

# **How to Reduce the Carbon Footprint without Sacrificing Affordability, Nutrient-Density and Taste**

Jennie Macdiarmid

Food Forum 2018



**Nutrition /  
public health**

**Sustainable  
diets**

**Climate  
change**

**Triple burden of disease**

- *undernourishment*
- *nutrient deficiency*
- *obesity*

**Paris agreement 2015**

*Hold the increase in the global average temperature to **well below 2°C above pre-industrial levels (1.5°C).***

## greenhouse gas emissions



Land use  
Water  
Biodiversity

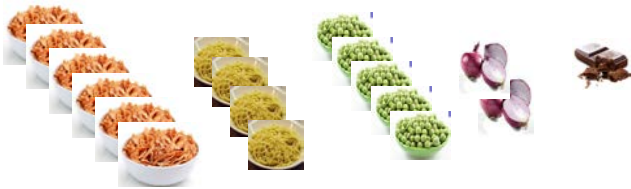
# Healthy and reduced carbon footprint

Macdiarmid Food form 2018

## 90% reduction in GHGE

### limited food items

no meat, no milk (or much else!)



- ✓ Nutritionally adequate
- ✓ Low carbon footprint
- ✓ Affordable

## 25% reduction in GHGE

### many food items

incl. meat, dairy



- ✓ Nutritionally adequate
- ✓ Low carbon footprint
- ✓ Affordable
- ✓ Tasty

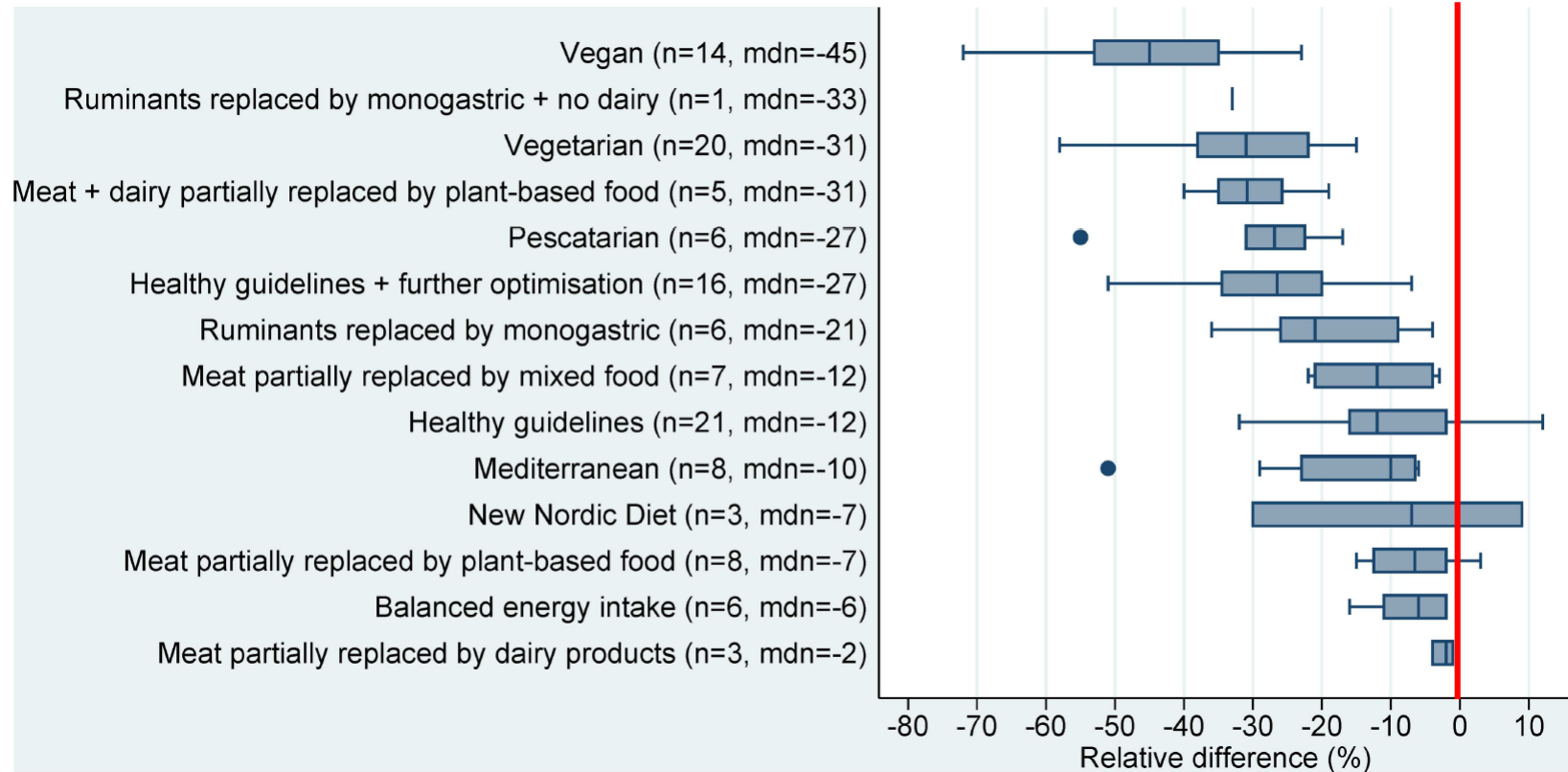


# Healthy is not necessarily lower carbon footprint

| <i>Dietary intakes for a woman</i>                       | Healthy<br>Low GHGE                                            | Healthy<br>High GHGE                              | Unhealthy<br>Low GHGE                                        | Unhealthy<br>High GHGE                                       |
|----------------------------------------------------------|----------------------------------------------------------------|---------------------------------------------------|--------------------------------------------------------------|--------------------------------------------------------------|
| Energy (MJ/day)                                          | 8.7                                                            | 8.7                                               | 8.7                                                          | 8.7                                                          |
