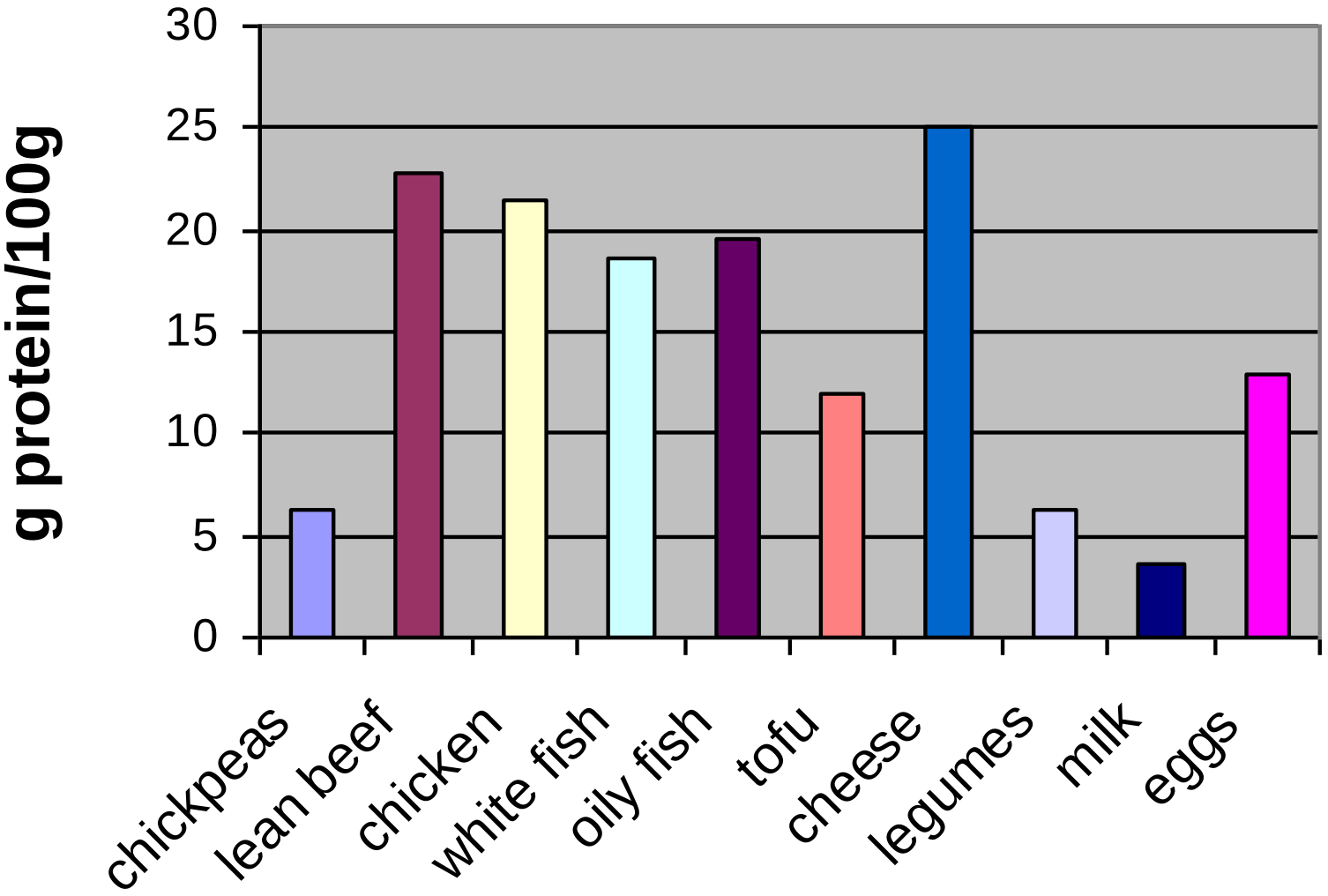
Dietary protein in nutrition and health

Indonesian International Institute of Life Sciences - 4th March 2016

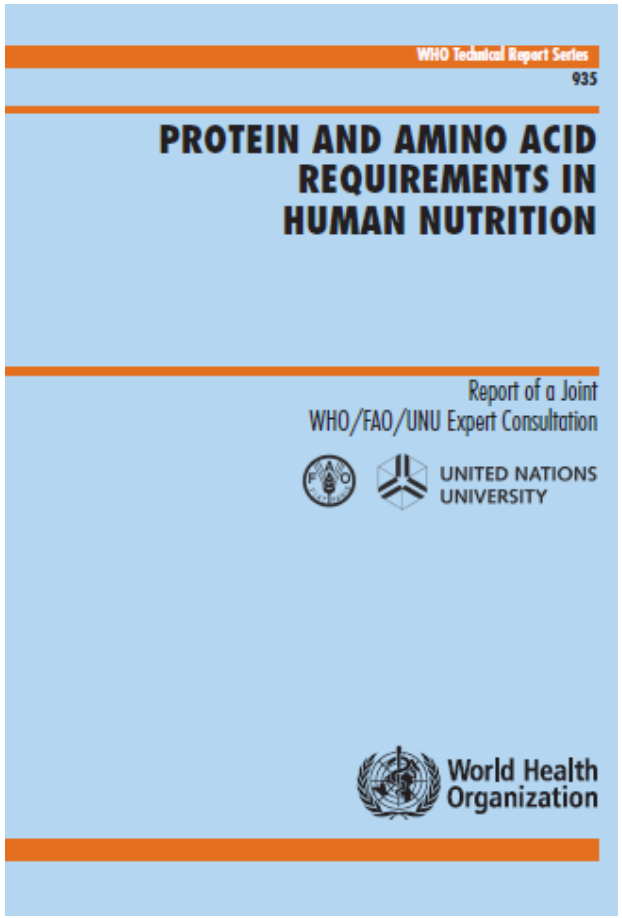
Manny Noakes Director, Nutrition and Health Program

FOOD AND NUTRITION FLAGSHIP
www.csiro.au

High Protein Foods



WHO Report 2007



- determining food and nutrition adequacy of population food intakes;
