



# Nutritional Benefits of Animal Products

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# Overview

1. UK purchasing trends for animal products
2. UK intake of animal products vs recommendations
3. Challenges for the agri-food industry

## Definition of animal Products:

- Meats & meat products
  - Red meats
  - Processed meats
  - Poultry
- Fish and fish products
- Eggs
- Milk & dairy products



# Overview

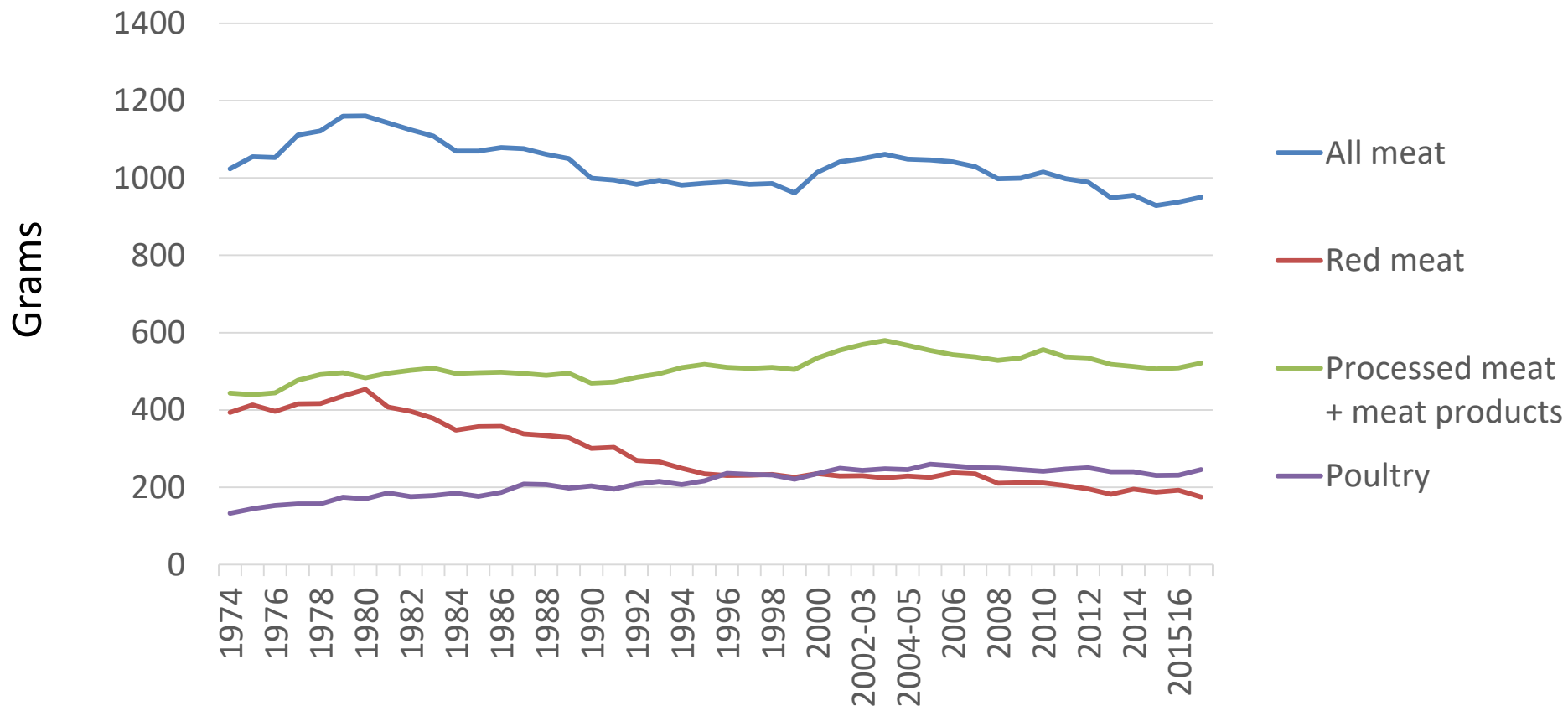
1. **UK purchasing trends for animal products**
2. UK intake of animal products vs recommendations
3. Challenges for the agri-food industry



# UK household purchasing trends

(average / person / week)

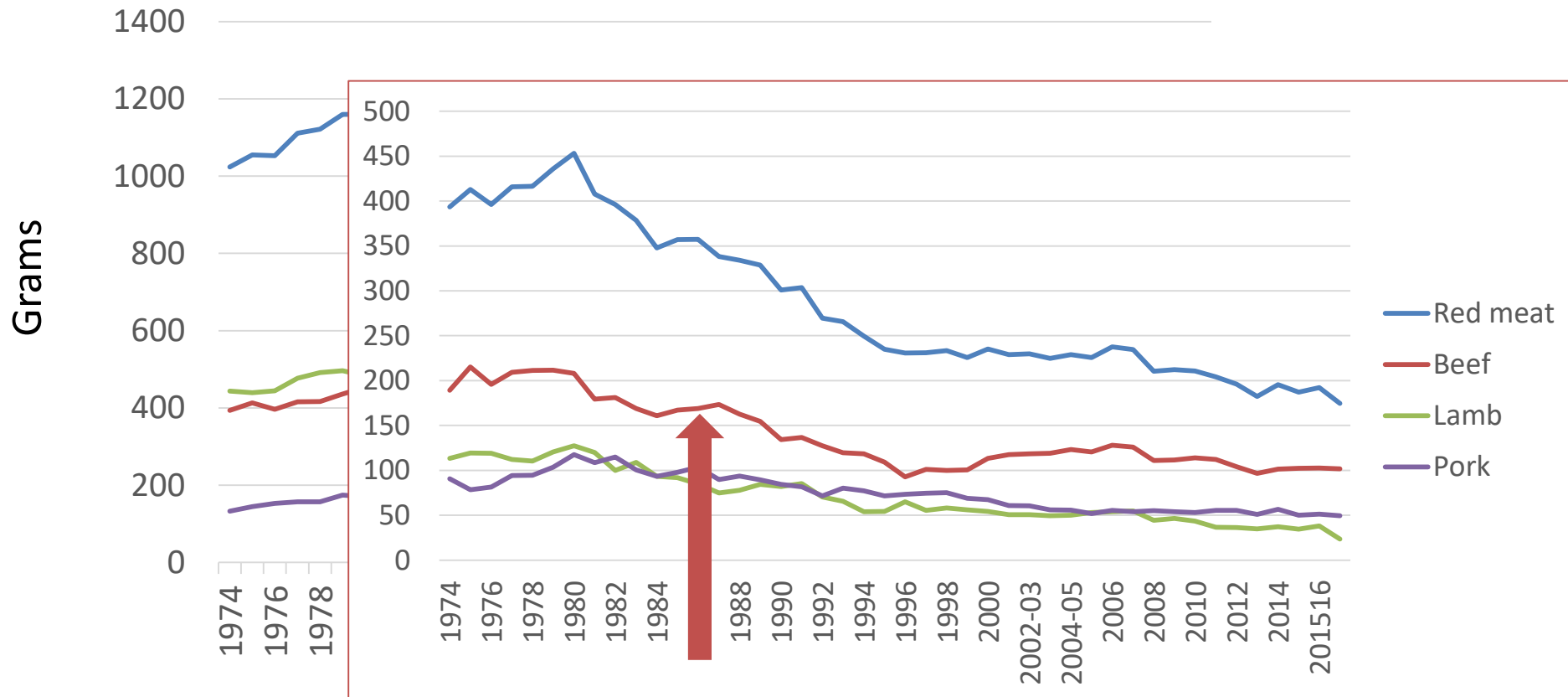
## Meat & meat product purchases



# UK household purchasing trends

(average / person / week)

