

ADVISORY COMMITTEE ON ANIMAL FEEDINGSTUFFS

42nd Meeting of ACAF on 3 June 2008

Presentation to the Committee

**LIPGENE PROJECT – CURRENT INTAKES OF EPA AND
DHA POTENTIAL OF ANIMAL-DERIVED FOODS TO
INCREASE INTAKE**

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CURRENT INTAKES OF EPA AND DHA AND POTENTIAL OF ANIMAL-DERIVED FOODS TO INCREASE INTAKE

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Animal Sciences Research Group**

Overview

- Long chain n-3 fatty acids: the need?
- Current recommended daily intakes of EPA/DHA
- Current estimates of daily intake of EPA/DHA
- Approaches for increasing intake including enrichment of:
 - Milk
 - Meat
 - Eggs
- Conclusions

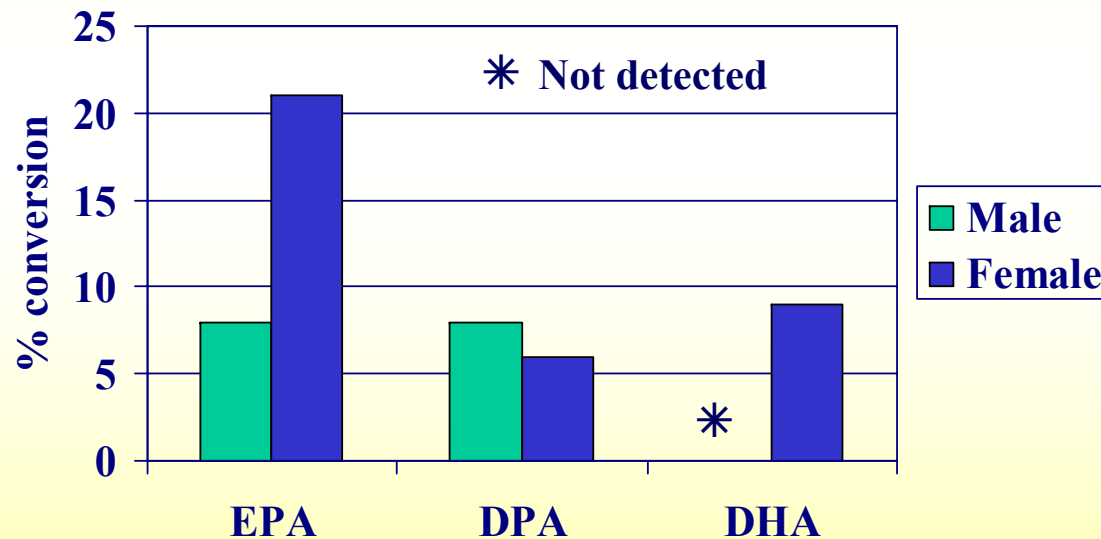
Long chain n-3 fatty acids: the need?

Conversion of α -linolenic acid to EPA and DHA

(Burdge et al., 2002; Burdge & Wootton, 2002)

Stable isotope tracer studies, [^{13}C] α -LNA

Conversion of LNA to long chain PUFA in
plasma NEFA, TAG, CE and PC



Wang *et al.*, 2006
n-3 Fatty acids from fish or
fish-oil supplements, *but*
not α -linolenic acid,
benefit cardiovascular
disease outcomes in
primary- and secondary-
prevention studies: a
systematic review.
Am J Clin Nutr.84(1):5-17.