| Saturated fatty acids (% energy)                         | 8.8                                                            | 9.9                                               | 15.0                                                         | 13.7                                                         |
| Sugar (NMES) (% energy)                                  | 8.4                                                            | 8.9                                               | 24.0                                                         | 13.7                                                         |
| Protein (g/day)                                          | 84                                                             | 89                                                | 57                                                           | 101                                                          |
| Fibre (NSP) (g/day)                                      | 25                                                             | 19                                                | 10                                                           | 11                                                           |
| <b>Greenhouse gas emissions</b><br>(kgCO <sub>2</sub> e) | <b>2.44</b>                                                    | <b>4.56</b>                                       | <b>1.97</b>                                                  | <b>4.37</b>                                                  |
| Foods in the diet                                        | <b>balance</b> of meat, fish,<br>dairy, fruit &<br>vegetables. | <b>high</b> meat, selected<br>fruit & vegetables. | <b>high</b> sugar,<br><b>low</b> vegetables,<br>fruit, meat. | <b>high</b> meat, sugar,<br><b>low</b> fruit,<br>vegetables. |

# Modelling healthy and sustainable diets

Macdiarmid Food form 2018



Aleksandrowicz *et al.* (2016) PLoS ONE

greenhouse gas emissions

plant-based  
food

animal-based  
food

# Reduce meat consumption .....

- **Protein replacements**
- **Acceptability**
  - Producers
  - Governments
  - Public
- **Cost (cheaper diets??)**