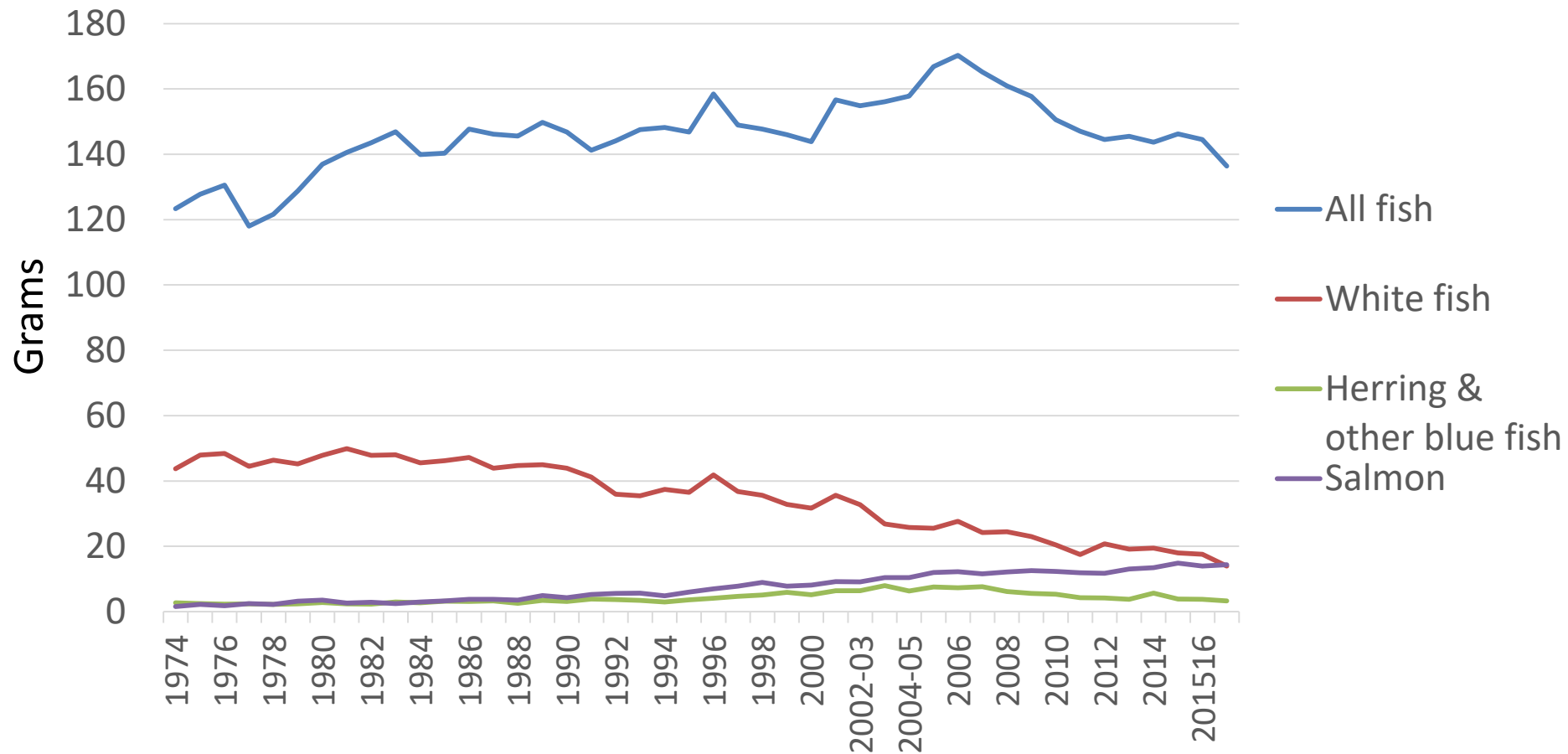
## Meat & meat product purchases



# UK household purchasing trends

(average / person / week)

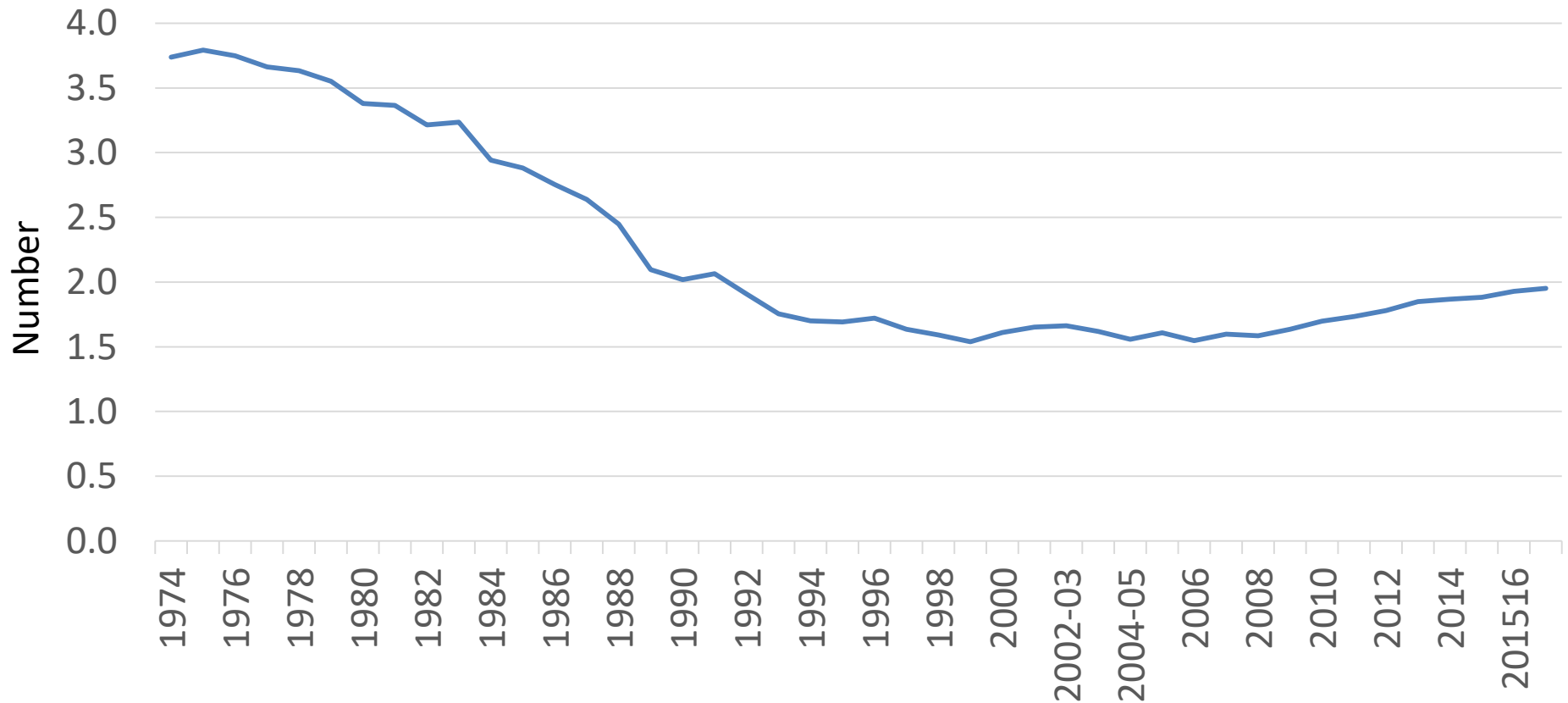
## Fish purchases



# UK household purchasing trends

(average / person / week)