**Current recommended daily
intakes of EPA + DHA**

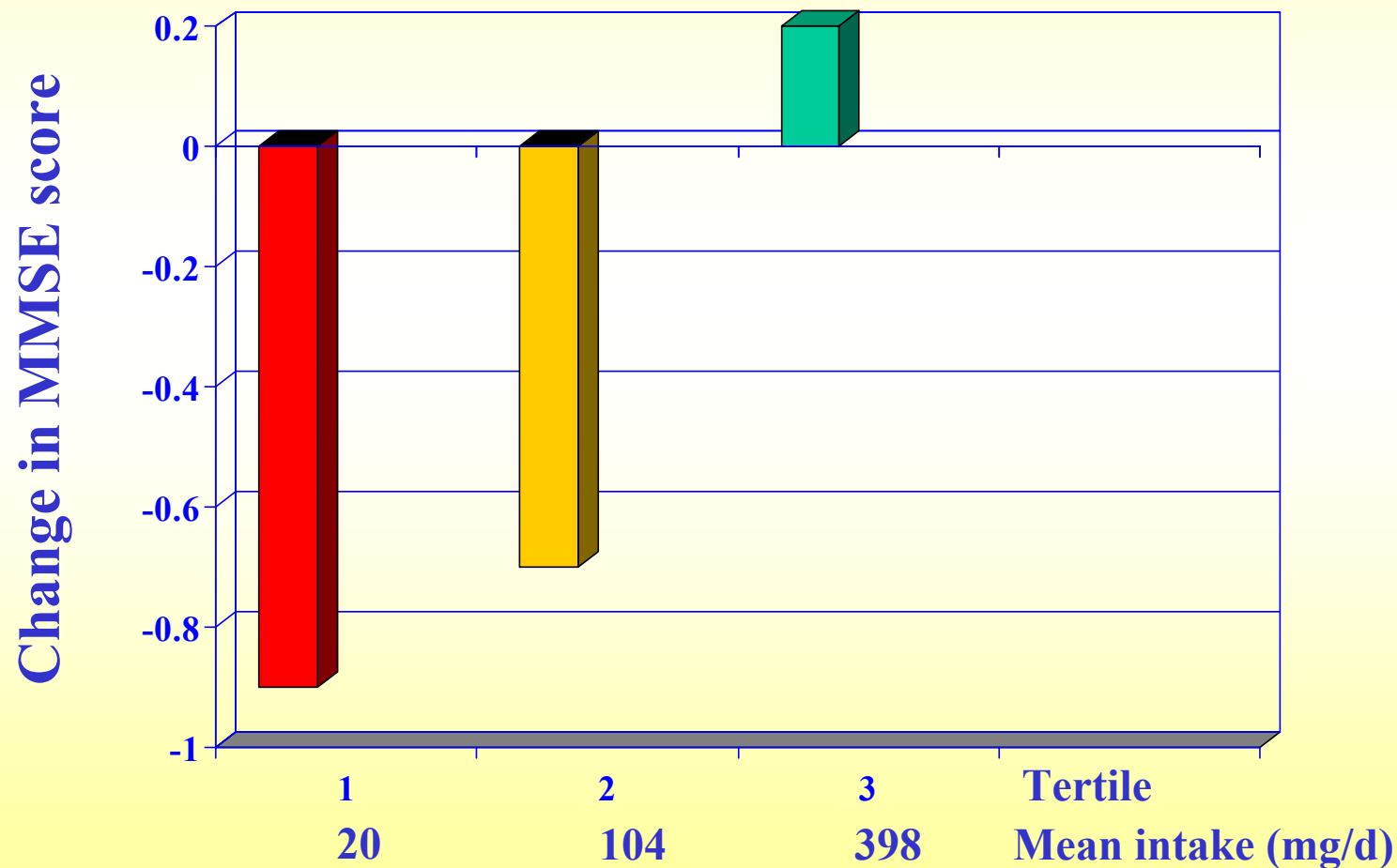
Recommended daily intake of EPA + DHA

Country	RDI (mg/d)	Reference
UK	200	DoH (1994)
UK	450	SACN/COT (2004)
Various	500	WHO/FAO (2003)
Various	500	ISSFAL (2004)
USA	270*	Inst of Med (2005)
Belgium	680*	BHCouncil (2007)

* Calculated from % EI

5 year change in cognitive function in 210 elderly men relative to EPA+DHA intake

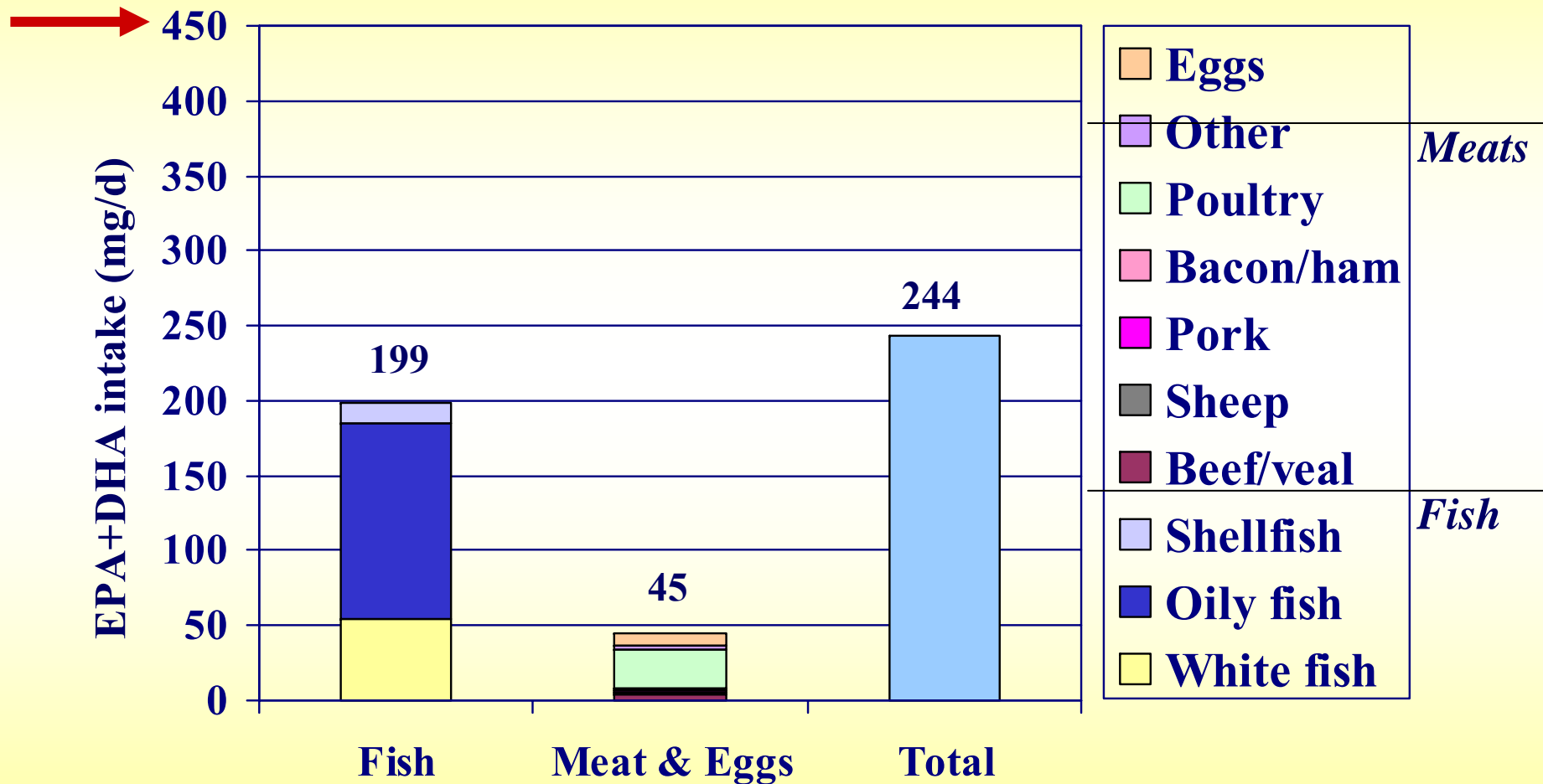
(van Gelder et al., 2007)



