



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. Comparisons with EU intakes
4. 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



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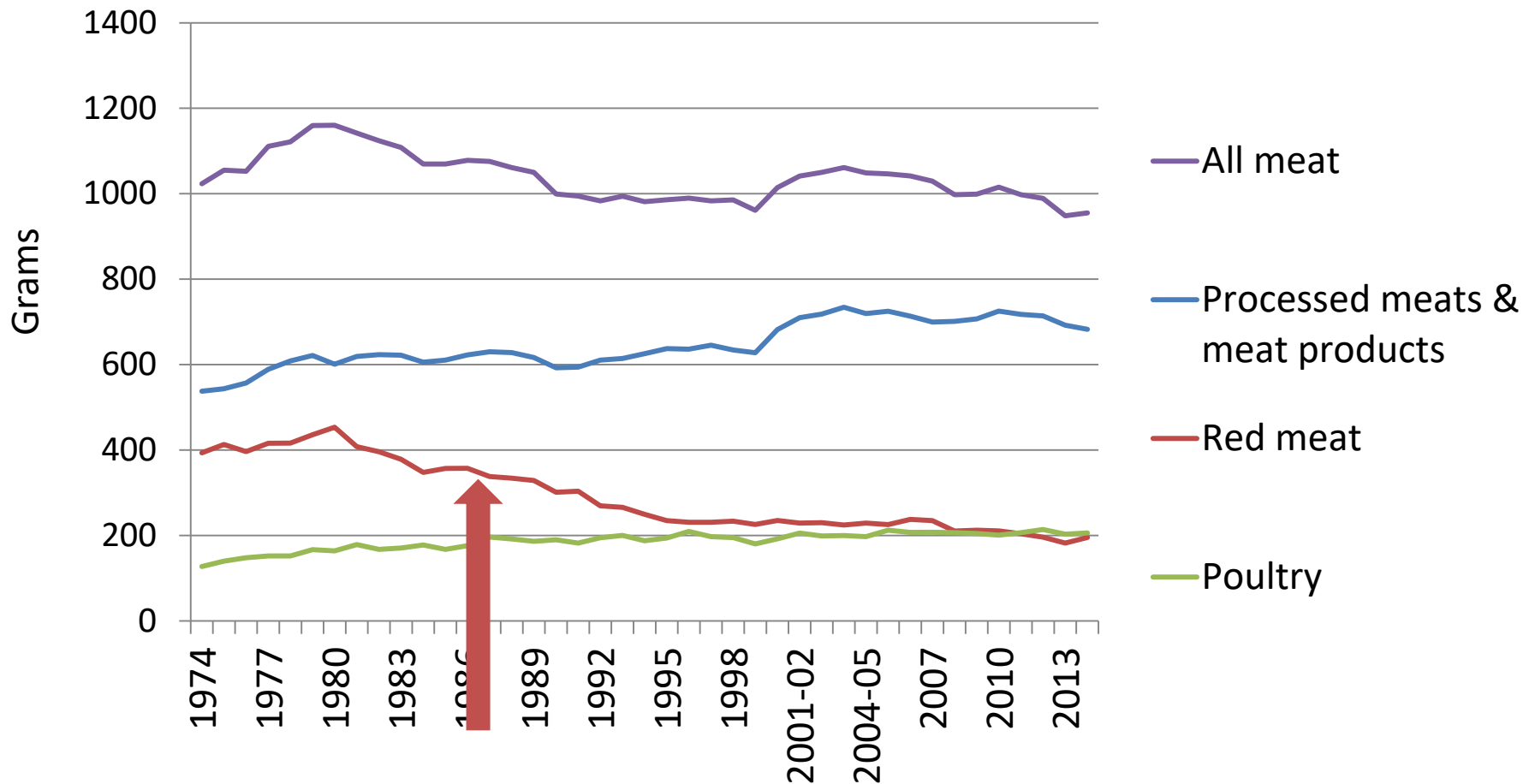
UK household purchasing trends

(average / person / week)

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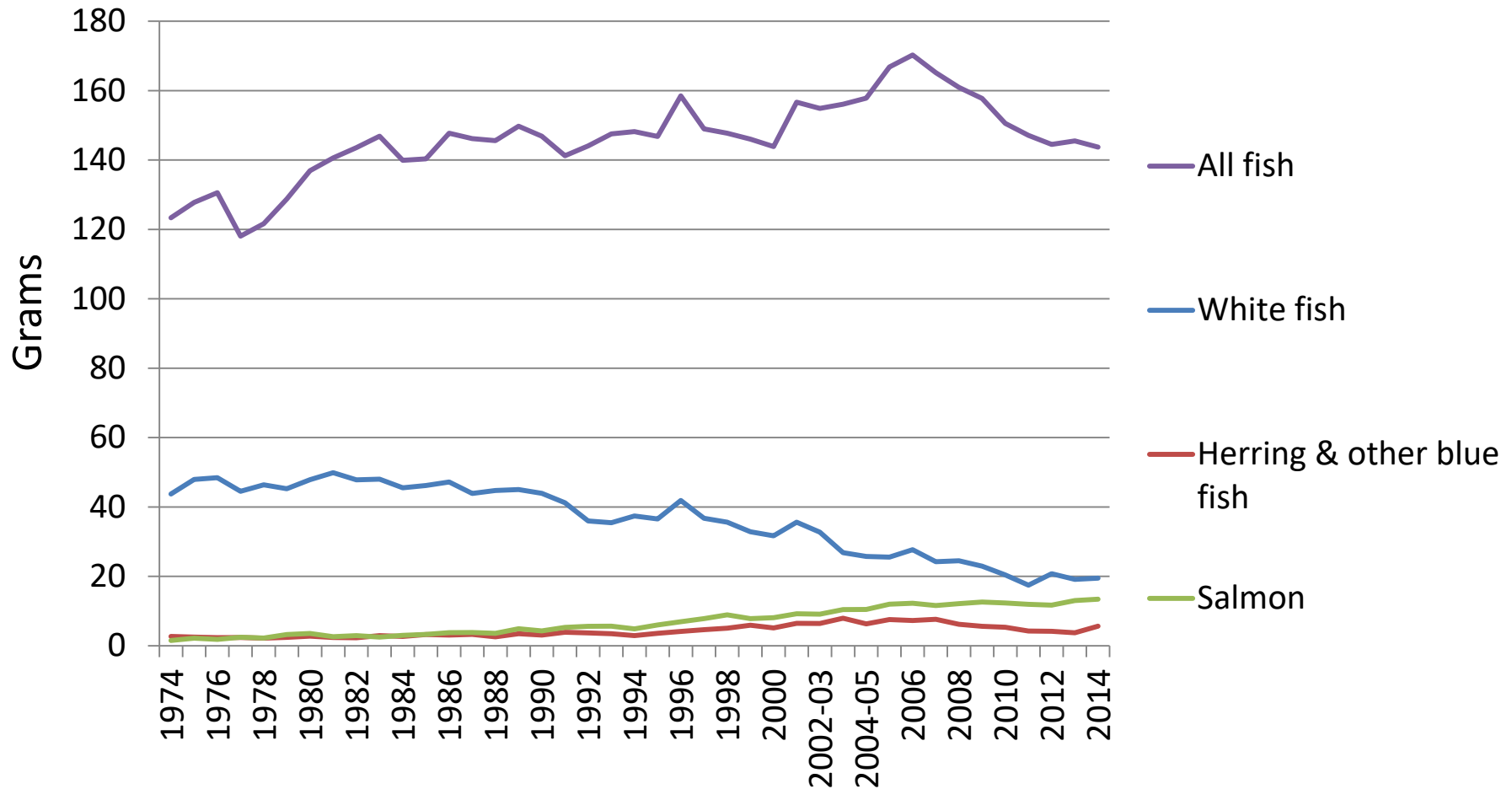
Meat & meat product purchases