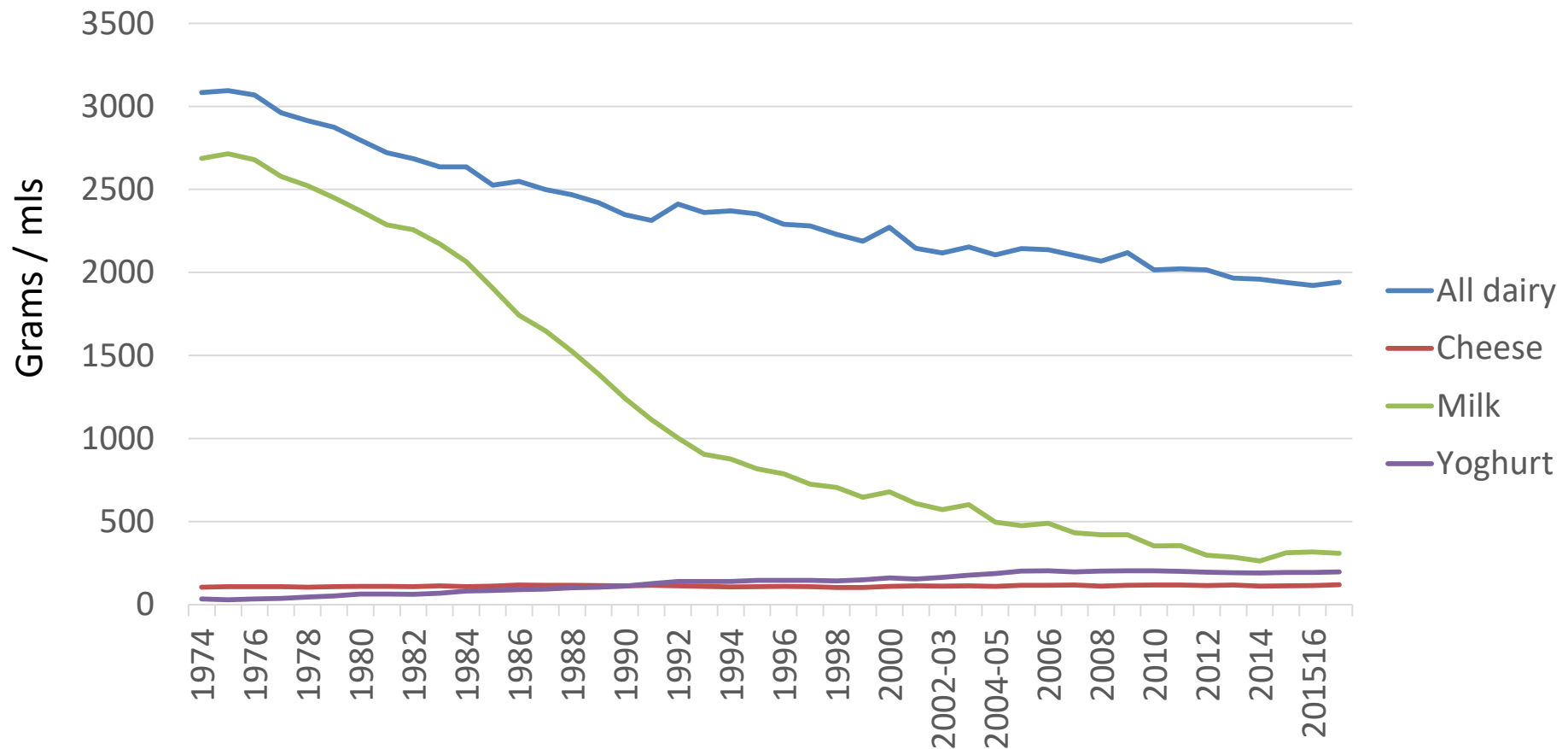
## Egg purchases



# UK household purchasing trends

(average / person / week)

## Milk & dairy product purchases





# Factors affecting purchasing trends

## Changes in:

**Cost**, driven by factors such as:

- Environment / climate
- Demand

Lifestyle & food preferences

Nutritional advice

Agricultural & Processing techniques

Safety concerns

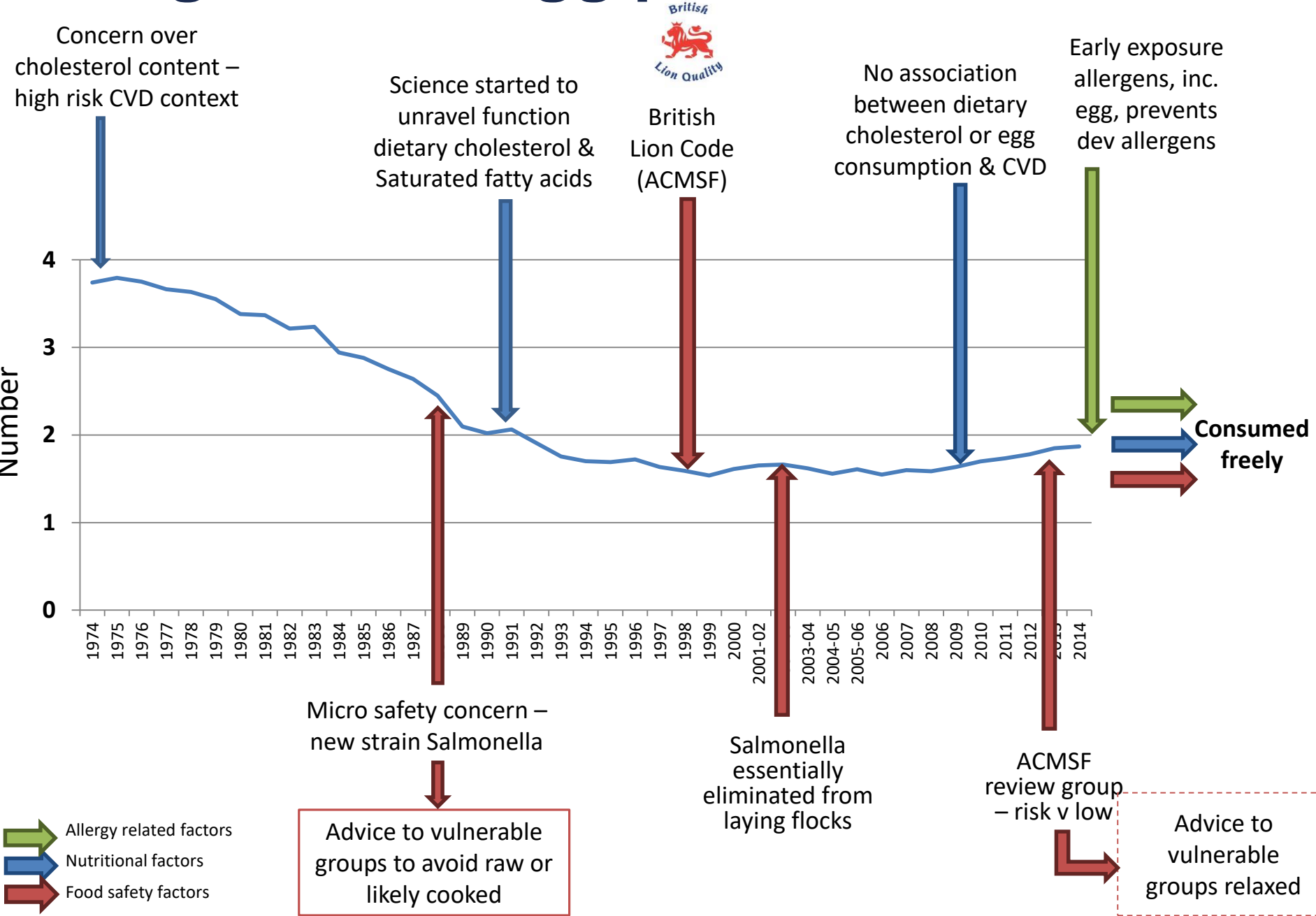
Environmental concerns



Economy

Population changes

# Changes in UK egg purchases



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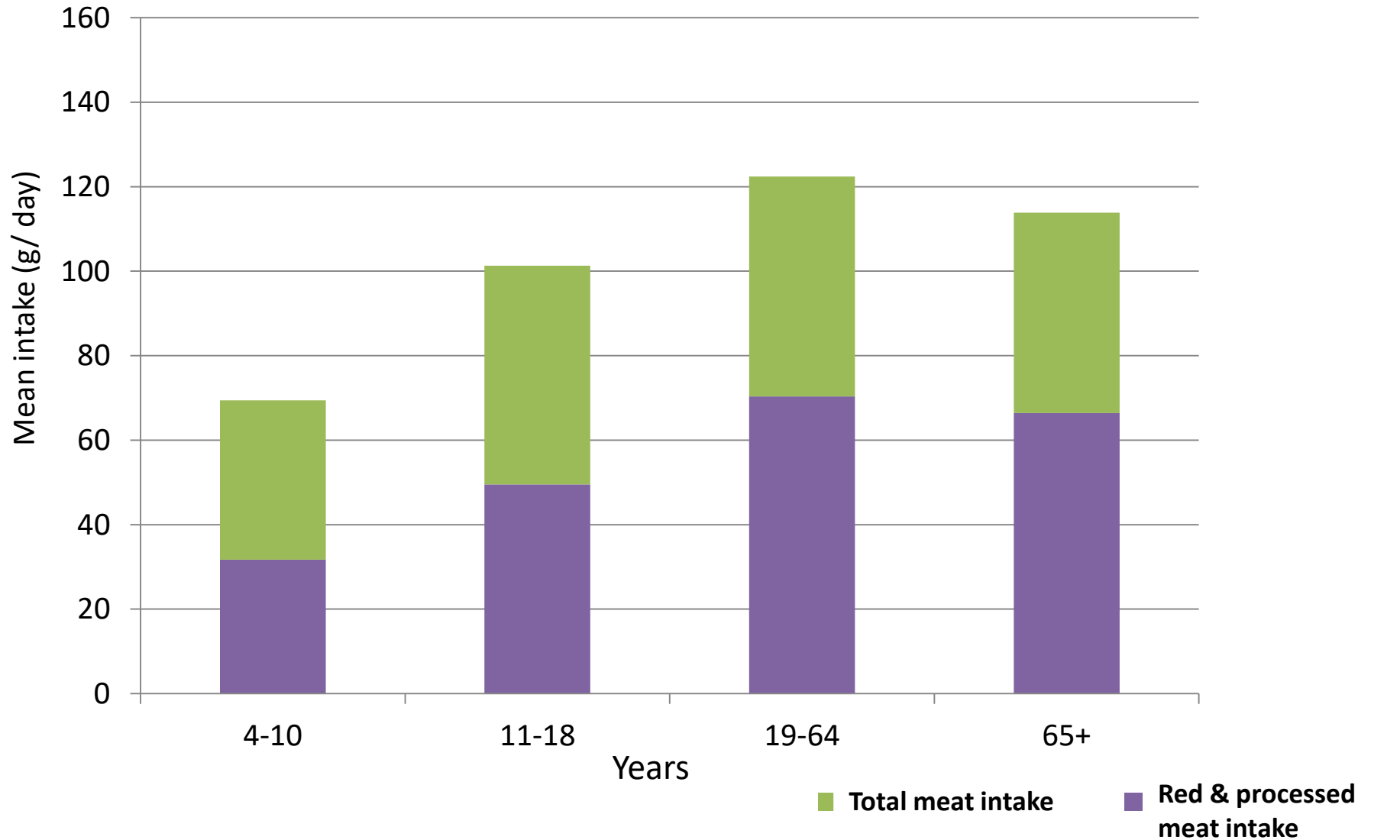