- setting of national food and nutrition guidelines;
- determining nutrient needs, and evaluating adequacy of rations for vulnerable groups
- providing information to manufacturers of infant formula and processed complementary foods,
- mapping and monitoring food shortages and undernutrition in developing countries and globally,

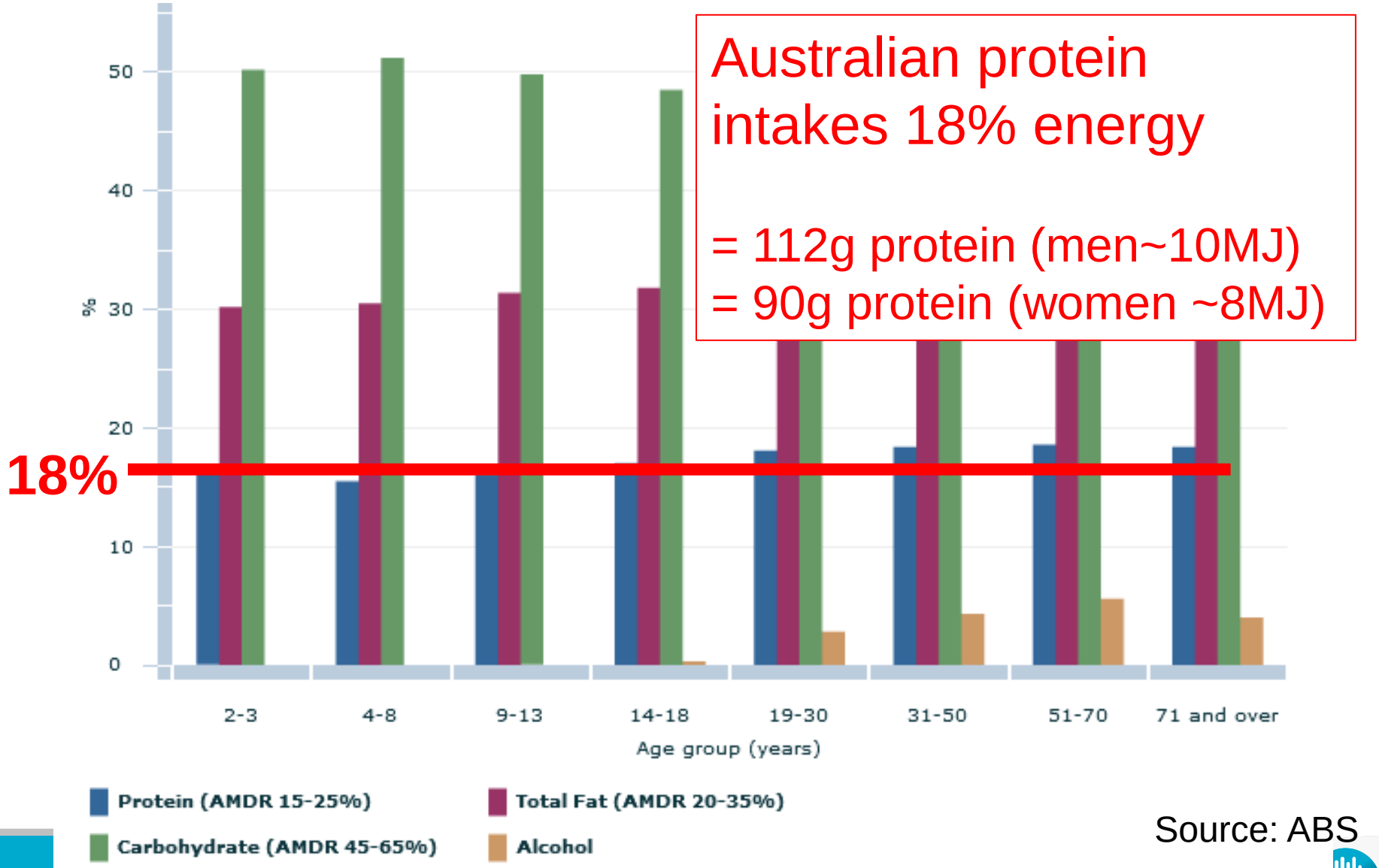
Nutrient Reference Values for Protein – are they sufficient?