UK household purchasing trends

(average / person / week)

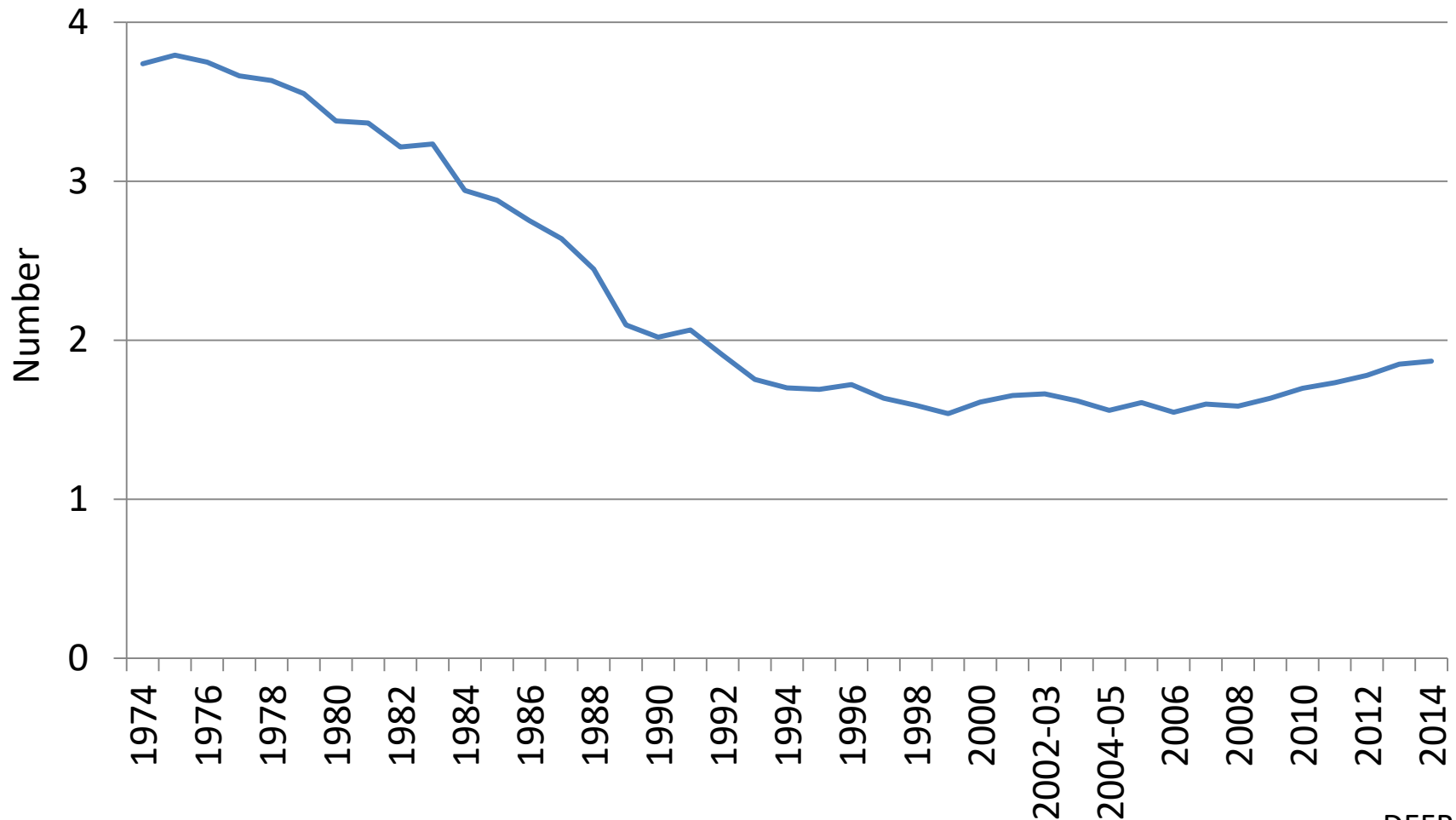
Fish purchases



UK household purchasing trends

(average / person / week)

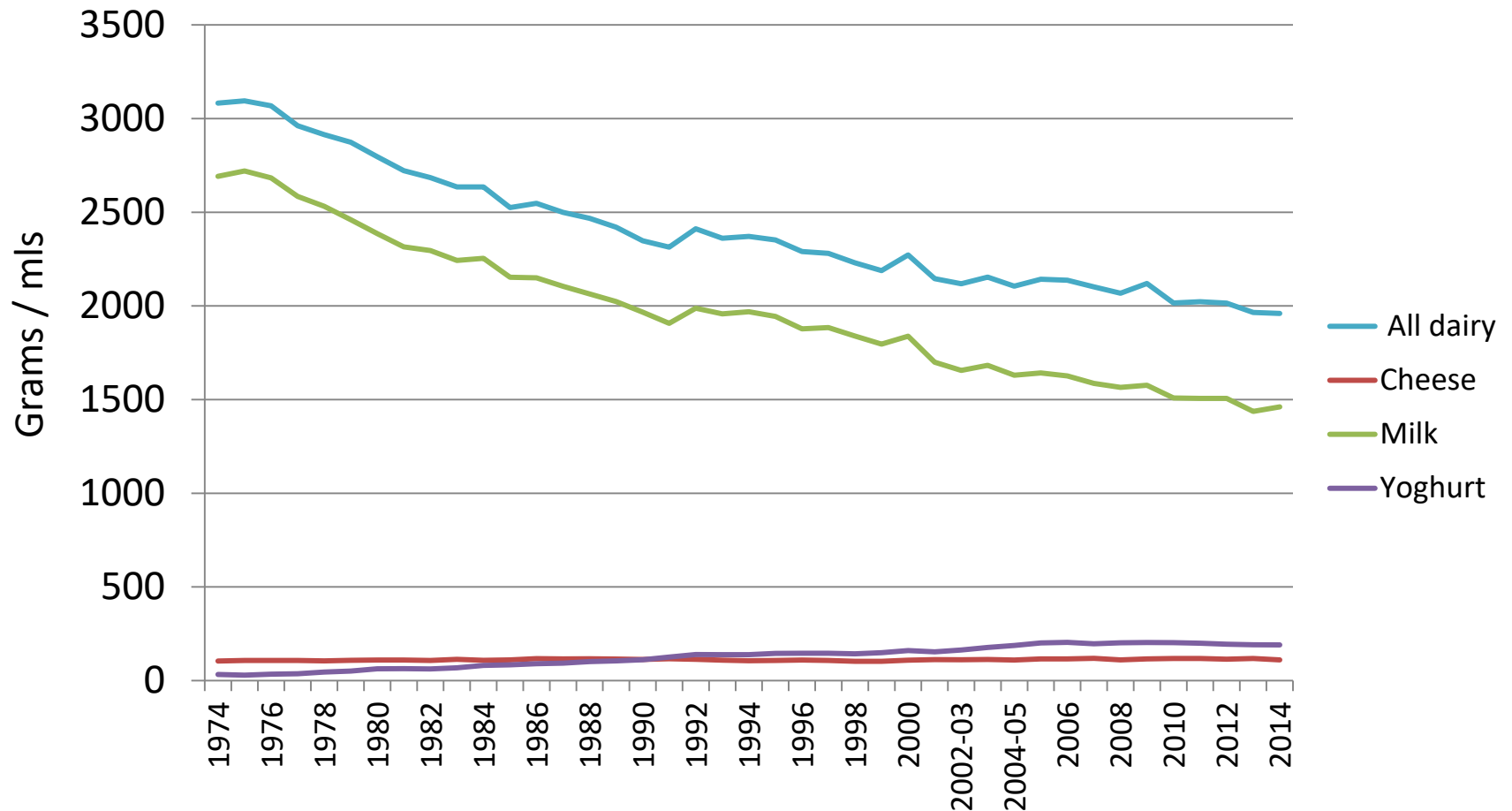
Egg purchases



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



Environmental concerns

Safety concerns

Economy

Population changes

Factors affecting purchasing trends

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- Environment / climate
- Demand