Current estimates of daily intake

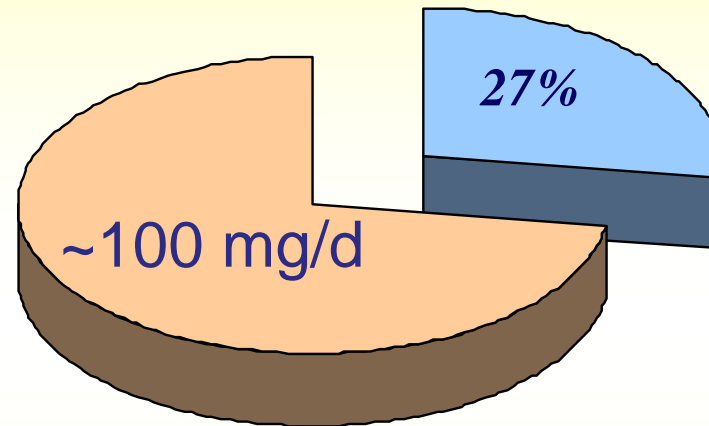
EPA+DHA Intake in UK Adults

(Givens & Gibbs, 2006)



Consumption of oily fish by UK adults

(SACN, 2004)



Consumers

Non-consumers

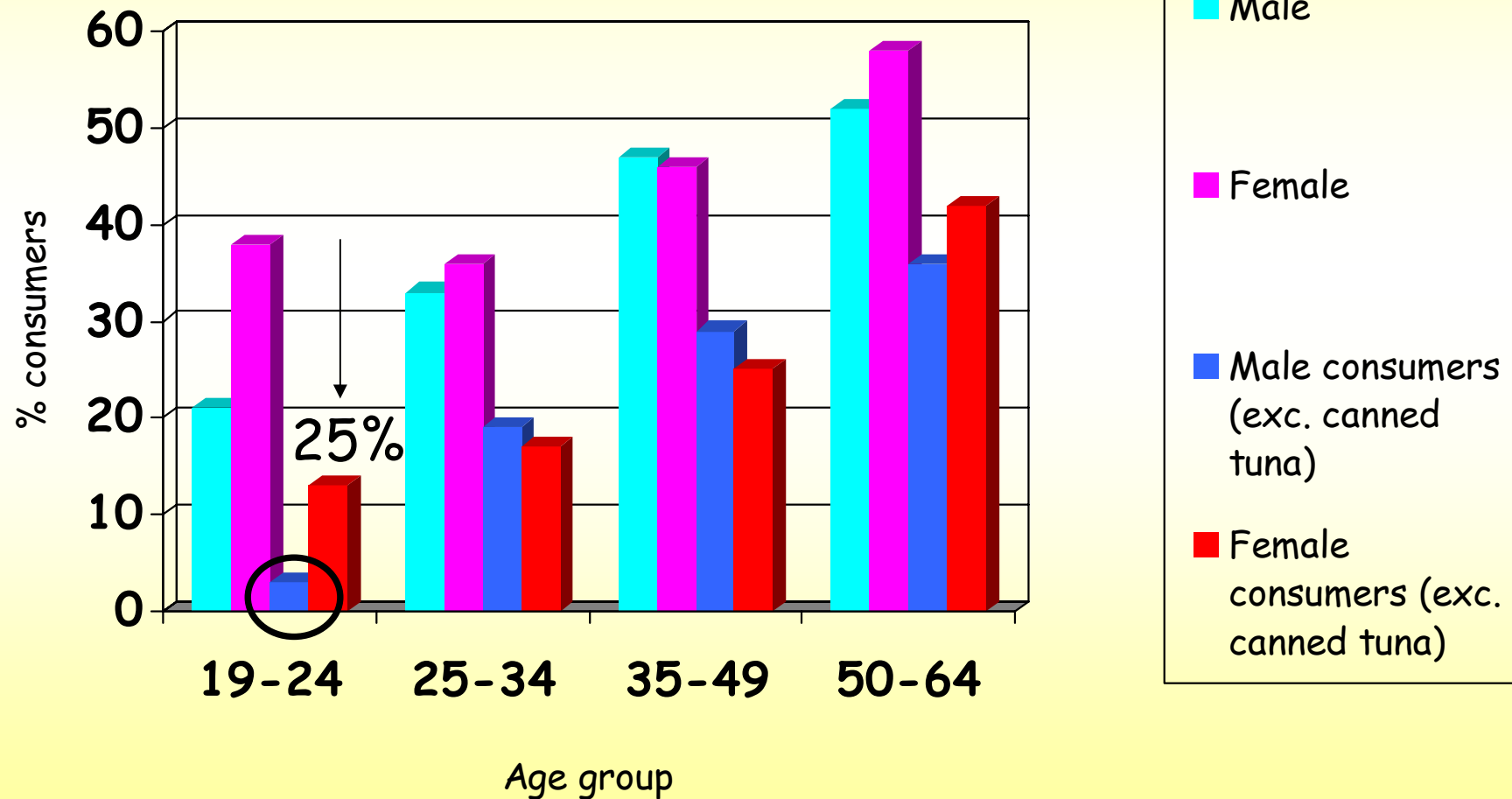


Consumption of Oily Fish: the 'age effect'

(derived from NDNS, 2002)

(Gibbs *et al.*, Unpub.)