RDI Women
46 g/d(19-70 y)
58g /d(>70 y)

RDI Men
64 g/d (19-70 y)
80 g/d (>70 y)

- Assumes lean mass is adequate which is unlikely in sedentary populations
- Assumes reference body weights ie 56kg for women and 75kg for men.
- Protein for nitrogen balance alone may not meet functional benefits of protein such as appetite regulation
- Recent studies suggest values of **0.93 and 1.2 g protein/kg/day** *(Elango et al 2010)*

Protein Intakes in Australia



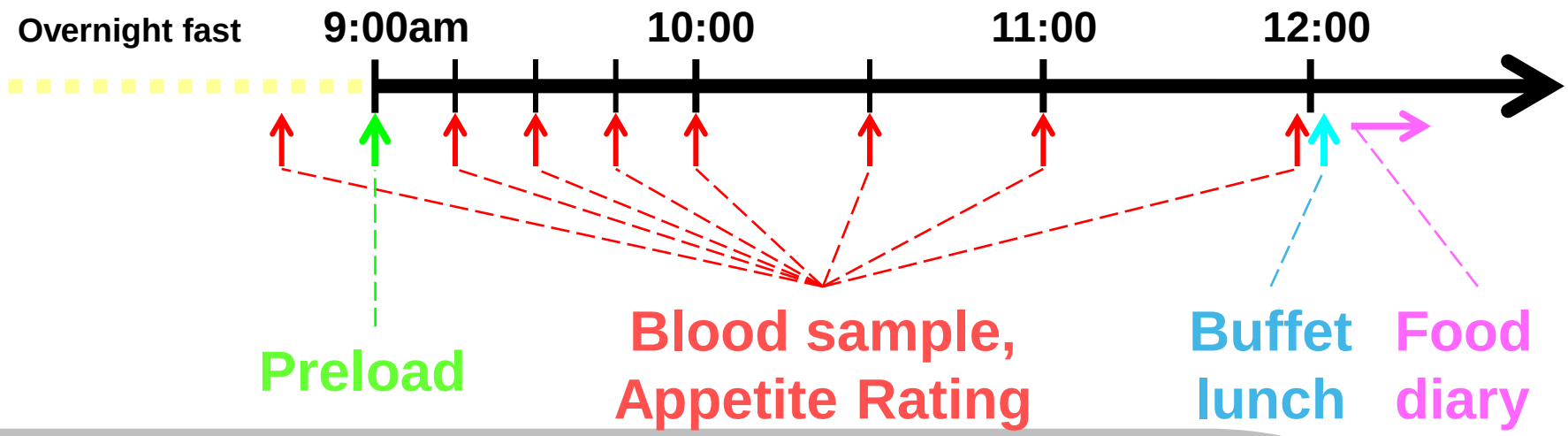
Source: ABS

Protein and Appetite Studies

38 obese men (Age: 53 ± 2y, BMI: 32 ± 1kg/m^2)

Fasting glucose: 6.3 ± 0.1mmol/L

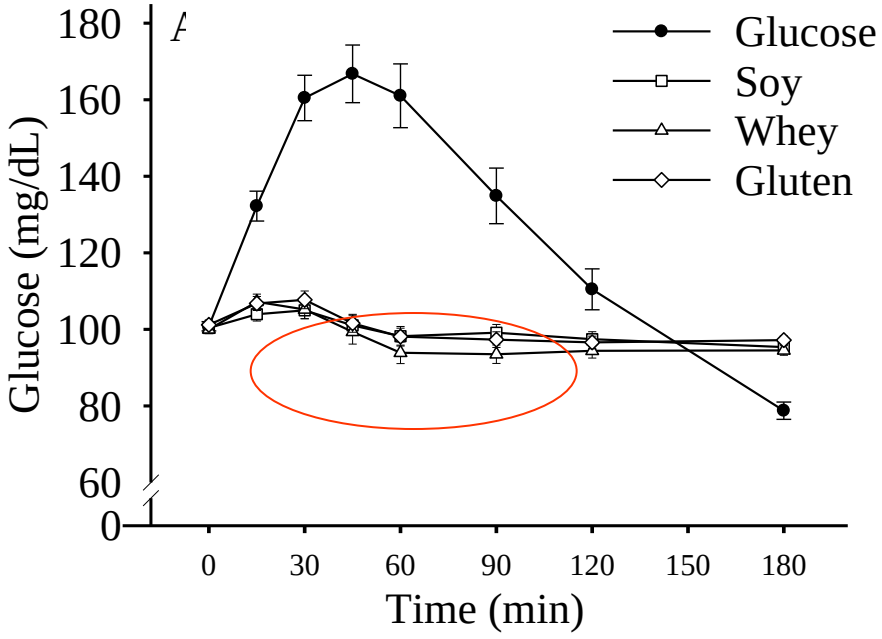
Bowen et al JCEM (2006)



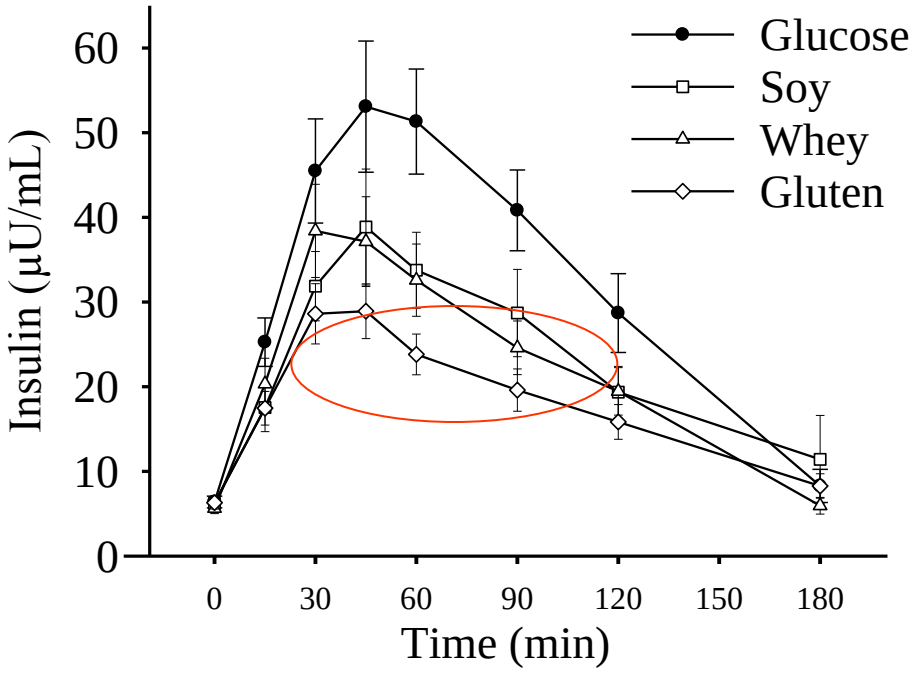
Protein vs glucose-insulin & glucose responses