# Protein replacements

- plant-based alternatives
- insects
- lab meat



## Hotel plan to serve up midge burgers

21 June 2018

f t e Share

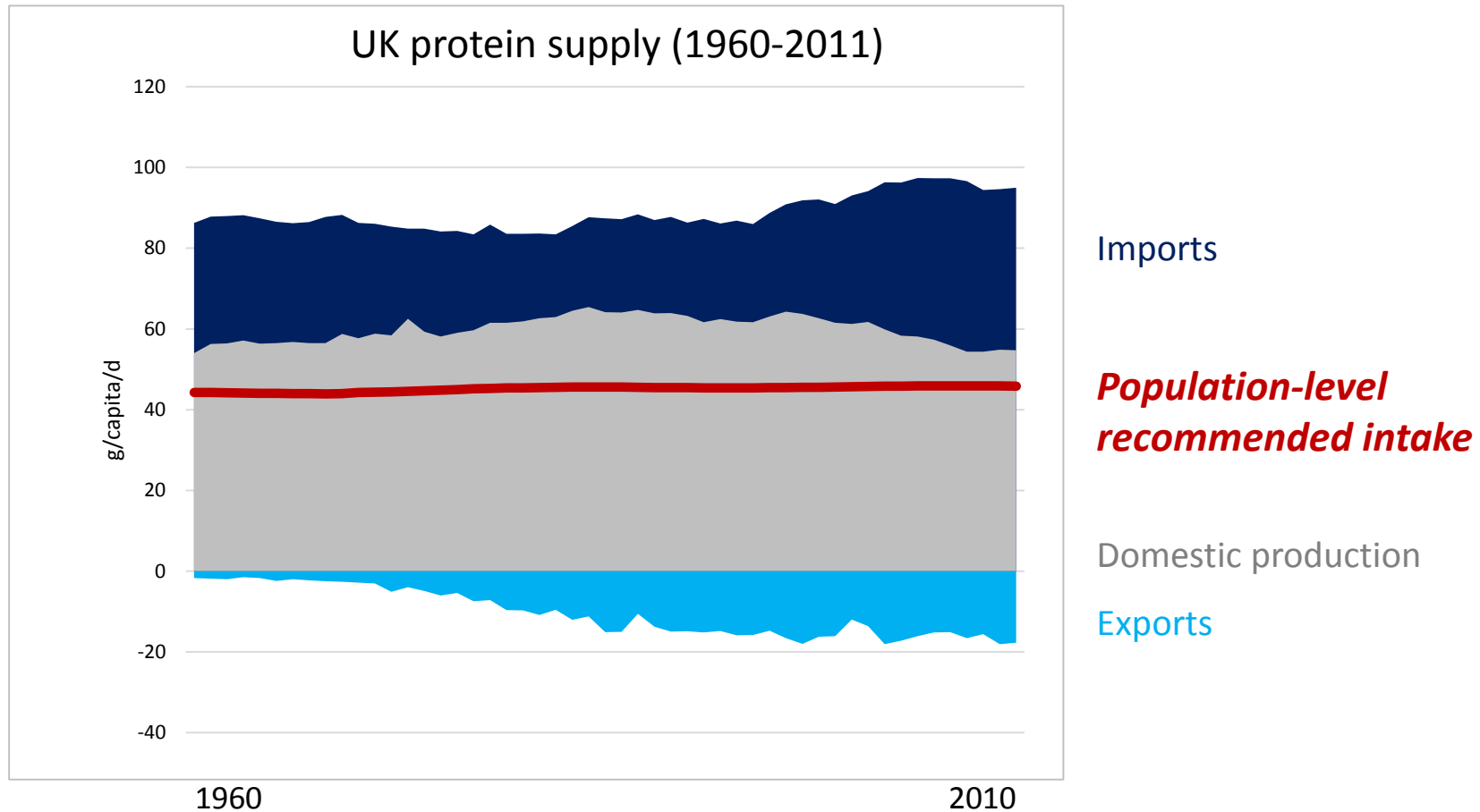


The burger will be dipped in midges and coated with a secret ingredient

An Argyll hotelier has unveiled plans to serve burgers made with midges to his customers.