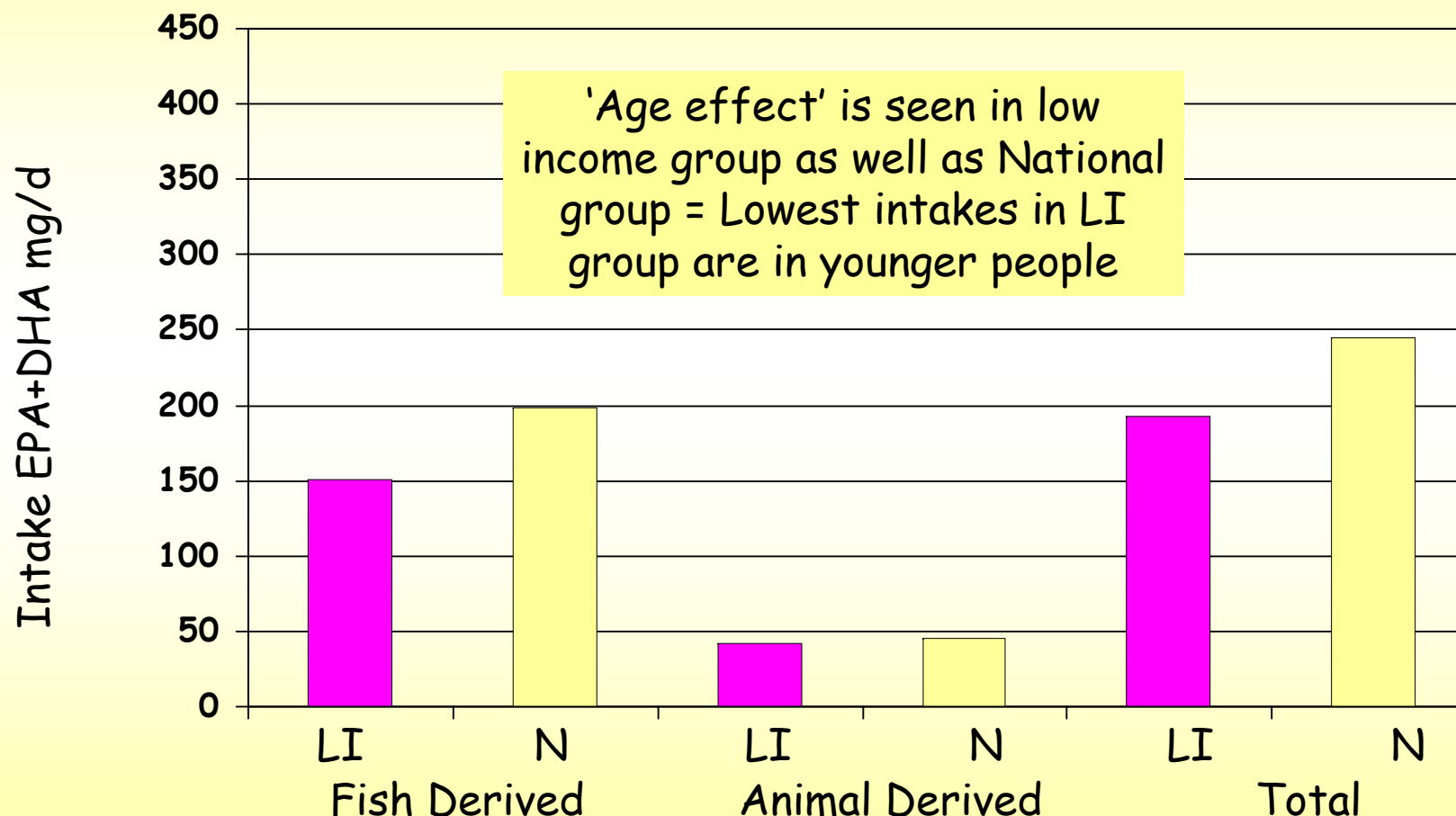
➡ Canned tuna not classed as an oily fish



Low income (LI) vs. National (N)

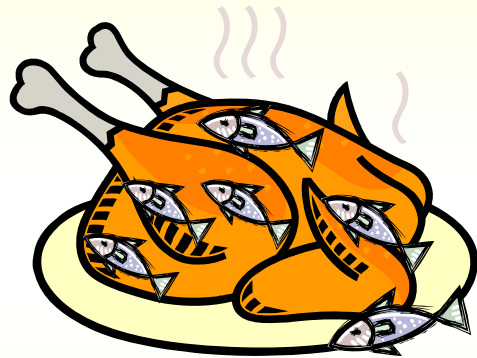
(Gibbs *et al.*, Unpub)