50g in liquid preload

Bowen et al (2006)

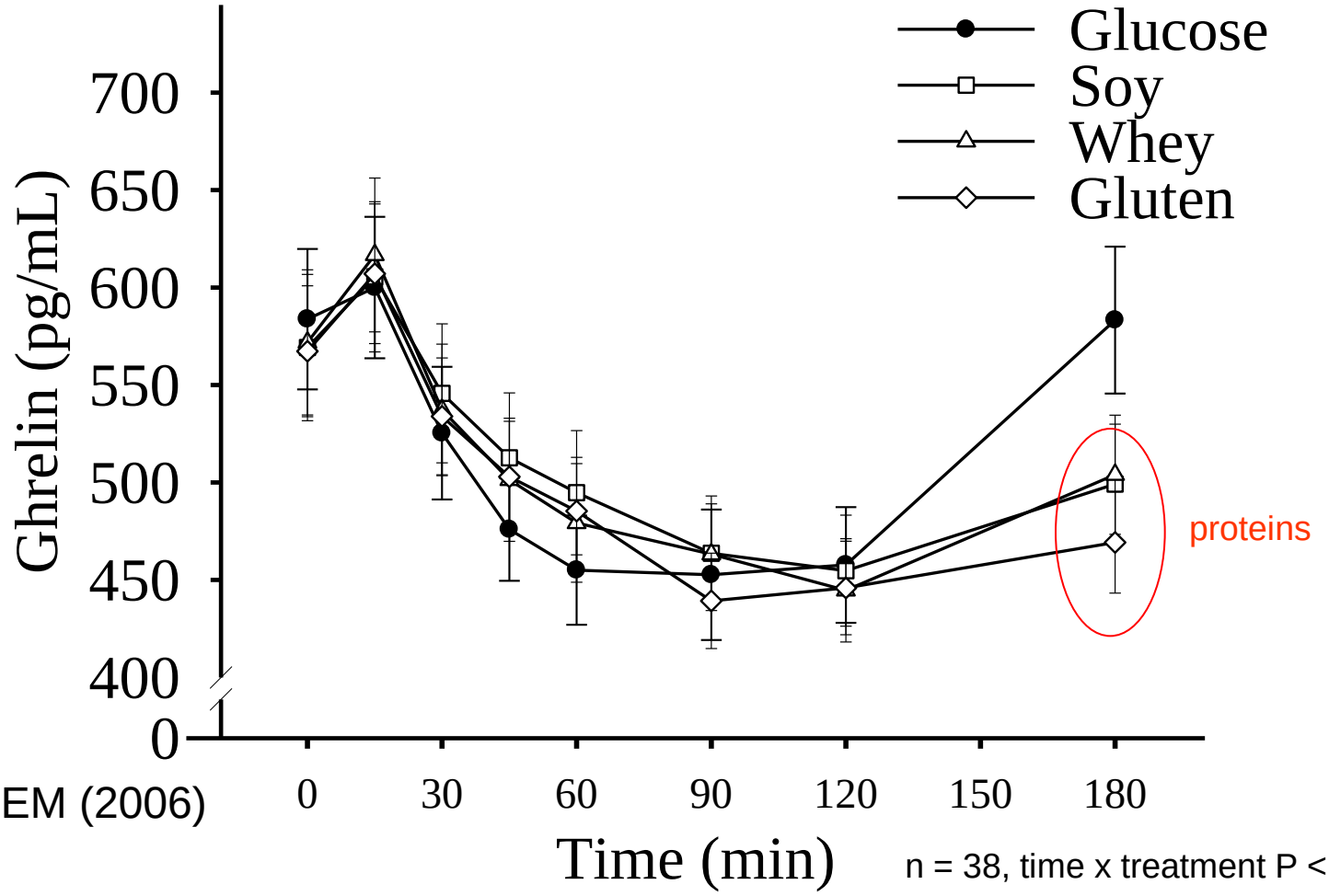


n = 38, time x treatment P < 0.0001