Lifestyle & food preferences

Nutritional advice

Agricultural & Processing techniques



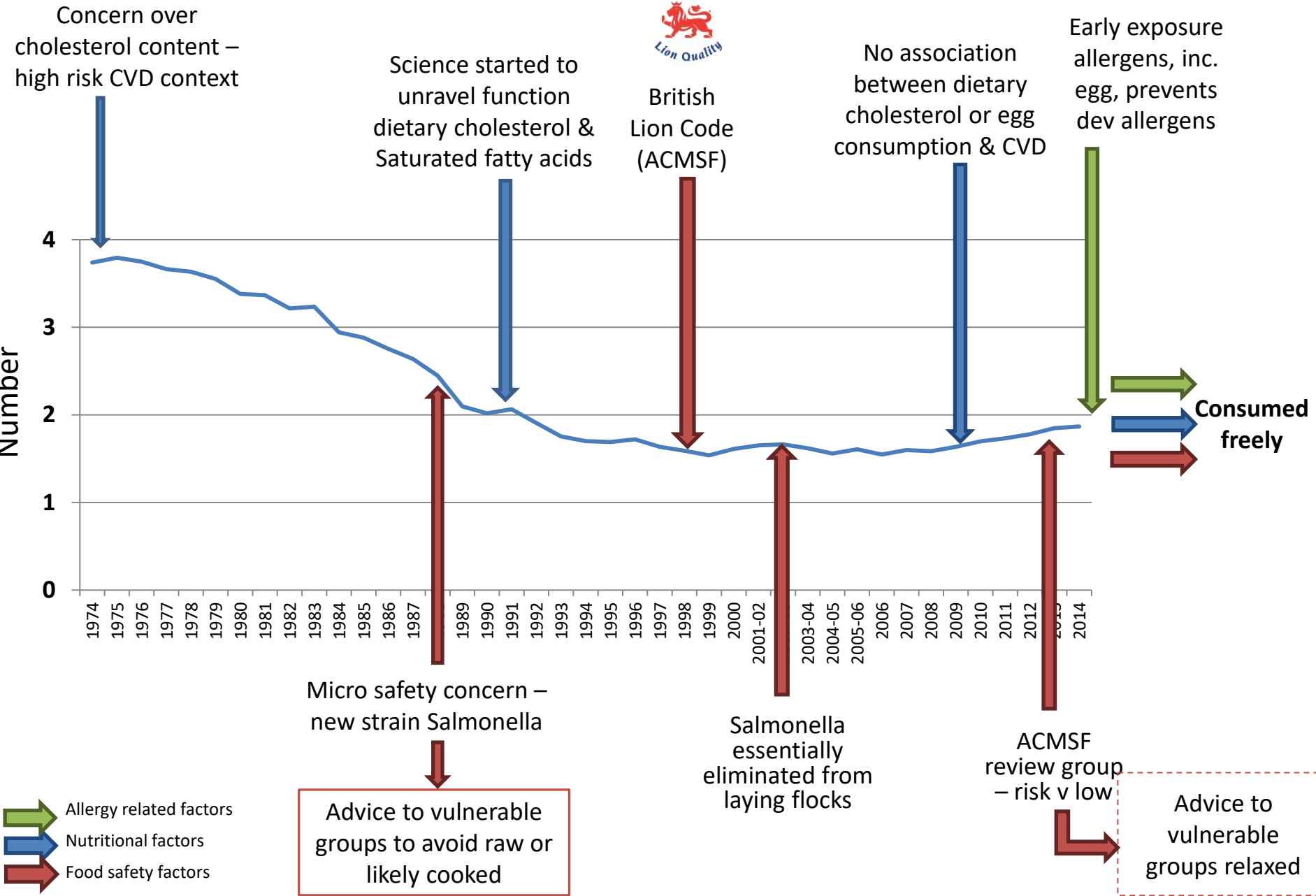
Environmental concerns

Safety concerns

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Population changes

Changes in UK egg purchases



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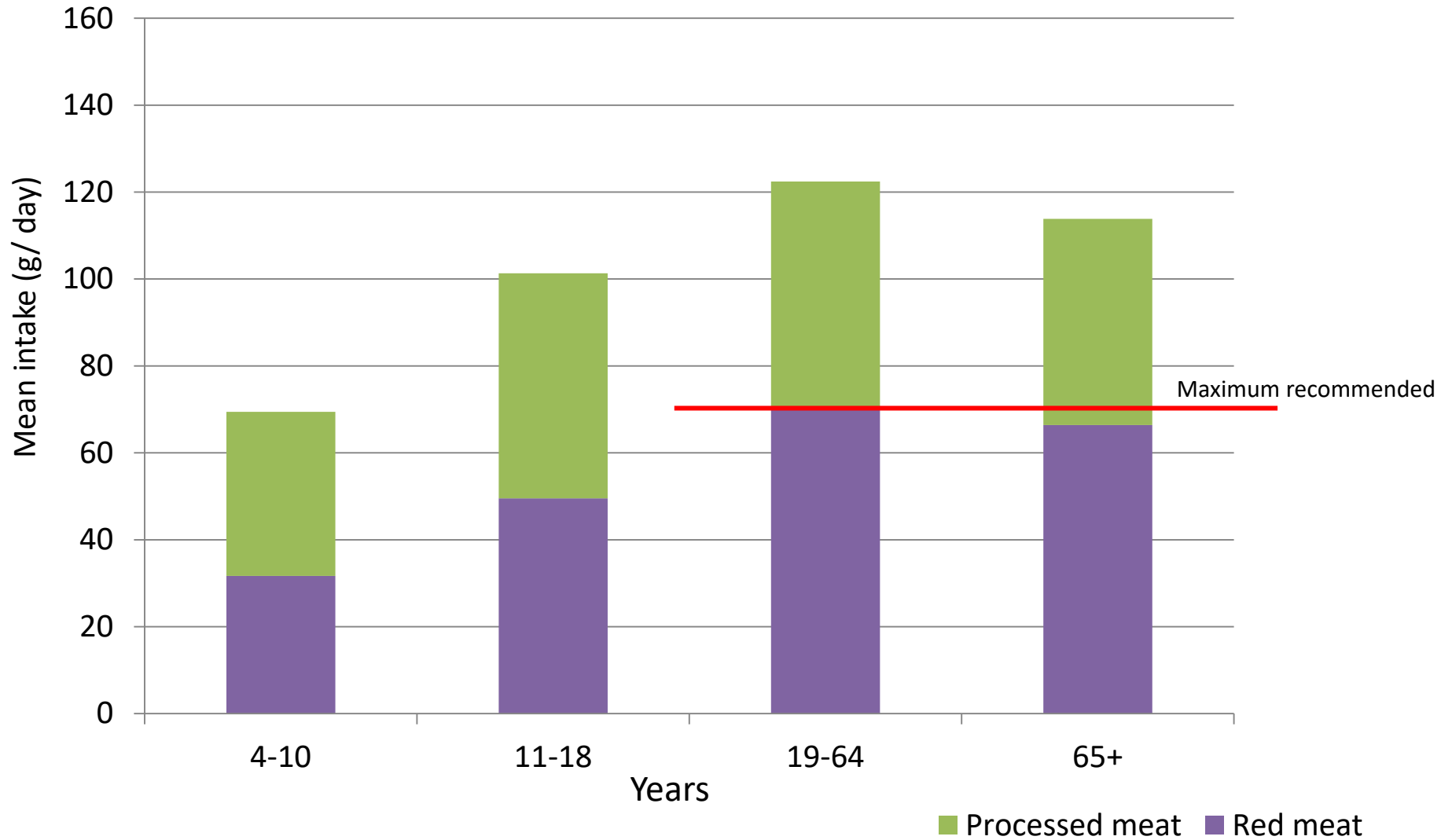