# Adequacy of the supply of protein



FAO food supply data

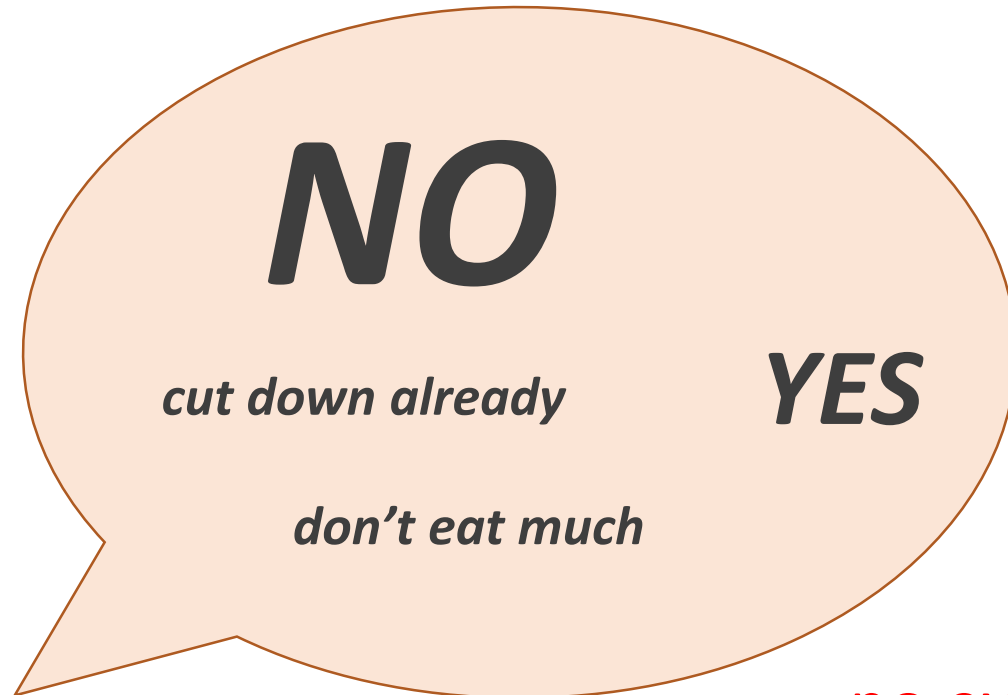


# Acceptability: “*will you eat less meat?*”

I like it!

it fills me up

others wouldn't



no evidence

meat is important to me

make no difference

humans eat meat





**Nutrition**



**Climate Change**



**Natural resources**



**Dietary choices**



PII: S0301-4215(97)00159-6

Energy Policy, Vol. 26, No. 6, pp. 435-438, 1998  
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Printed in Great Britain  
0301-4215/98 \$ 19.00 + 0.00

## Viewpoint

### The embodied energy of food: the role of diet

David A Coley\*, Emma Goodliffe\* and Jennie Macdiarmid†

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† Department of Psychology, University of Leeds, Leeds LS2 9JT, U.K.

PLOS ONE

#### RESEARCH ARTICLE

### The Impacts of Dietary Change on Greenhouse Gas Emissions, Land Use, Water Use, and Health: A Systematic Review

Lubana Akshayachandran<sup>1,2,3</sup>, Rosemary Green<sup>1,2</sup>, Richard J. M. Jay<sup>1,2</sup>, Peter Smith<sup>1,2</sup>, Andy Murrells<sup>1,2</sup>

### Sustainable diets for the future: can we contribute to reducing greenhouse gas emissions by eating a healthy diet?<sup>1-3</sup>

Jennie I Macdiarmid, Janet Kyle, Graham W Horgan, Jennifer Lee, Claire Effe, Alexandra Johnston, and Geraldine McNeill

*Am J Clin Nutr* 2012;96:632-9.