n = 38, time x treatment P < 0.001

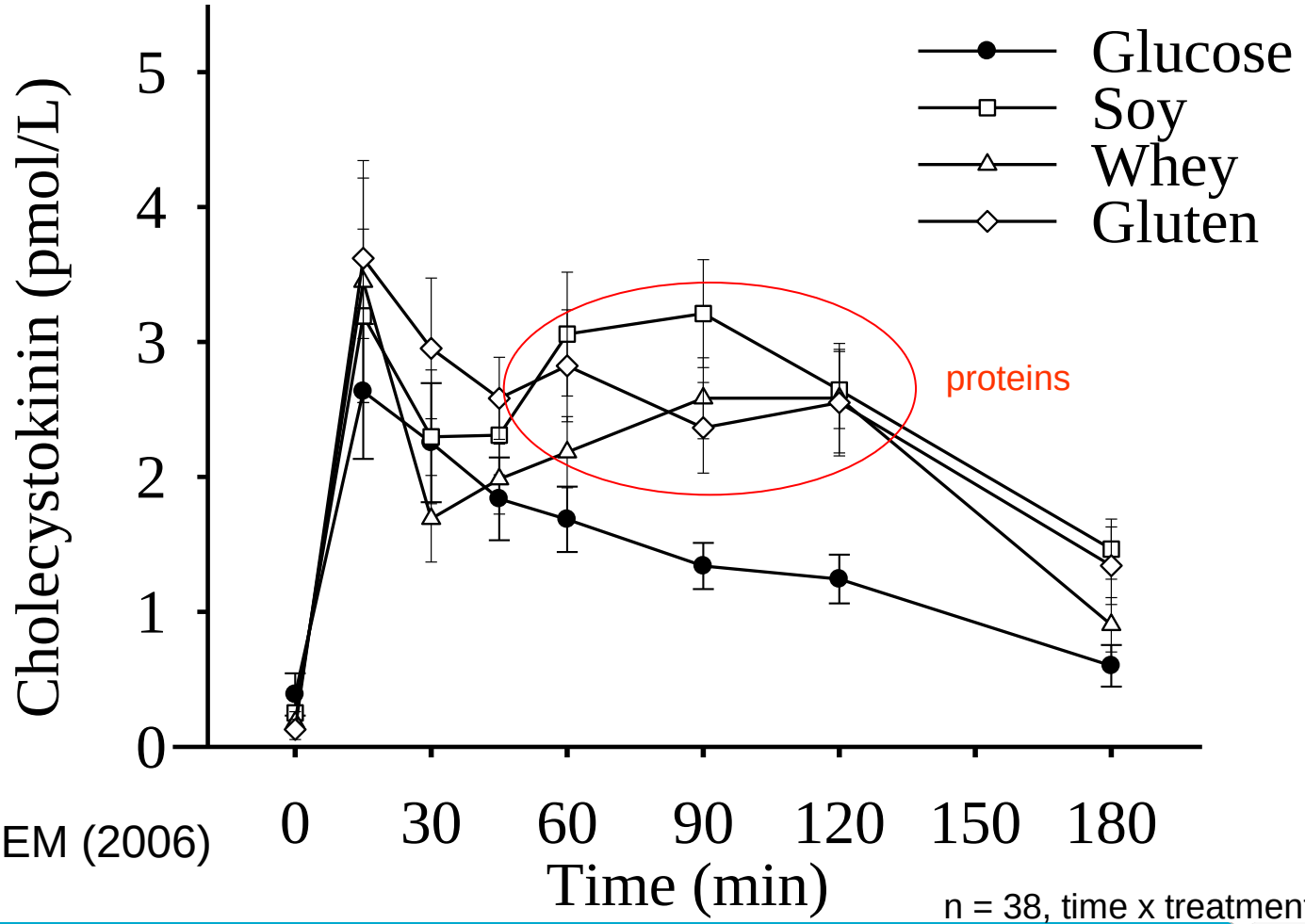
Proteins vs glucose-Ghrelin response



Bowen et al JCEM (2006)