National Diet & Nutrition Survey (NDNS)

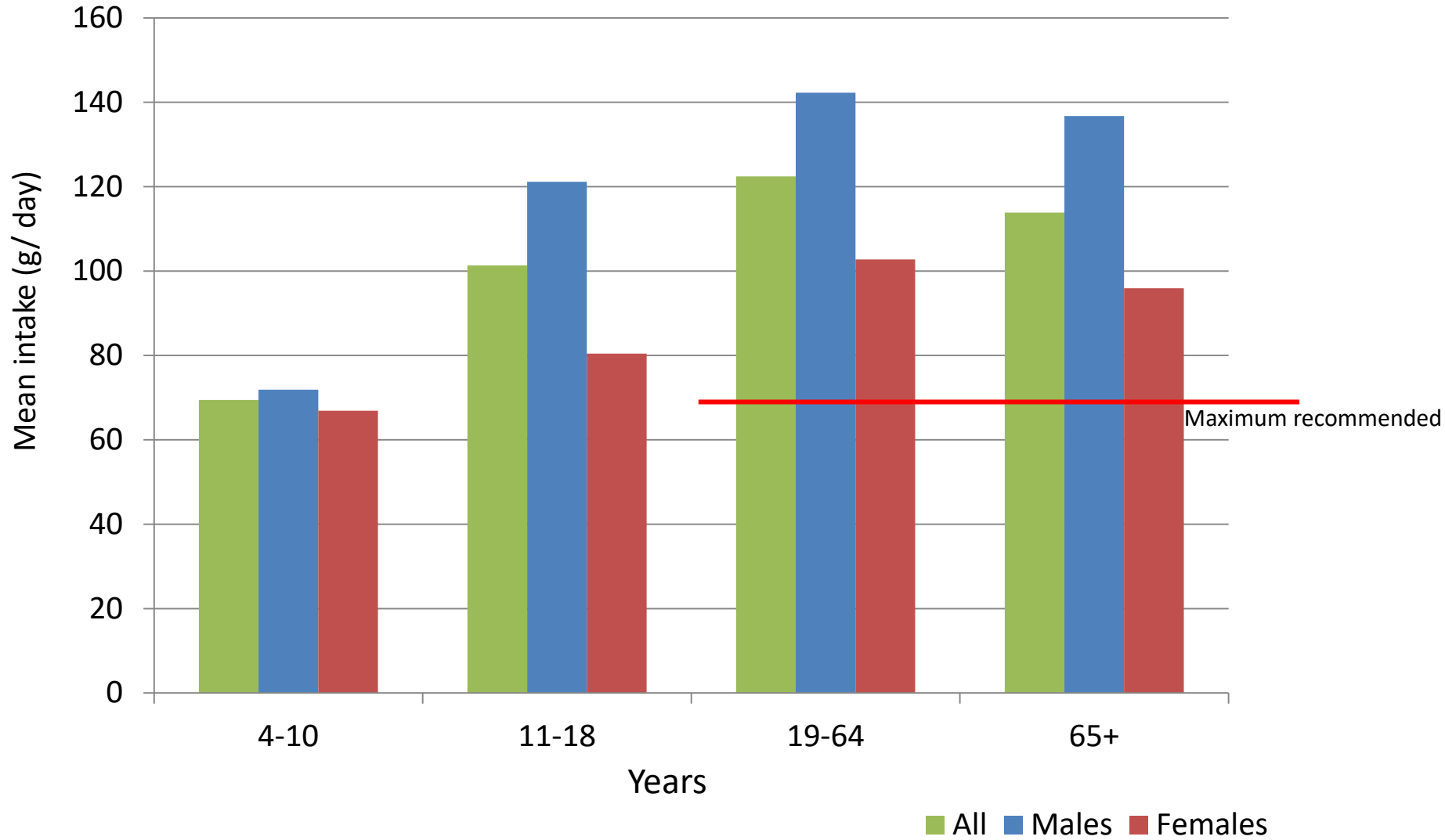
- Nationally representative data
 - Pre-school children: 1.5-4.5 years
 - Young people: 4-18 years
 - Adults: 19-64 years
 - Older adults: ≥ 65 years
- Data from 1992
- Latest programme 2008/09-2011/12
 - Food diary (n=6,828)
 - Blood sample (n=2,671)
 - Urine sample (n=3,676)



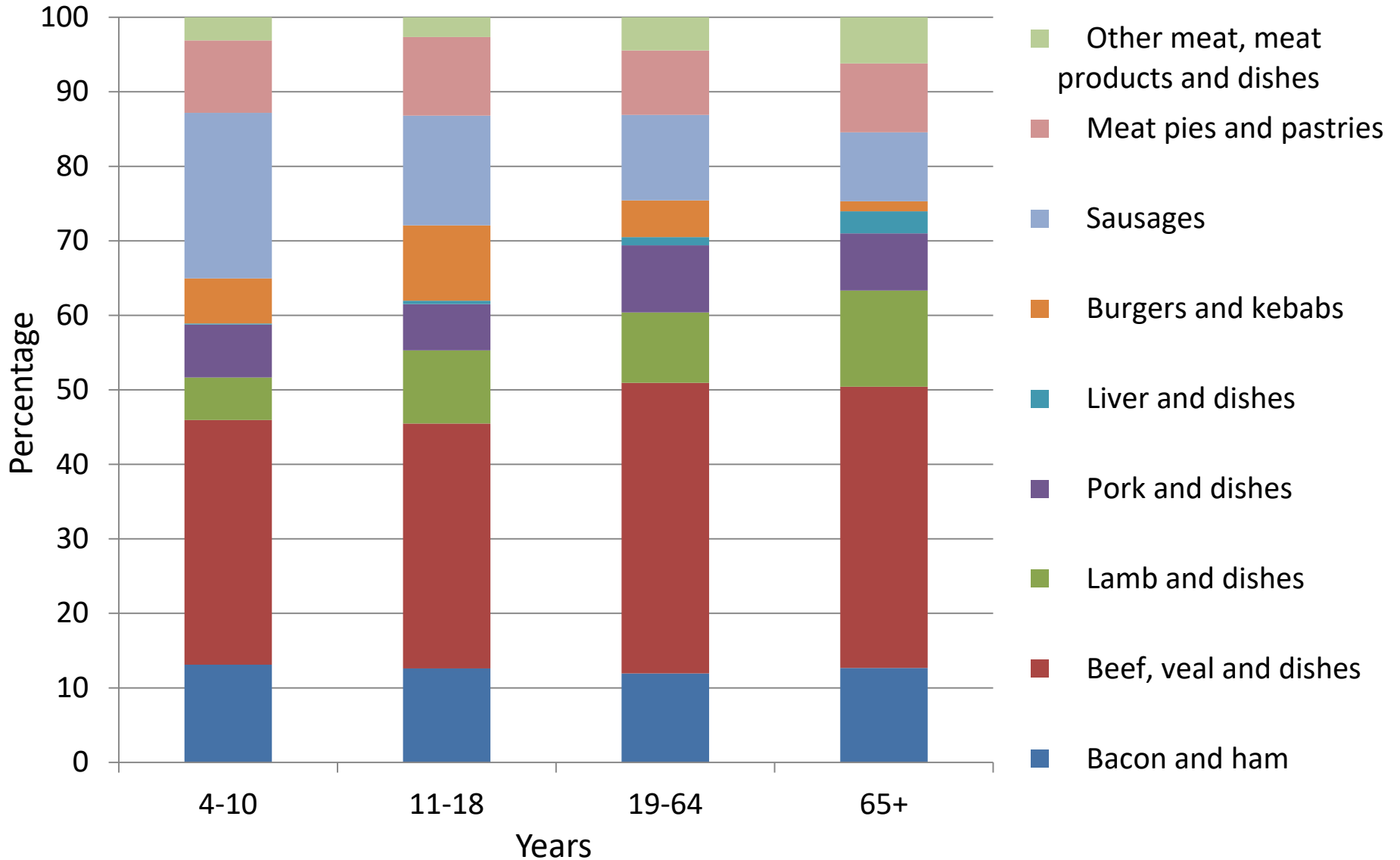
UK meat intake (g/day)