# National Diet & Nutrition Survey (NDNS)

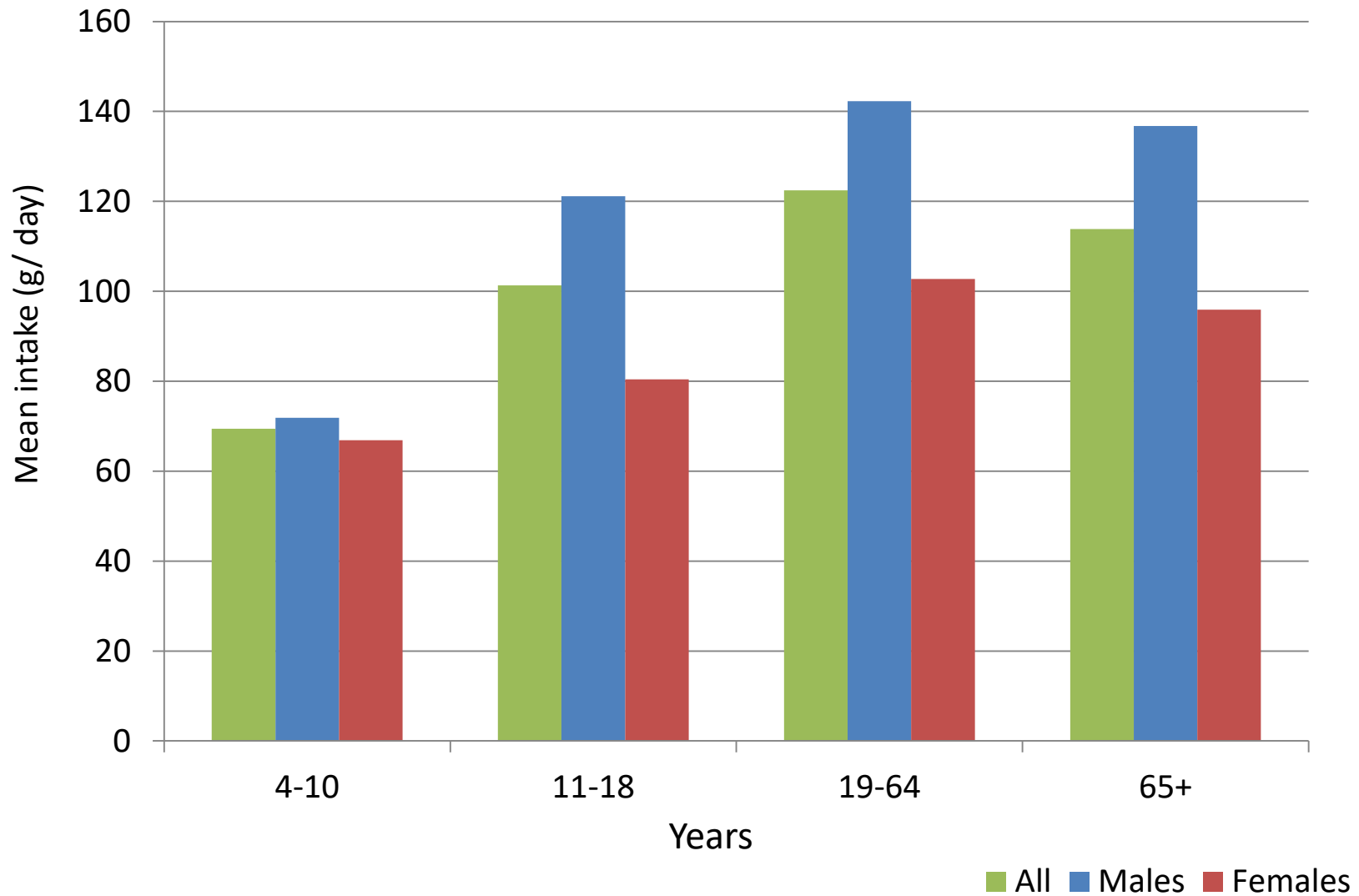
- Nationally representative data
  - Pre-school children: 1.5-4.5 years
  - Young people: 4-18 years
  - Adults: 19-64 years
  - Older adults:  $\geq 65$  years
- Data from 1992
- Latest rolling programme 2008/09-2011/12
  - Food diary (n=6,828)
  - Blood sample (n=2,671)
  - Urine sample (n=3,676)



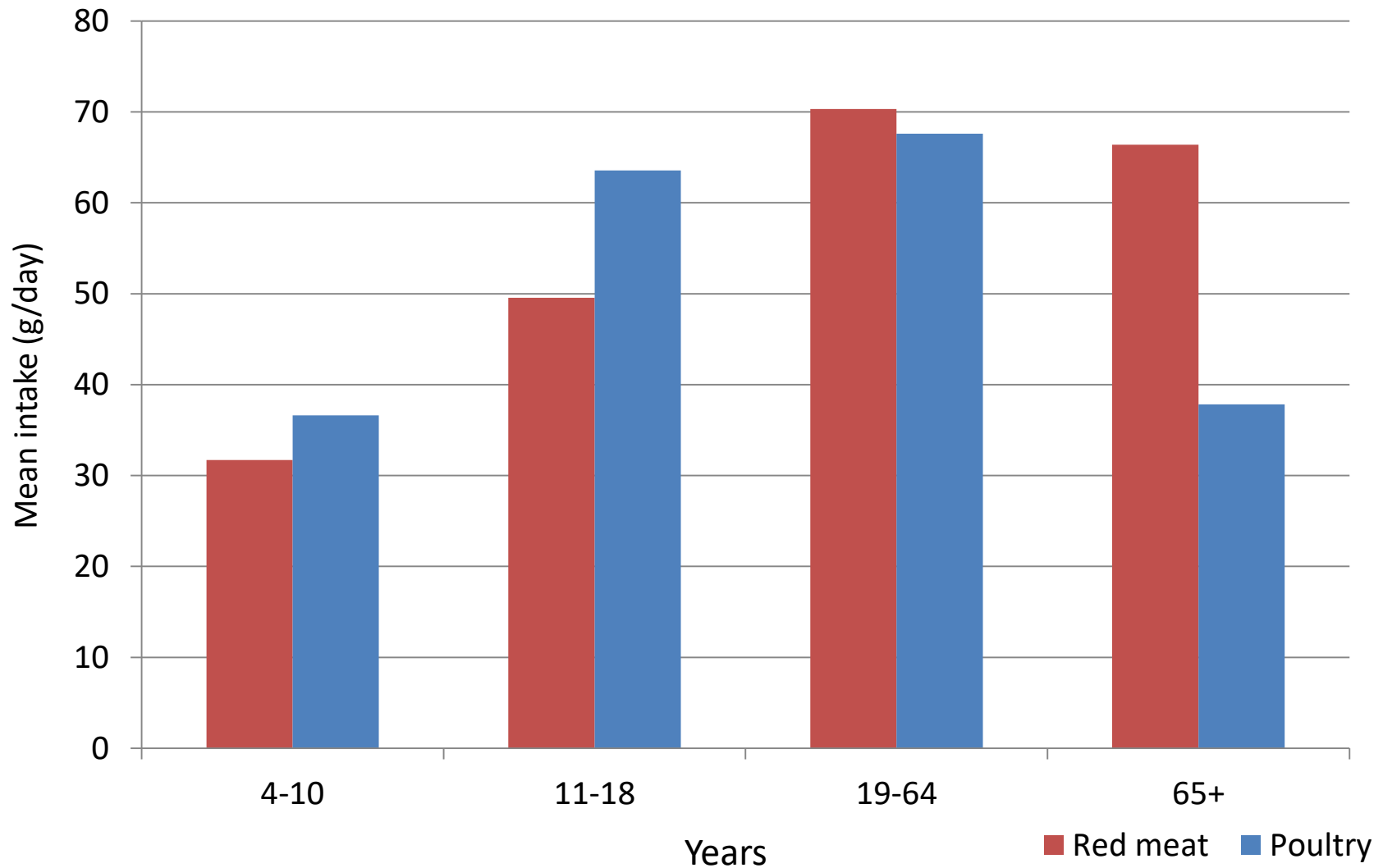
# UK meat intake (g/day)