n = 38, time x treatment P < 0.001

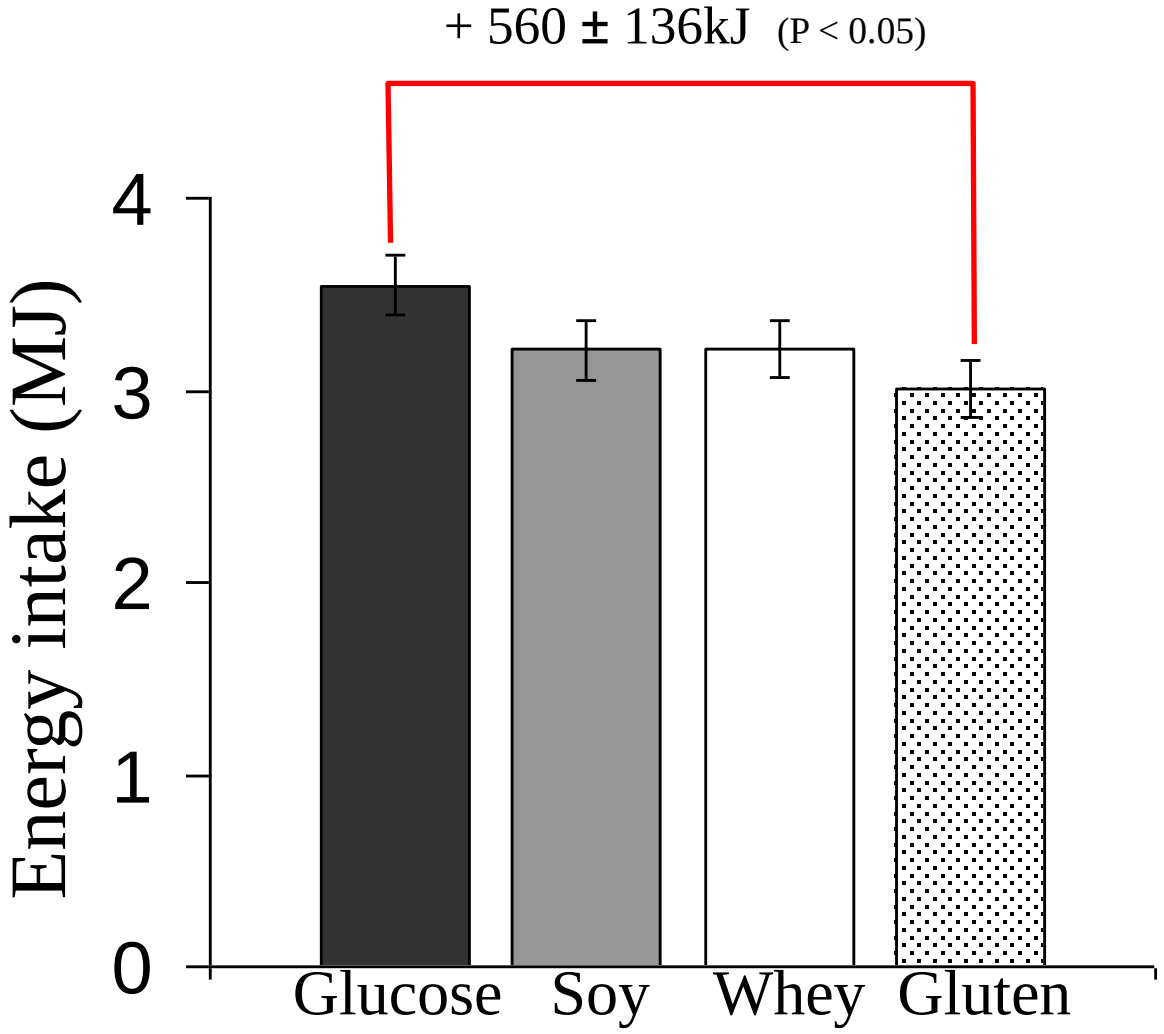
Cholecystokinin After Glucose Or Protein