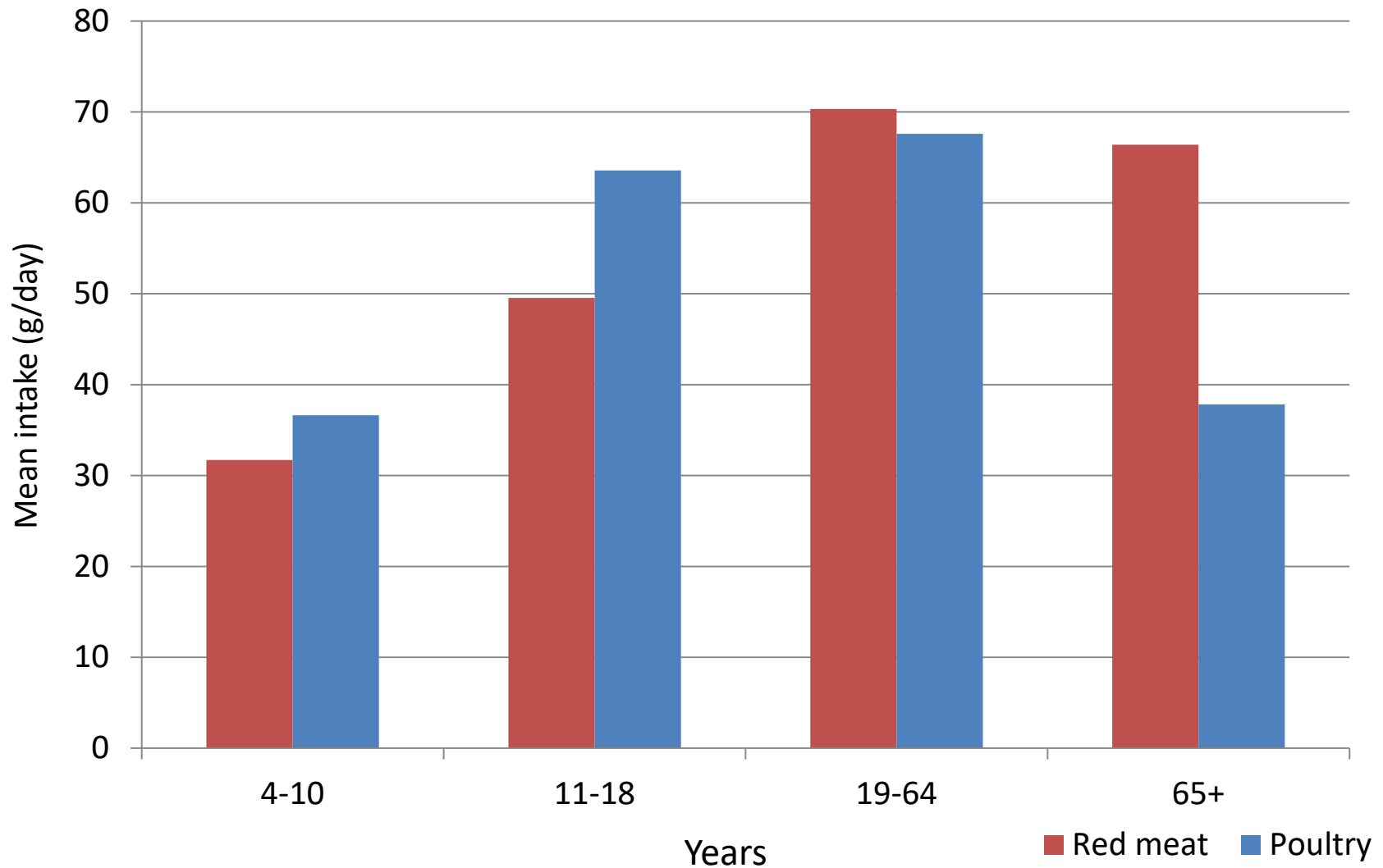
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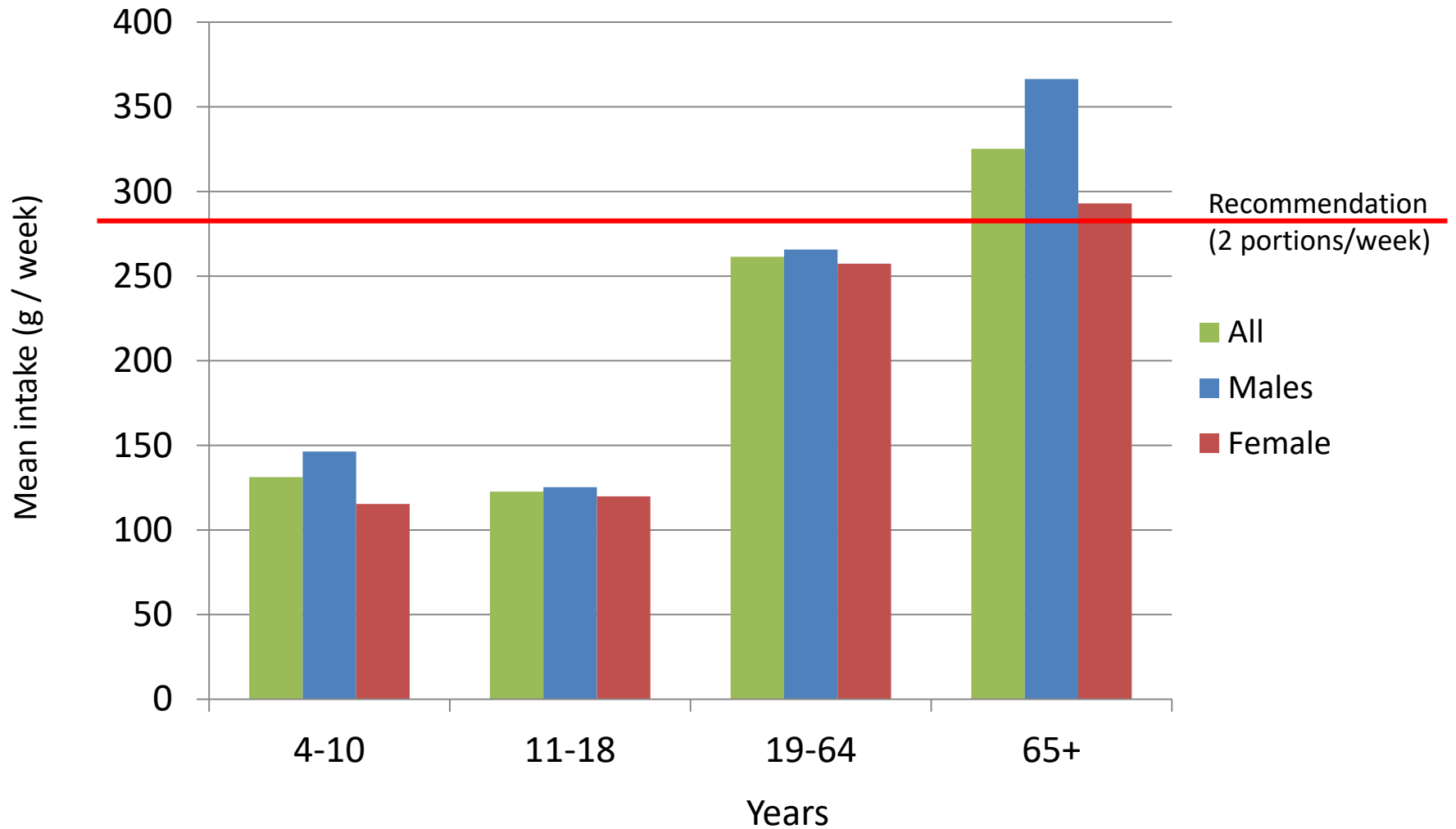
Meat types consumed