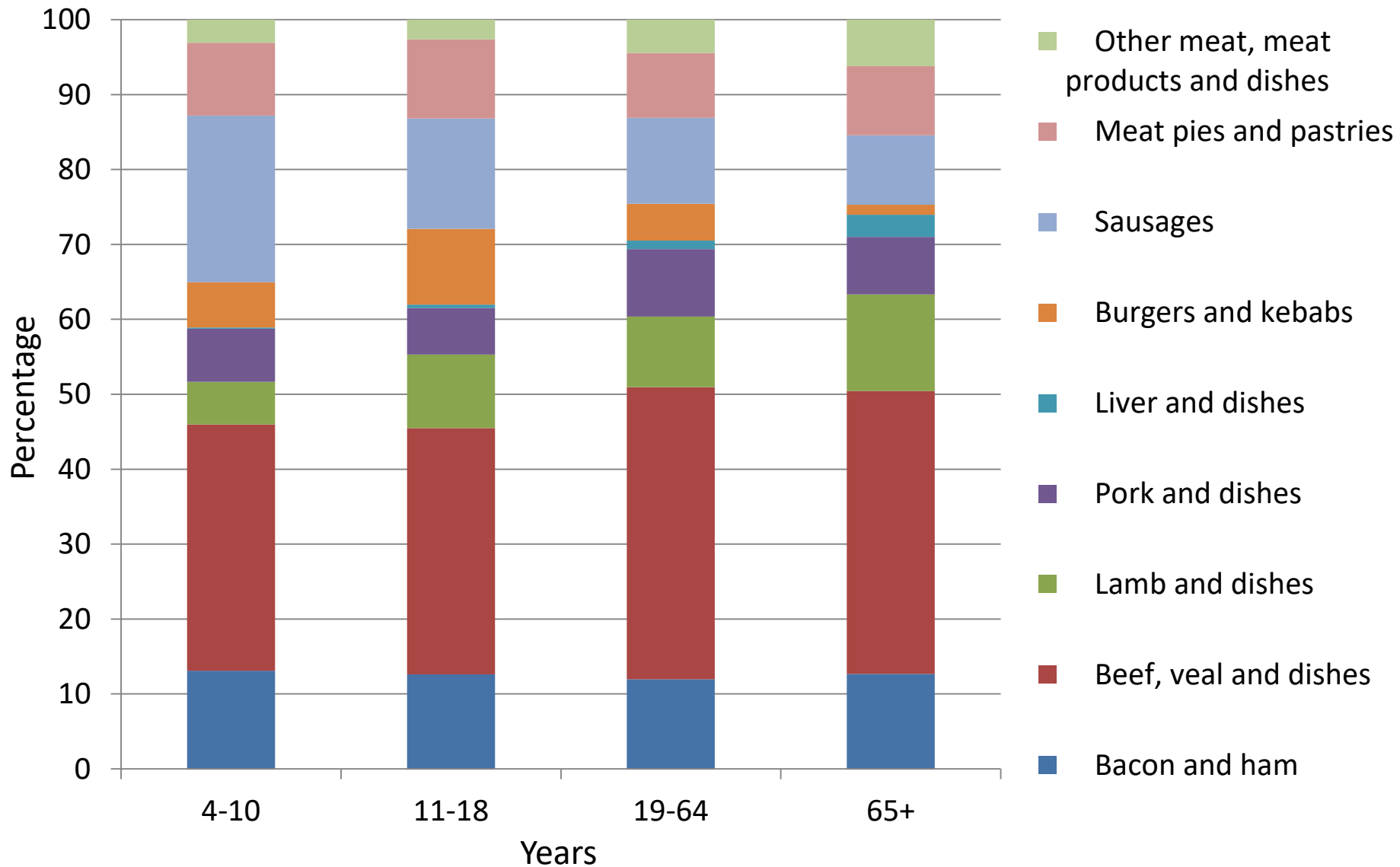
# UK meat intake (g/day)