Based on 'Low Income Diet and Nutrition Survey' (Nelson *et al.*, 2007)



Approaches for increasing intake of EPA/DHA

Enrichment of animal-derived foods



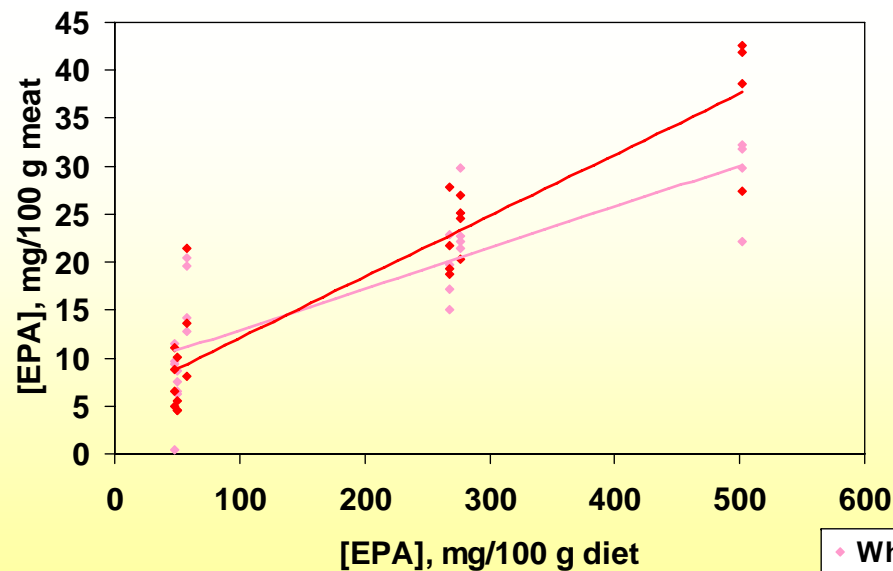
Have to be:

- Consumed by a large proportion of the population
- Consumed in relatively large quantities
- Amenable to enrichment

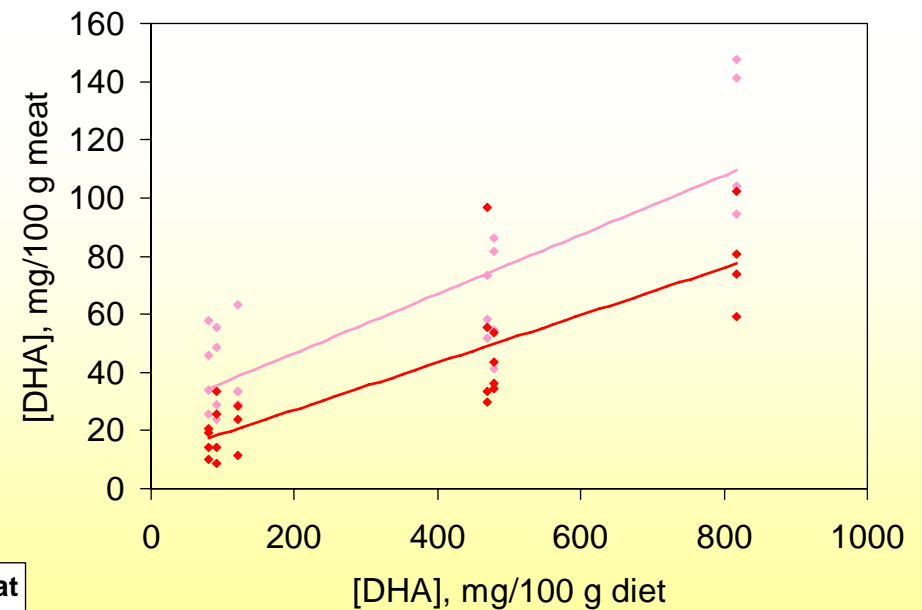
Enrichment of poultry meat with fish oil



- Responsive to dietary EPA and DHA
- LC n-3 PUFA accumulate in membrane phospholipids
- Relatively more abundant in white meat
- Our target is 300 mg EPA+DHA/200 g portion of meat



EPA



DHA

St Ivel advance

Contains at least
20x
more Omega 3
(EPA and DHA)
than standard milk

Contains more long chain Omega 3*
(EPA & DHA) than any other whole
or semi-skimmed milk