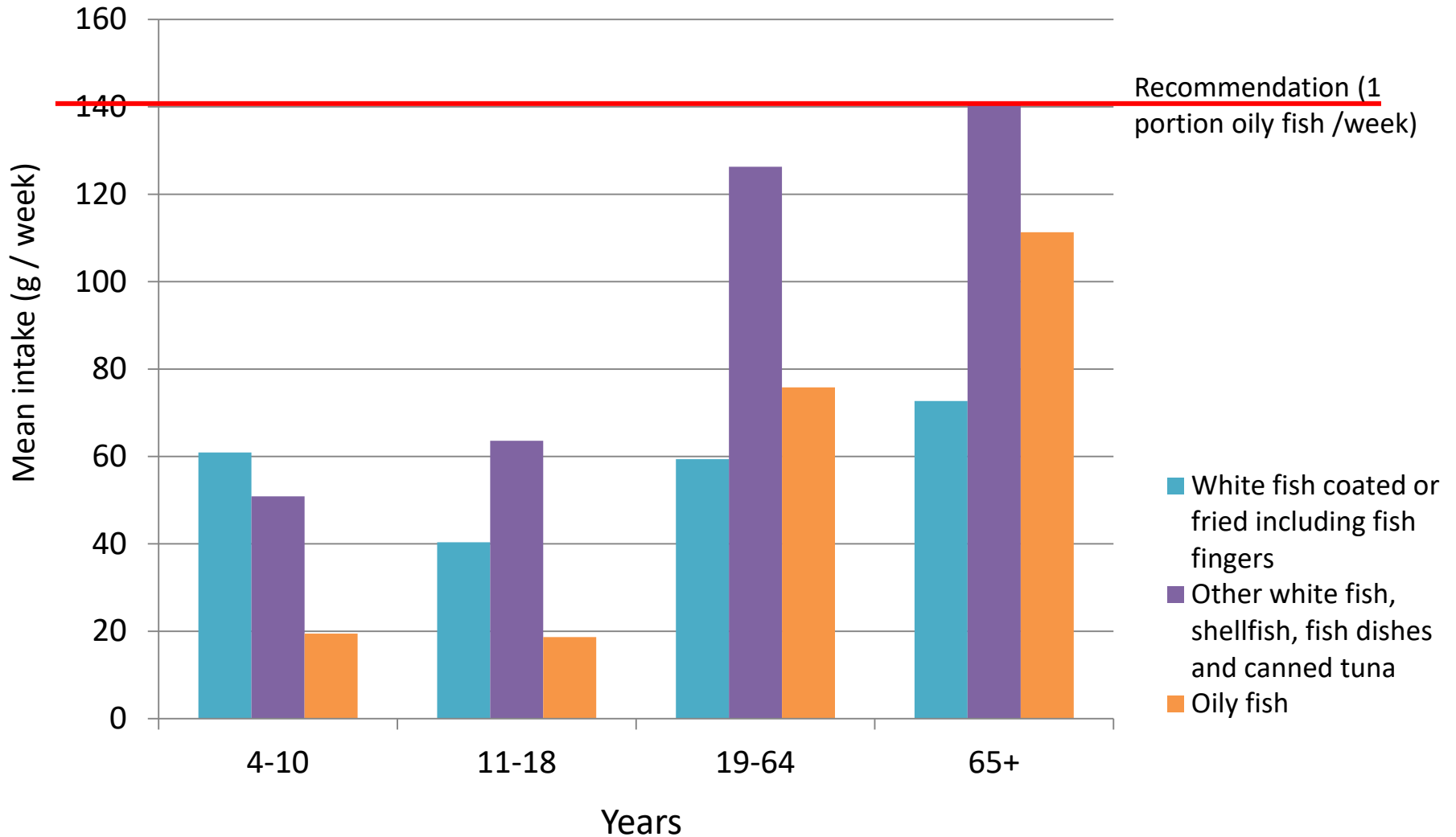
Red vs poultry meat intake



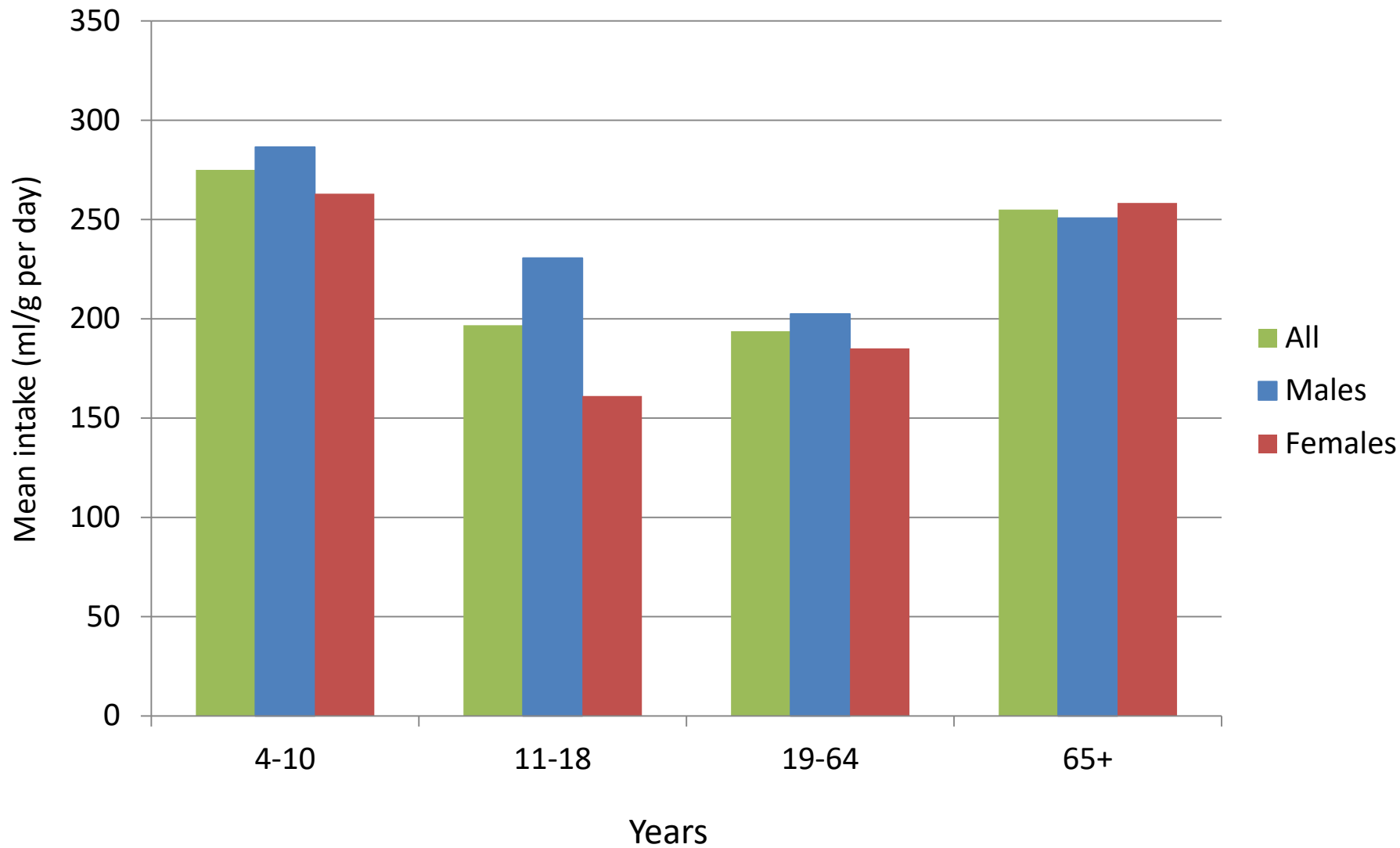
UK Fish intake



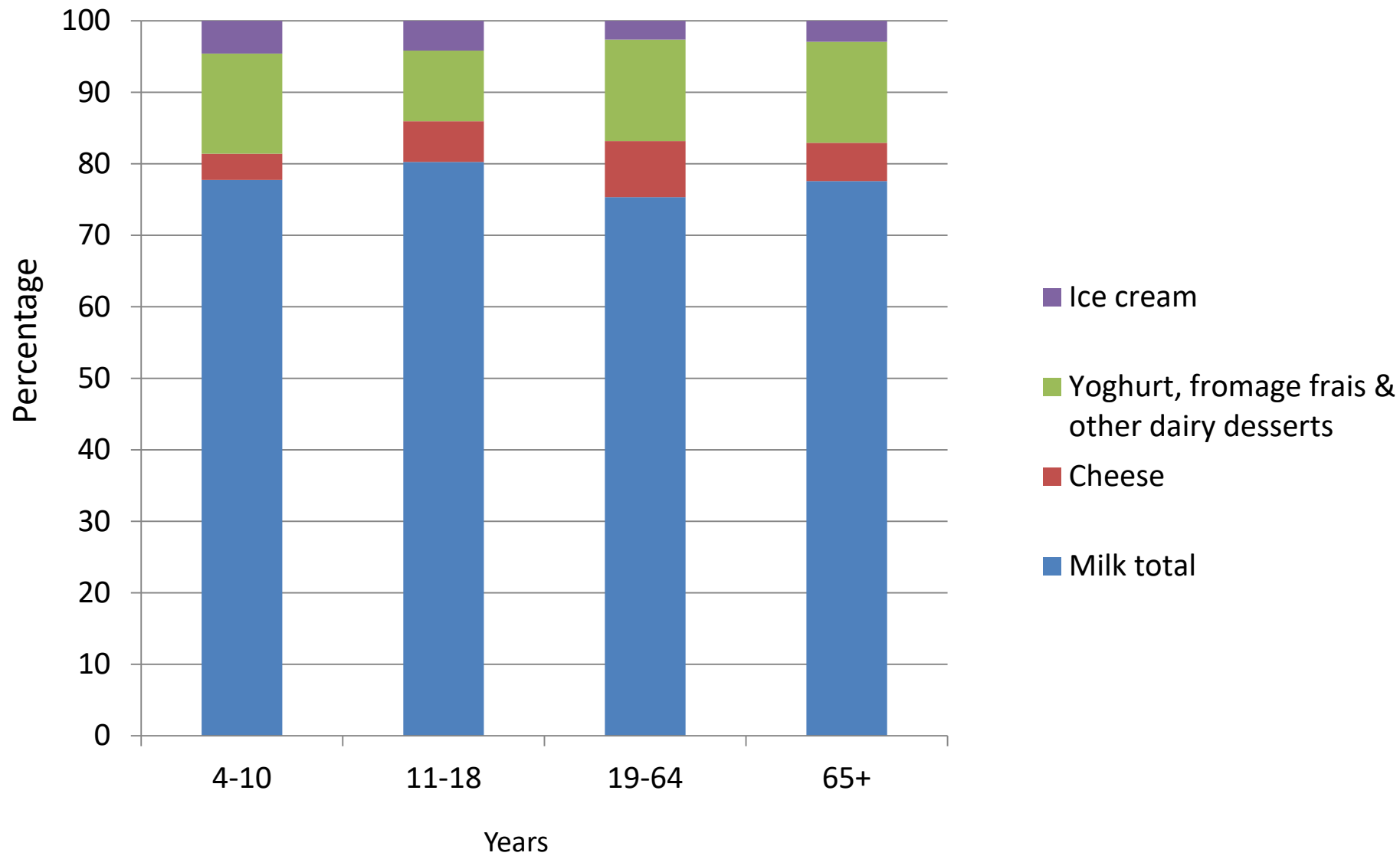
UK Fish intake



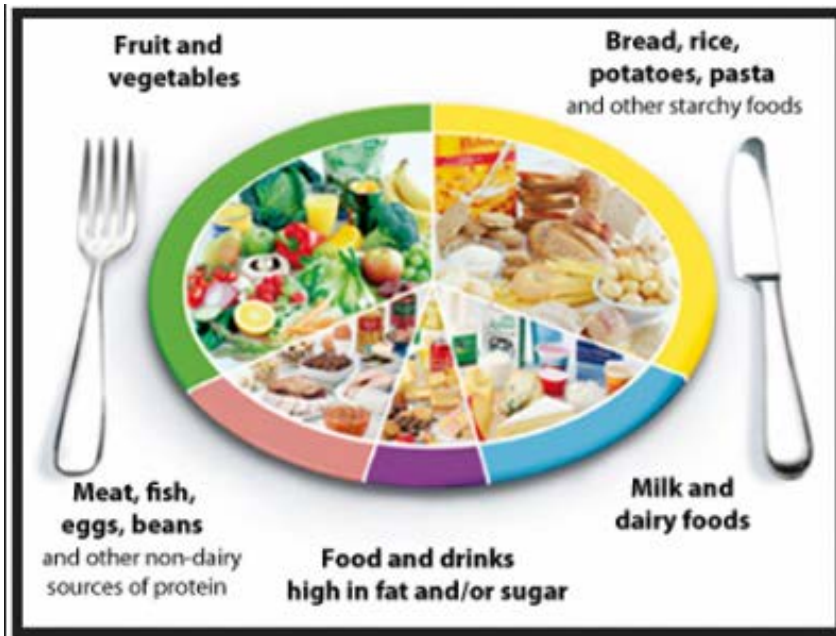
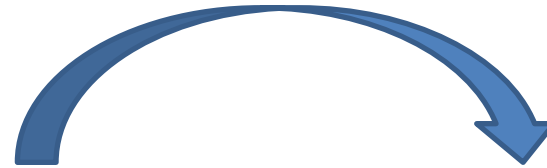
UK milk & dairy product intake



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

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

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Contribution (%) of dairy foods to nutrient intakes in Europe (www.milknutritiousbynature.eu; European Milk Forum)

Nutrients	Austria	Belgium	Denmark	France	Ireland	Netherlands		Norway	UK
Age (years)	18-65	15+	Total	18+	18-64	31-50	51-69	18-70	19-64
Calories	-	11	15	12	9	14	16	18	9
Protein	-	18	27	17	13	23	24	22	13
Total fat	14	14	19	17	12	18	20	26	13
Sat fat	23	-	30	25	19	31	33	42	22
Calcium	53	54	60	46	39	58	62	67	36
Phosphorus	-	-	37	22	-	32	34	-	22
Potassium	-	-	18	10	12	16	15	17	11
Iodine	-	-	37	30	-	16	16	-	33
Zinc	-	-	25	20	-	24	25	30	15
Selenium	-	-	19	9	-	14	14	-	6
Magnesium	-	-	16	10	-	14	15	14	10
Vit A	-	-	13	10	-	21	20	-	14
Vit B2	-	-	45	28	29	42	42	37	28
Vit B12	-	-	37	14	35	40	40	25	33
Vit D	-	-	12	12	9	6	6	16	5