# Red vs poultry meat intake



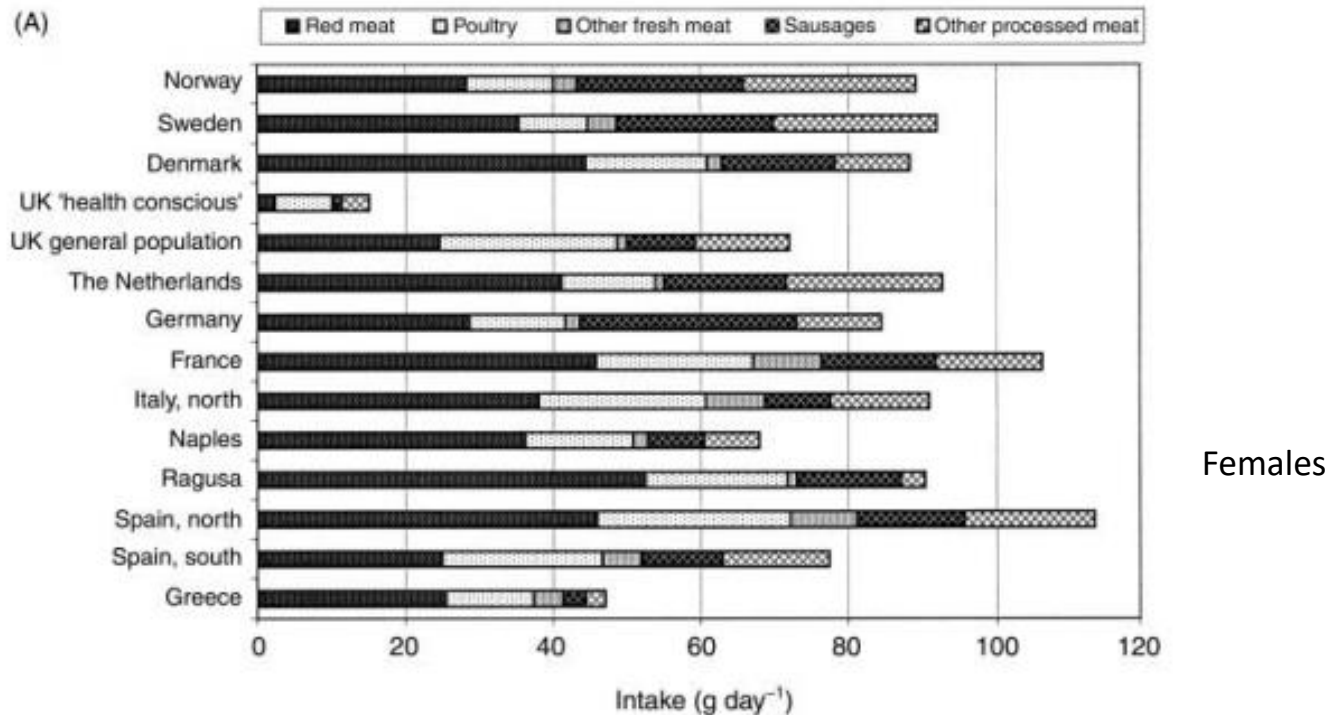
# Meat types consumed





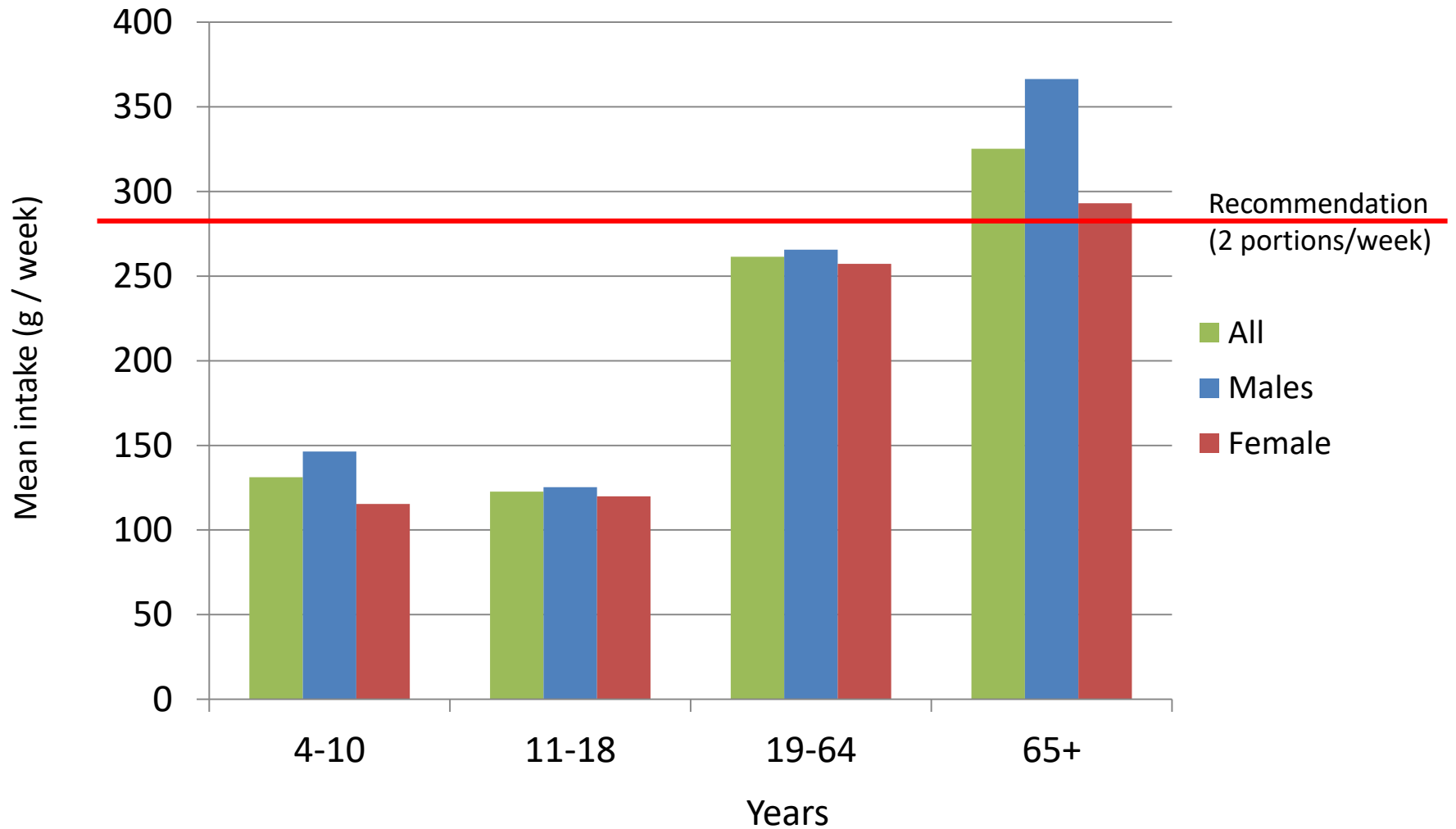
# Contribution (%) of meat & meat products to total energy intakes across Europe (Linseisen et al 2002)

## European Investigation into Cancer & Nutrition (EPIC) study

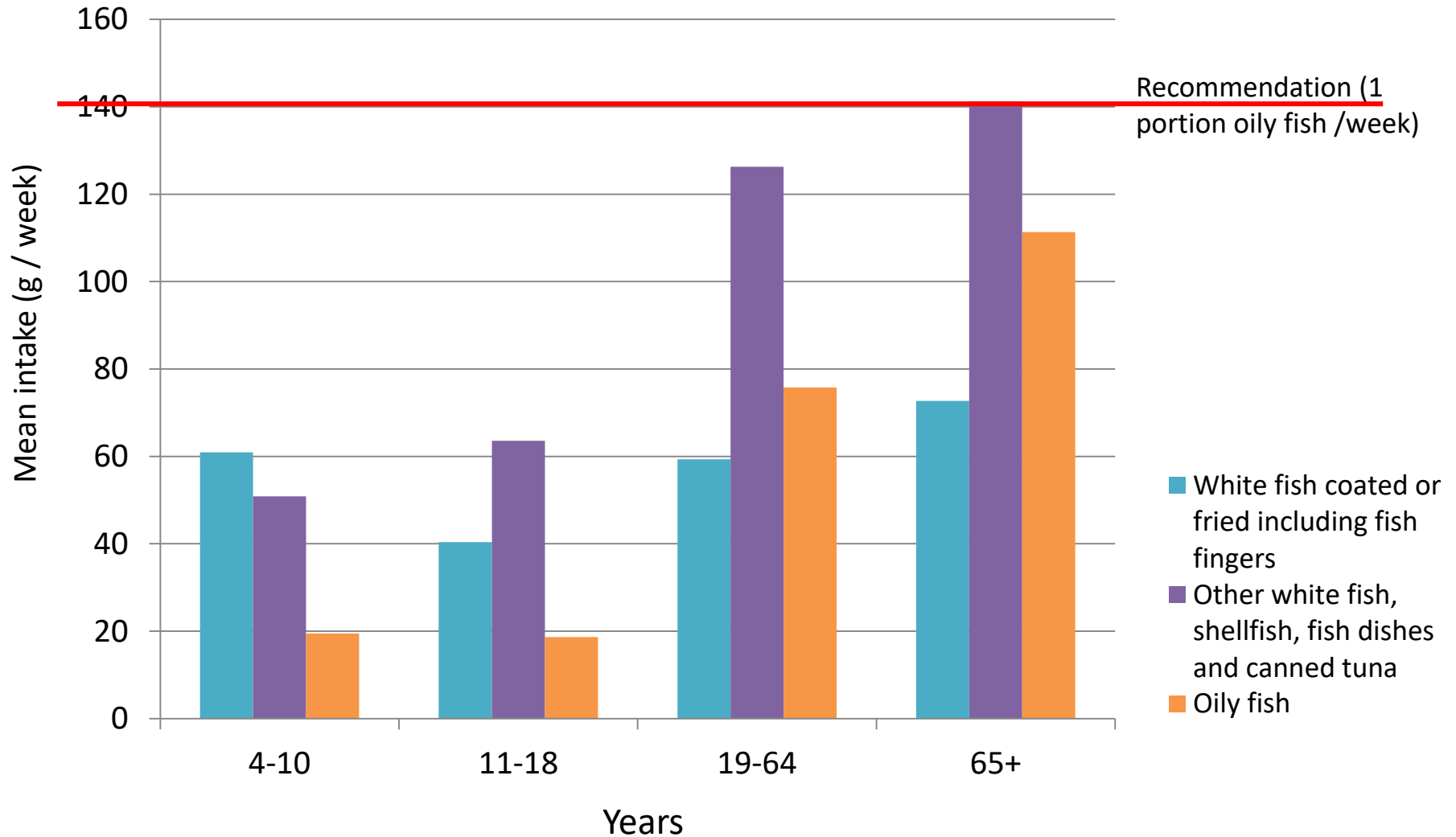


- *Northern Europe*: ↑total meat intakes
- Greater differences with meat **type** rather than **total intake**
- *Southern Europe* : ↑intake beef, veal & poultry  
↓ intake pork & processed meat