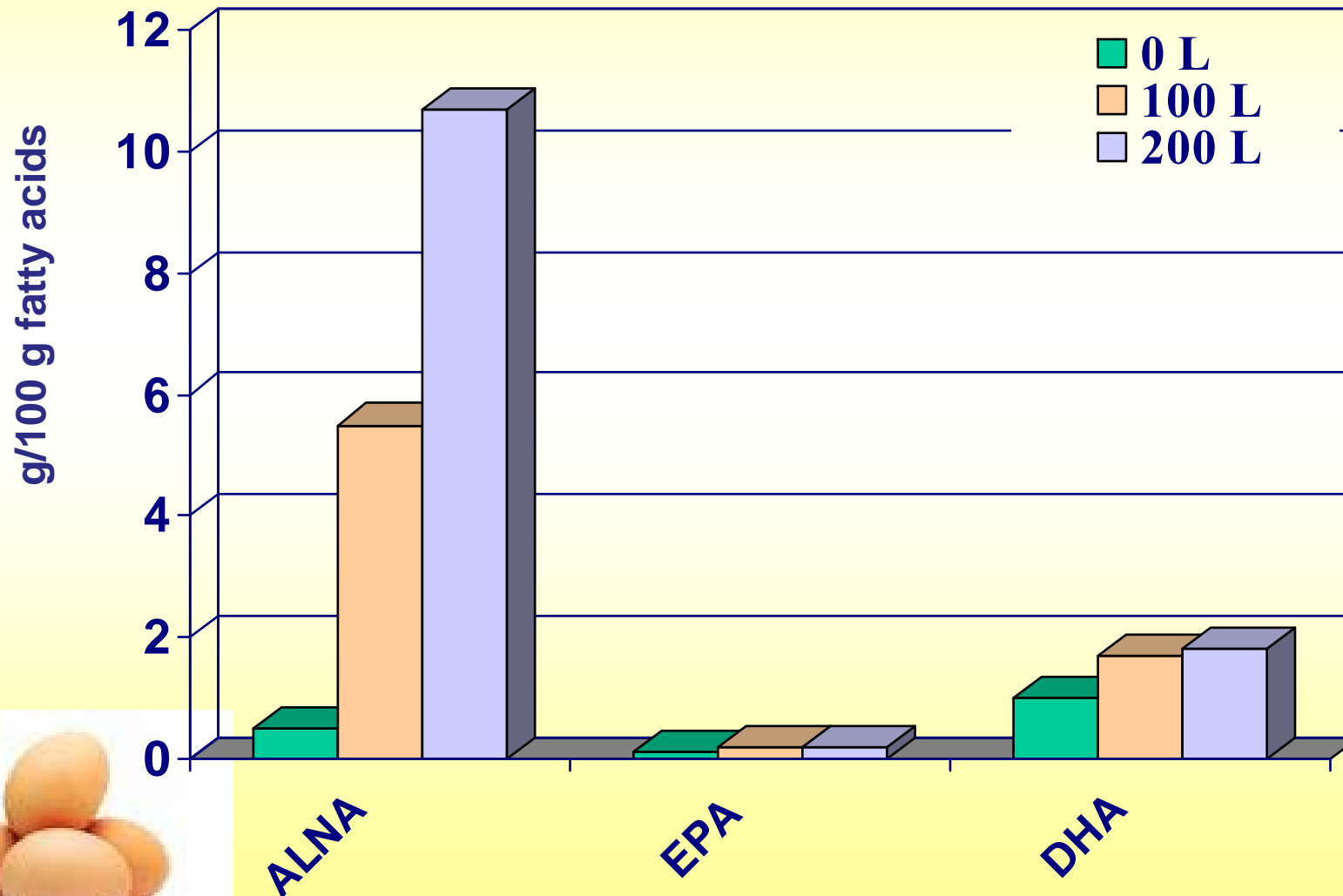
*mg/250ml serving typical amount

Whole Milk	Semi-skimmed Milk
5mg Standard milk	2mg Standard milk
12mg Organic milk	4mg Organic milk
St. Ivel advance® 113mg	St. Ivel advance® 63mg

**Fish oil
emulsion added
during
processing**

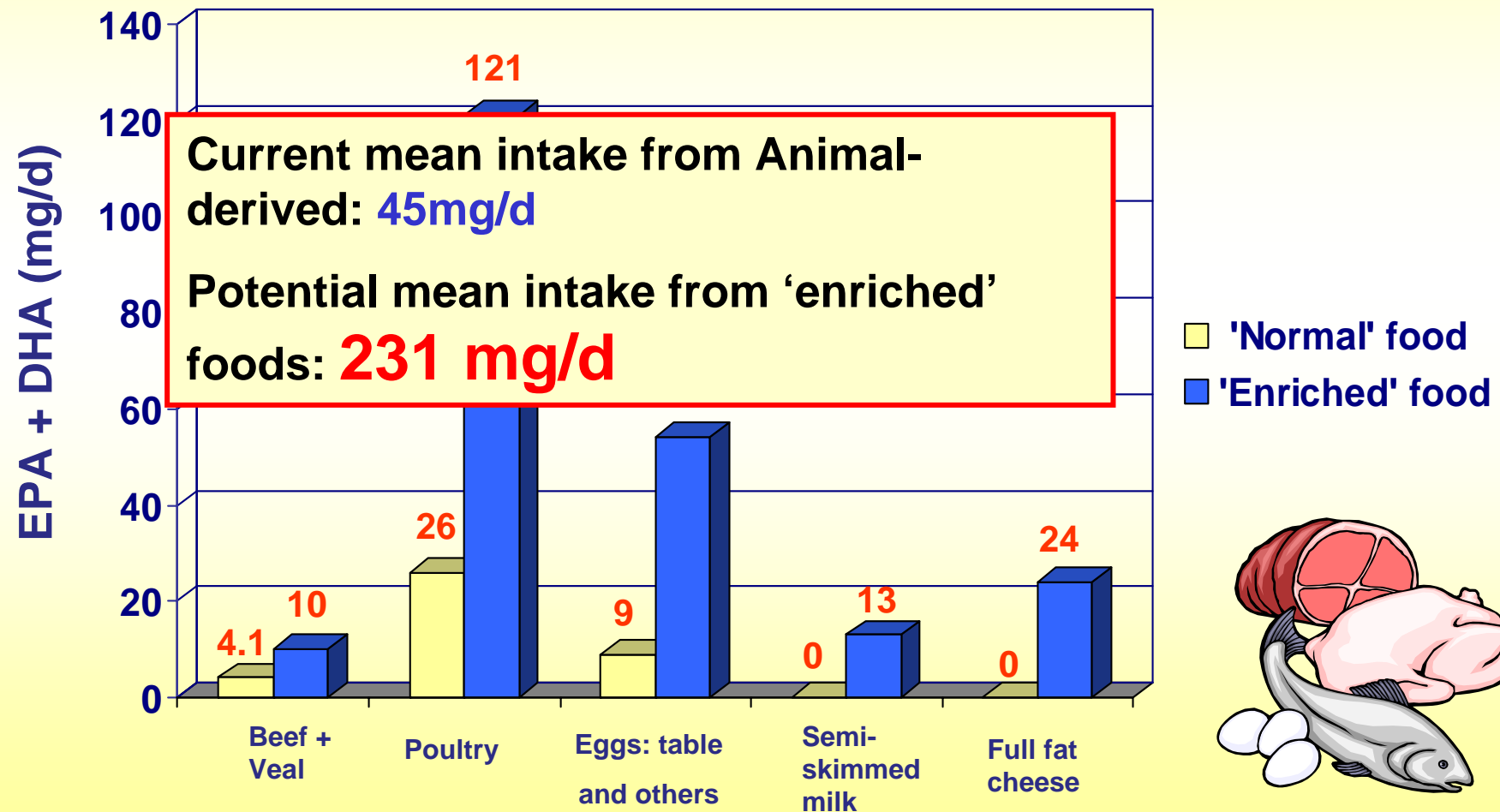
Effect of three levels of linseed in diet of laying hens on fatty acids in egg yolk

