshire.
What about organic?

Data source: Clark & Tilman (2017) – Comparative analysis of environmental impacts of agricultural production systems, agricultural input efficiency, and food choice. In Environmental Research Letters. The data visualization is available at OurWorldInData.org. There you find research and more visualizations on this topic. Licensed under CC-BY-SA by the authors Hannah Ritchie and Max Roser.

https://ourworldindata.org/is-organic-agriculture-better-for-the-environment
Producing food has transformed the planet

• 26% of greenhouse gas emissions
• 38% of Earth’s ice free land
• 70% freshwater withdrawals
How could we change diets?

• Nudging (or “choice architecture”):
  • Strategic changes in the environment
  • Anticipated to alter people’s behaviour in a predictable way
  • Without forbidding any options

“The whole world wants me to eat meat! I can’t fight it anymore!”
Lisa Simpson, The Simpsons

Conclusions

• Reducing meat consumption in high-income countries is vital to combat climate change and improve human health

• Simple changes in cafeterias can increase vegetarian sales and reduce meat consumption

• Ambitious government policies are also needed to bring about healthy and sustainable diets