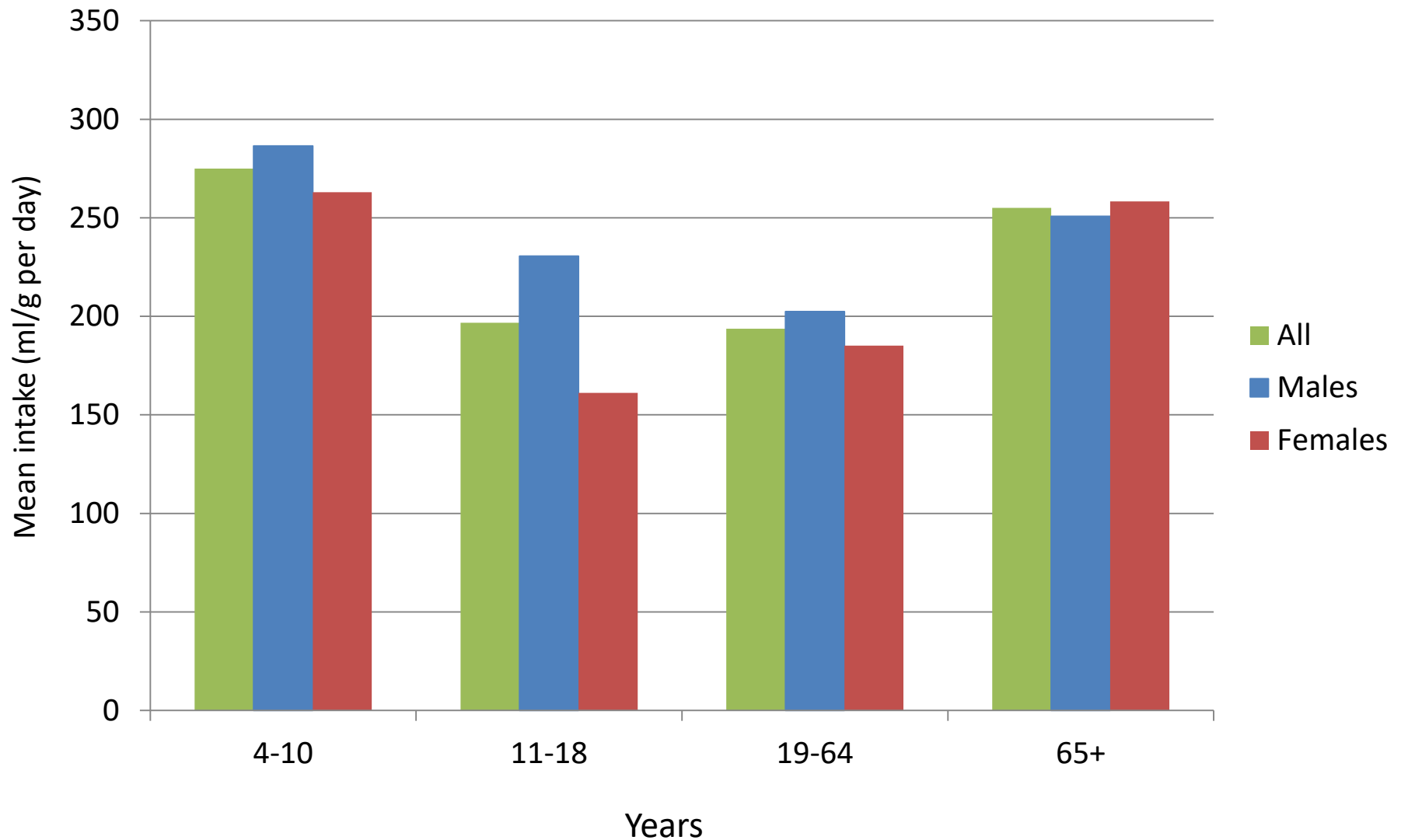
# UK Fish intake



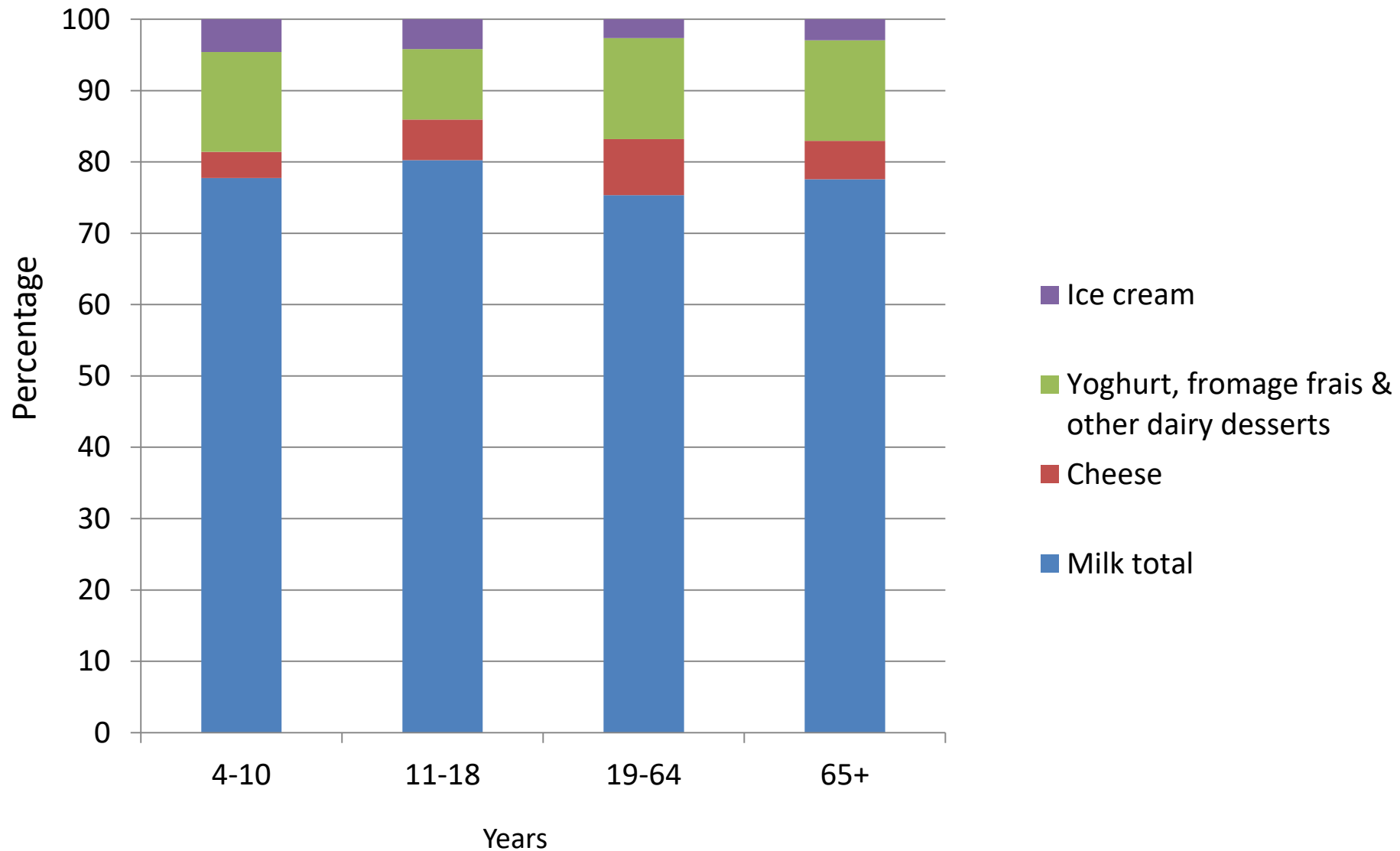
# UK Fish intake



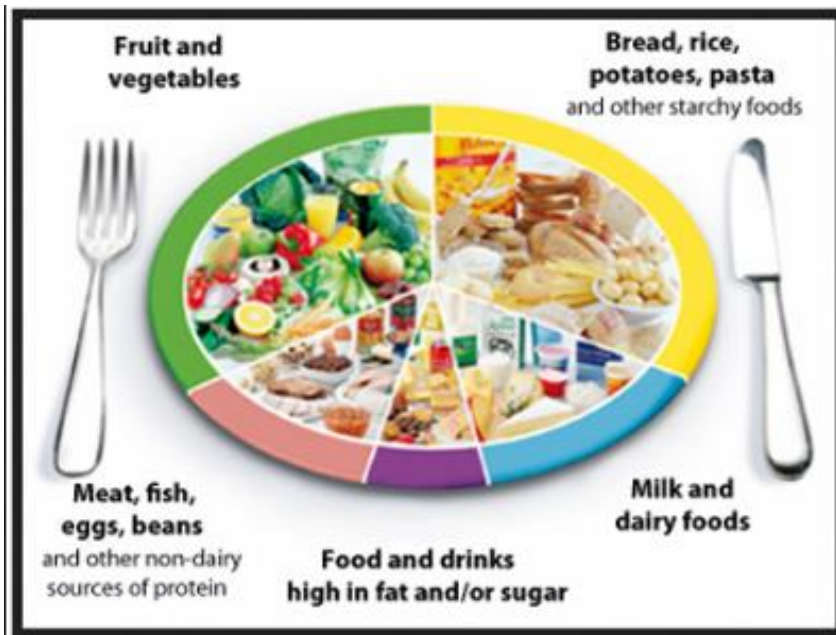
# UK milk & dairy product intake



# Milk & milk products consumed



# Eatwell Plate vs New Eatwell Guide



# Dairy & cardiovascular (CVD) health

## Inflammation

(↓risk) not observed in  
overweight/obese subjects

## Blood

## cholesterol

(↓risk)