(Ferrier et al., 1995)



UK EPA and DHA intakes - normal and enriched animal-derived foods

(Givens & Gibbs, 2006)



Future alternatives to fish oil

- SDA (C18:4 n-3) rich oilseeds?
- Industrial micro-algae production?
- GM plants using cloned algal genes to express EPA/DHA in seed oils?



Conclusions

- EPA/DHA should probably be regarded as dietary essential.
- Estimates of EPA/DHA intake are variable and highly dependant on diet survey and compositional data. Can they be improved?
- EPA/DHA intake sub-optimal for many EU groups, especially the young and lower income sectors
- For many, intakes of EPA/DHA from animal-derived foods may be crucial and these foods (esp. poultry meat) have the potential for worthwhile enrichment and would increase intake very substantially.
- It seems highly likely that alternative sources to fish oils will be needed.
- Big changes in the Agro-Food industry needed to put this research into practice

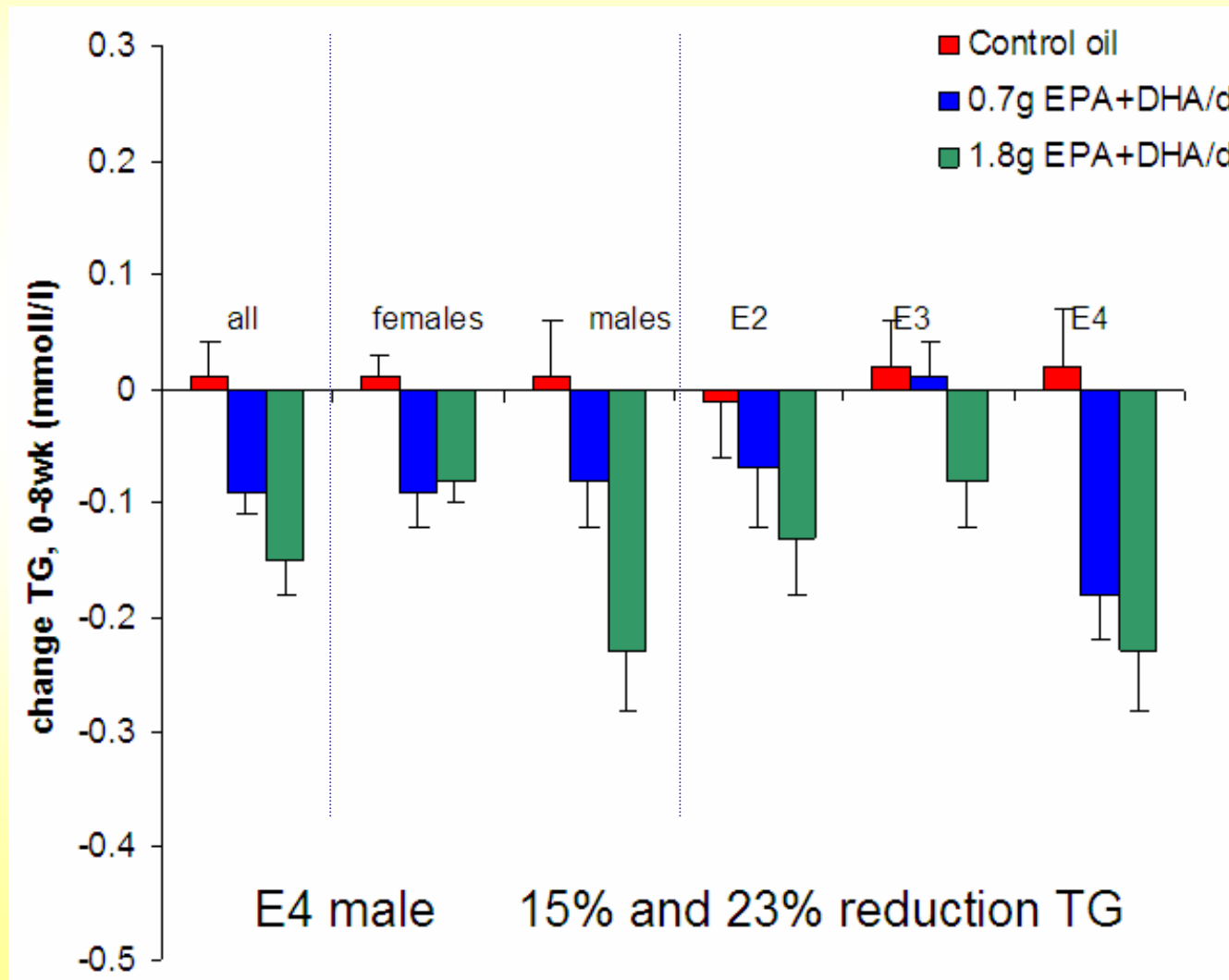
**.....but finally we must
remember that we are not all
equal....**