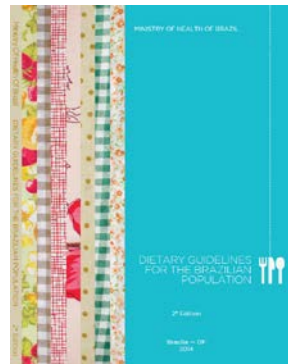
#### Feature Article

### Improving diet sustainability through evolution of food choices: review of epidemiological studies on the environmental impact of diets

Marlene Perignon, Florent Vieux, Louis-Georges Sève, Gabriel Masiat, and Nicole Darmon

### Understanding Sustainable Diets: A Descriptive Analysis of the Determinants and Processes That Influence Diets and Their Impact on Health, Food Security, and Environmental Sustainability<sup>1-3</sup>

Joanna L. Johnson<sup>1,2</sup>, Jessica C. Fortin<sup>1</sup>, and Bruce G. Carr<sup>1</sup>



- habit
- desires /preferences
- social influences
- affordability

## ***Pre-swallowing nutrition***

society  
experience  
habit  
cultural  
desire

## ***Post swallowing nutrition***

biology  
physiology  
biochemistry

# Social and behaviour changes



## culture

*"I'm aware of the environment  
I take other steps, fine I do my  
bit, recycling, driving less but I  
probably wouldn't change my  
diet."*

Macdiarmid et al. 2016



## social networks

*"I don't want people to  
think I'm strange or a  
hippy."*

Lea et al. 2006

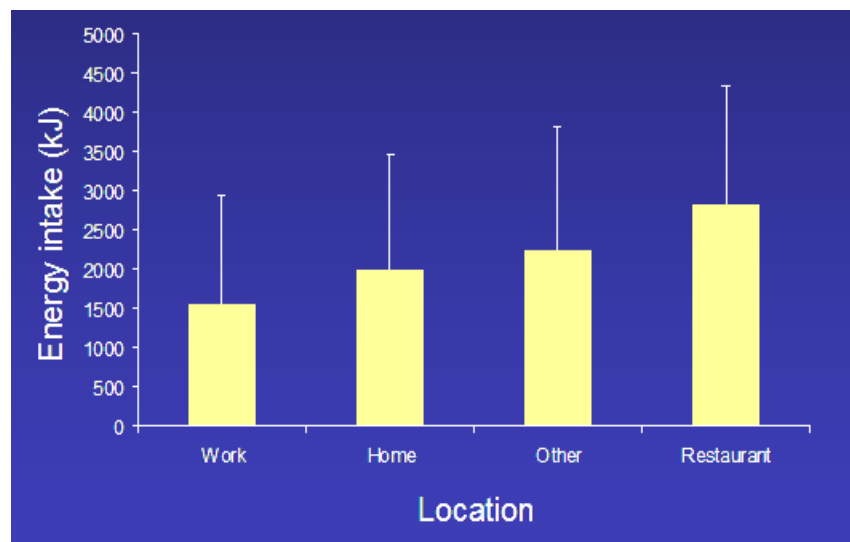
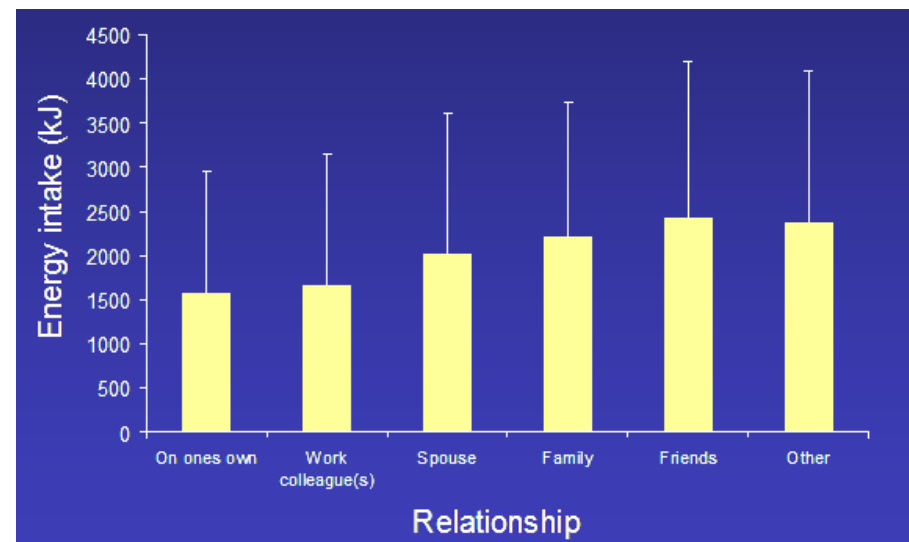
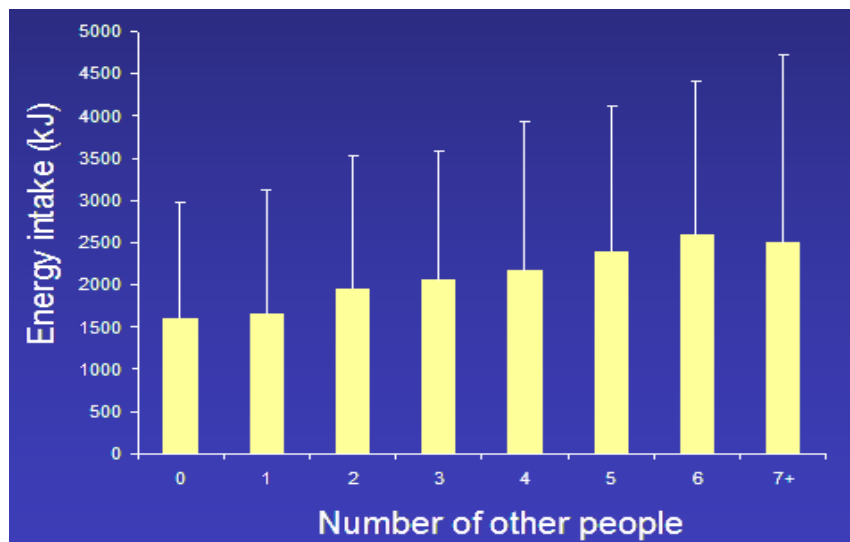