**CVD** (No ↑ risk)

## Milk & Dairy products



## Blood pressure

(↓risk)

**Stroke** (↓risk)

↑ **Weight control**

**Myocardial  
infarction risk**  
(↓risk)

**Type 2 diabetes**  
(↓risk)

# Nutrient contribution of animal products

Meat	Dairy	Fish	Eggs
<b>Protein</b> <ul style="list-style-type: none"><li>• High biological value proteins</li></ul>	<ul style="list-style-type: none"><li>• High biological value proteins</li></ul>	<ul style="list-style-type: none"><li>• High biological value proteins</li></ul>	<ul style="list-style-type: none"><li>• High biological value proteins</li></ul>
<b>Fat</b> <ul style="list-style-type: none"><li>• Saturated fat</li><li>• Essential PUFA's</li></ul>	<ul style="list-style-type: none"><li>• Saturated fat</li><li>• Essential PUFA's</li></ul>	<ul style="list-style-type: none"><li>• Saturated fat</li><li>• Essential PUFA's</li></ul>	<ul style="list-style-type: none"><li>• Saturated fat</li><li>• Essential PUFA's</li></ul>
<b>Vitamins</b> <ul style="list-style-type: none"><li>• Vitamin D</li><li>• Vitamin B12</li></ul>	<ul style="list-style-type: none"><li>• Vitamin D</li><li>• Vitamin B12</li><li>• Vitamin B2</li><li>• Vitamin A</li></ul>	<ul style="list-style-type: none"><li>• Vitamin D</li><li>• Vitamin B12</li><li>• Vitamin B6</li><li>• Niacin</li></ul>	<ul style="list-style-type: none"><li>• Vitamin D</li><li>• Vitamin B12</li><li>• Vitamin B2</li></ul>
<b>Minerals</b> <ul style="list-style-type: none"><li>• High bioavailable iron</li><li>• Zinc</li></ul>	<ul style="list-style-type: none"><li>• Iodine</li><li>• High bioavailable calcium</li><li>• Potassium</li></ul>	<ul style="list-style-type: none"><li>• Iodine</li><li>• Selenium</li><li>• Potassium</li></ul>	<ul style="list-style-type: none"><li>• Iodine</li><li>• Selenium,</li></ul>



# NDNS key findings



## Too high

- Saturated fat
- Free sugar
- Salt

## Too low

- 
- Fruit & Vegetables
  - Fibre
  - Oily Fish
  - Vitamin D\*
  - Riboflavin (young people & women)
  - Iron\* (young people & women)
  - Vitamin A (young people)
  - Folate (girls only)
  - Magnesium, potassium & selenium (older children & adults)



\* Biochemical data

# Overview

1. UK consumption trends for animal products
2. UK intake of animal products vs recommendations
3. **Challenges for the agri-food industry**



# Challenges for the agri-food industry

- Sustainability
- Safety and traceability
- Quality
- Maximise nutritional quality of foods, e.g.
  - modify fatty acid profile - ↓SFA while ↑PUFA's?



# Saturated fat (SFA)....an evolving picture

1. No independent association between the consumption of SFA and the risk of CVD (Jakobsen et al. 2009)
2. Limited evidence for a benefit of substituting CHO for SFA for the prevention of CVD (Astrup et al. 2011; Hooper et al. 2012)
3. Some evidence for the benefit of replacing SFA with PUFA (Livingstone et al 2012; Micha & Mozaffarian 2010; Hooper et al. 2012)
4. Strong evidence for consumption of industrially generated trans-FA and CVD (Brouwer et al. 2013; Mozaffarian 2009) not ruminant sources.

# Challenges for the agriculture & food industry

- Sustainability
- Safety and traceability
- Quality
- Maximise nutritional quality of foods, e.g.
  - modify fatty acid profile -  $\uparrow$  SFA while  $\downarrow$  PUFA's?
    - Bio-fortification
  - maximise vitamins and minerals content
    - Bio-fortification
    - Fortification



# Nutrition Innovation Centre for Food & Health (NICHE)

Ulster University, Coleraine campus



at the core of nutrition research  
[www.ulster.ac.uk/niche](http://www.ulster.ac.uk/niche)

# Red meat study: bio-fortification

McAfee et al. 2011

Aim: to compare the effects on plasma and platelet LC n-3 PUFA status of consuming red meat produced from either grass-fed animals or concentrate-fed animals.



VS



40 (20M; 20F) healthy volunteers

McAfee et al. 2011

**Baseline:** Blood sample - fatty acid profile; Anthropometric; Blood pressure; Randomly assigned to treatment.

Red meat (690g (469g)/week)



from animals offered a **grass-finishing diet**

Red meat (690g (469g)/week)



from animals offered a **concentrate- finishing diet**

**Post-intervention:** Blood sample - fatty acid profile; Anthropometric; Blood pressure.

mince beef, sirloin steak, lamb medallion

4-weeks



# Findings

McAfee et al. 2011

- Meat from grass-finished animals had a significantly:
  - ↓ total fat content
  - ↑ *n*-3 PUFA content
- 4-week consumption of the grass-finished meats (67g/d) resulted in:
  - 18mg/d ↑ intake of *n*-3 PUFA
  - ↑ plasma & platelet *n*-3 PUFA concentrations
  - No change in cholesterol or blood pressure

# Red meat study: bio-fortification

Price, Strain et al. 2018

Aim: To investigate the effect of consuming n-3 enriched beef, compared to control, on circulating plasma cholesterol concentrations, PUFA status and other markers of CVD risk



VS



VS



grass- finishing diet

concentrate-  
finishing diet

**TOP SECRET**

n-3 enriched-  
finishing diet



90 healthy volunteers

Price et al. 2018

**Baseline:** Blood sample - fatty acid profile; Anthropometric; Pulse wave analysis, Blood pressure; Randomly assigned to treatment.

Red meat (690g  
(469g)/week)



from animals offered a  
**grass- finishing diet**

Red meat (690g  
(469g)/week)



from animals offered a  
**concentrate- finishing diet**

Red meat (690g  
(469g)/week)



from animals offered an  
**omega rich- finishing diet**

**Post-intervention:** Blood sample - fatty acid profile; Pulse wave analysis, CVD risk, Anthropometric; Blood pressure.

mince beef, steak pieces, burgers

5-weeks

# Biofortified Meat: A potential vehicle for vitamin D enrichment and fortification

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*CAST PhD funded by Devenish Nutrition*

**PhD Researcher:** Holly Neill

**Supervisors:** Dr Kirsty Pourshahidi (UU), Dr Chris Gill (UU),  
Emma McDonald (Devenish) & Dr Colin McRoberts (AFBI)

# MAIN AIM



To determine the efficacy of **pork** meat as a vehicle  
for **vitamin D biofortification**



# Conclusions

## Meat products

### Purchasing trends:

- Little change in overall meat consumption
- ↓ red meat
- ↑ poultry, processed meats
- Similar to N Europe

### Intake

- ↑ the recommendations
- ↑ males vs females
- Beef most popular in all age groups
- ↑ poultry in younger age groups

**Currently** animal products make a significant contribution to UK intake of a range of nutrients

**Challenges:** develop novel strategies to maximise the nutritional content of animal products