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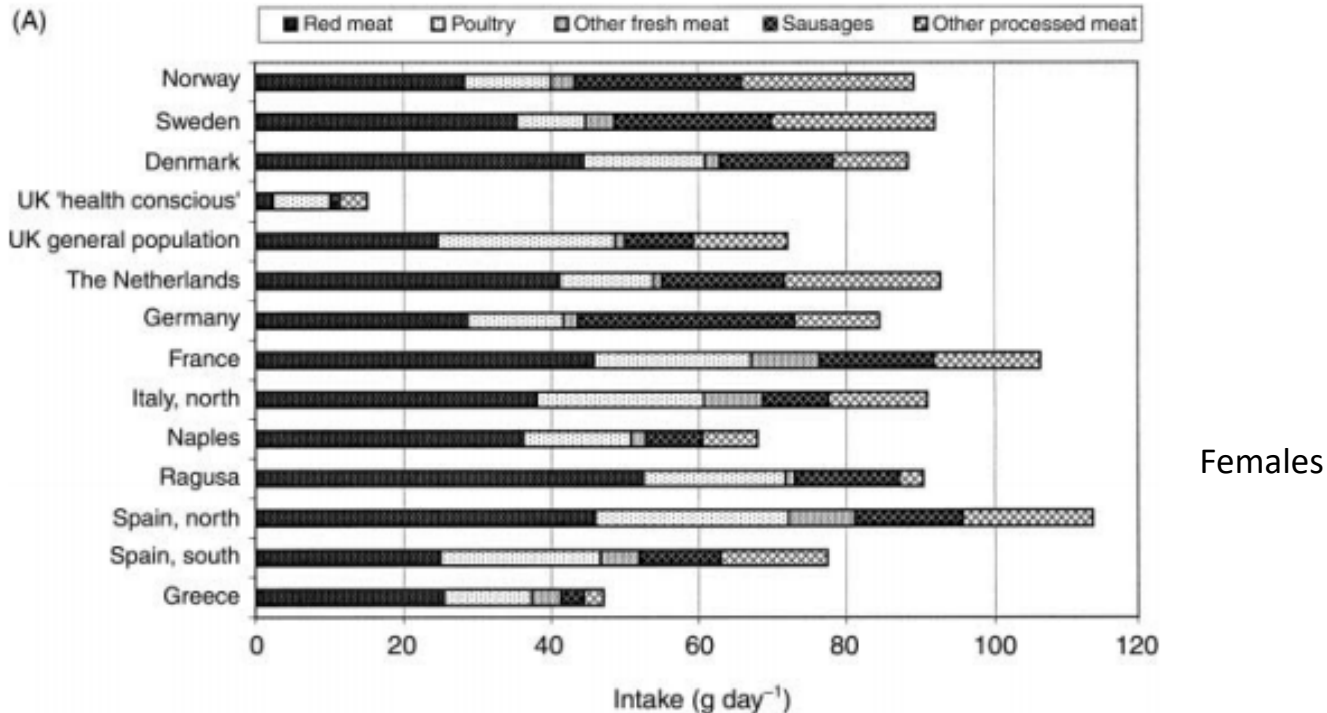
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Contribution (%) of meat & meat products to total energy intakes across Europe (Linseisen et al 2002)

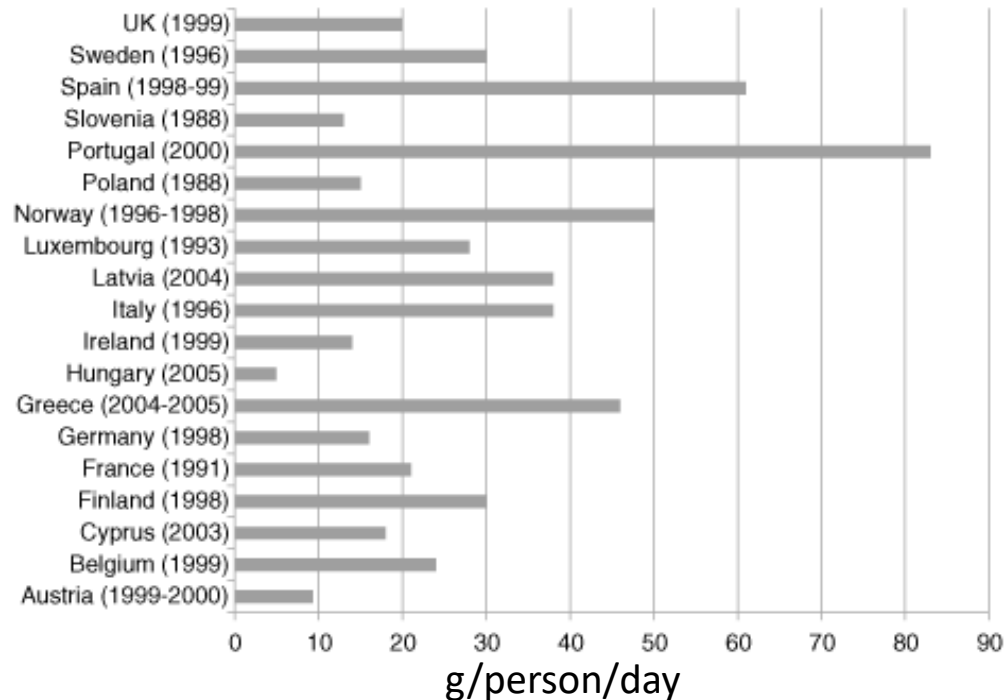
European Investigation into Cancer & Nutrition (EPIC) study



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

Fish (g/day) (Nelson et al. 2007)

Elmadfa et al. 2009



Mean availability of fish and seafood for European countries (g/person/day).

- Highest: Portugal (83g/person/day)
- Lowest: Hungary (4.8g/person/day)
- Main factors: proximity to sea and cost.

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Challenges for the agri-food industry

- Sustainability
- Safety and traceability
- Quality
- Maximise nutritional quality of foods, e.g.
 - modify fatty acid profile - “SFA while ‘PUFAs’?



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 - ‘ SFA while “ PUFA’s?
 - Bio-fortification
 - maximise vitamins and minerals content
 - Bio-fortification
 - Fortification



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Ulster University, Coleraine campus



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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.

4-weeks

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

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

The D-Light Study: fortification

Weir, Pourshahidi et al. *unpublished*

Aim: to investigate the effects of vitamin D3-fortified milk and supplemental vitamin D3 on vitamin D status and functional health outcomes during the winter.



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52 (26M; 26F) healthy volunteers

Baseline: Blood sample - Vitamin D status & inflammation, Body composition; Blood pressure; Randomly assigned to treatment.

24-weeks

n=13
Vitamin D3
10 μ g + 10 μ g



n=13
Vitamin D3
10 μ g + 0 μ g



n=13
Vitamin D3
0 μ g + 10 μ g



n=13
Vitamin D3
0 μ g + 0 μ g



Post-intervention: Blood sample - Vitamin D status & inflammation, Body composition; Blood pressure

500ml milk/day

Findings

Weir, Pourshahidi et al. *unpublished*

- Preliminary results indicate the potential for a Vitamin D fortified milk to maintain Vitamin D status throughout the winter period

Conclusions

Purchasing trends:

- Little change: all meat, cheese
- ↓: all fish, all dairy, red meat, milk
- ↑: eggs, poultry, processed meats, salmon, yoghurt

Currently animal products make a significant contribution to UK and European dietary intake of a range of nutrients

Comparison with UK current dietary **recommendations** indicates:

- ↓ fish intake
- ↑ red and processed meat intake

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



Acknowledgments



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