## identity

*"outgoing, popular, physically  
impressive and attractive to  
girls."*

Elliot 2014





## Social influences on eating behaviour

- impression management
- social suppression
- audience effect

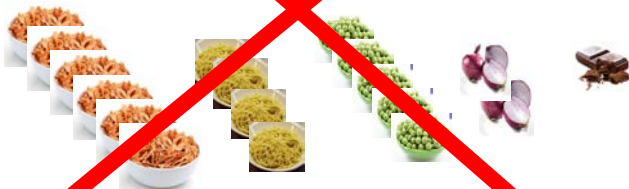
# Healthy, affordable and reduced carbon footprint diets that are culturally and socially appropriate

Macdiarmid Food form 2018

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Macdiarmid et al. (2012) AJCN

# Creating healthy, affordable and sustainable diets

Macdiarmid Food form 2018

Animal welfare  
Breeding  
(animal & plant)  
Climate change  
Land use /water  
Policies

Food safety  
Packaging  
Post-harvest loss

Demand  
Nutrition quality  
Trade  
Politics  
Economics

Acceptability  
Preferences  
Nutrition transition  
Cultural/social  
Economic access

**Nutritionally  
adequate**

**Agriculture  
productivity**

**Storage**

**Processing  
& Distribution**

**Consumption**

**Nutritionally  
poor**

Maize, rice, wheat: alarm at rising  
climate risk to vital crops

Simultaneous harvest failures in key regions would bring global  
famine, says the Met Office



**NEWS**  
UK heatwave: Lettuce growers warn of  
imminent shortage