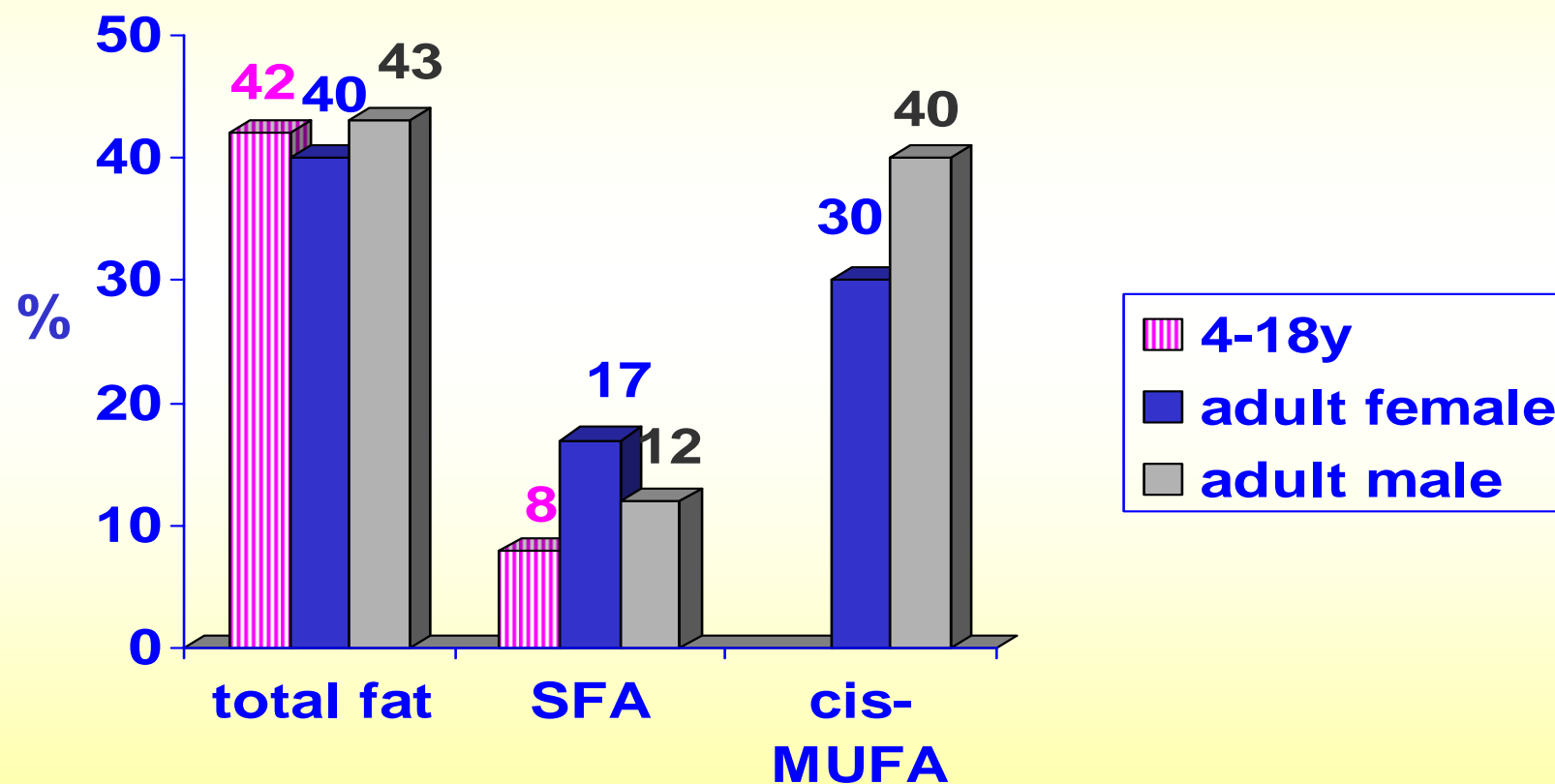
TG lowering was dependant on gender and apoE genotype



(Minihane *et al.*, unpublished)



% UK adults and children meeting current recommendations (NDNS, 2002)



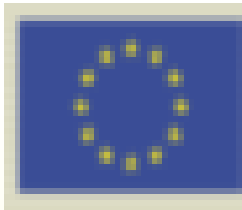
Targets

< 35% EI

<11% EI

13% EI

THANK YOU



Lipgene

Colleagues

Dr Caroline Rymer

Dr Anne Marie Minihane

Miss Rachael Gibbs