Bowen et al JCEM (2006)

n = 38, time x treatment P < 0.05

Energy Intake After Glucose Or Proteins

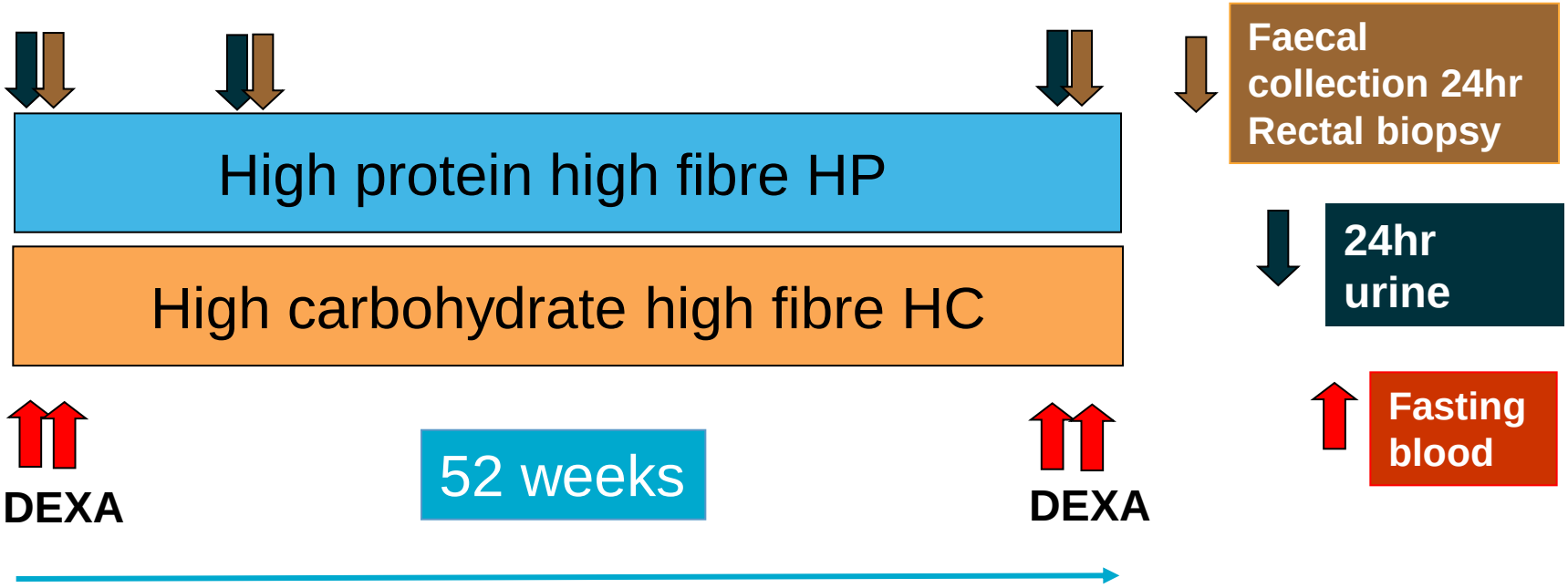


Bowen et al JCEM (2006)

High Protein Diet - efficacy and safety

– Aim: To assess body composition, bowel, renal and bone health markers during weight loss on 2 dietary patterns during weight loss in 120 abdominally overweight/obese *men* over 1 year.

– Design: Randomised parallel design



Metabolic Outcomes

Waist Circumference	↓ -11%	-11.9 cm
Glucose	↓ -3%	-0.2 mmol.L^{-1}
Insulin	↓ -38%	-3.8 mU.L^{-1}
C-reactive protein	↓ -29%	-0.7 mmol.L^{-1}
Total-Cholesterol	↓ -7%	-0.4 mmol.L^{-1}
HDL-Cholesterol	↑ +8%	-0.1 mmol.L^{-1}
LDL-Cholesterol	↓ -9%	-0.3 mmol.L^{-1}
Triglycerides	↓ -24%	-0.4 mmol.L^{-1}
Blood Pressure [sys/dia]	↓ -7/12%	-10/-10 mmHg

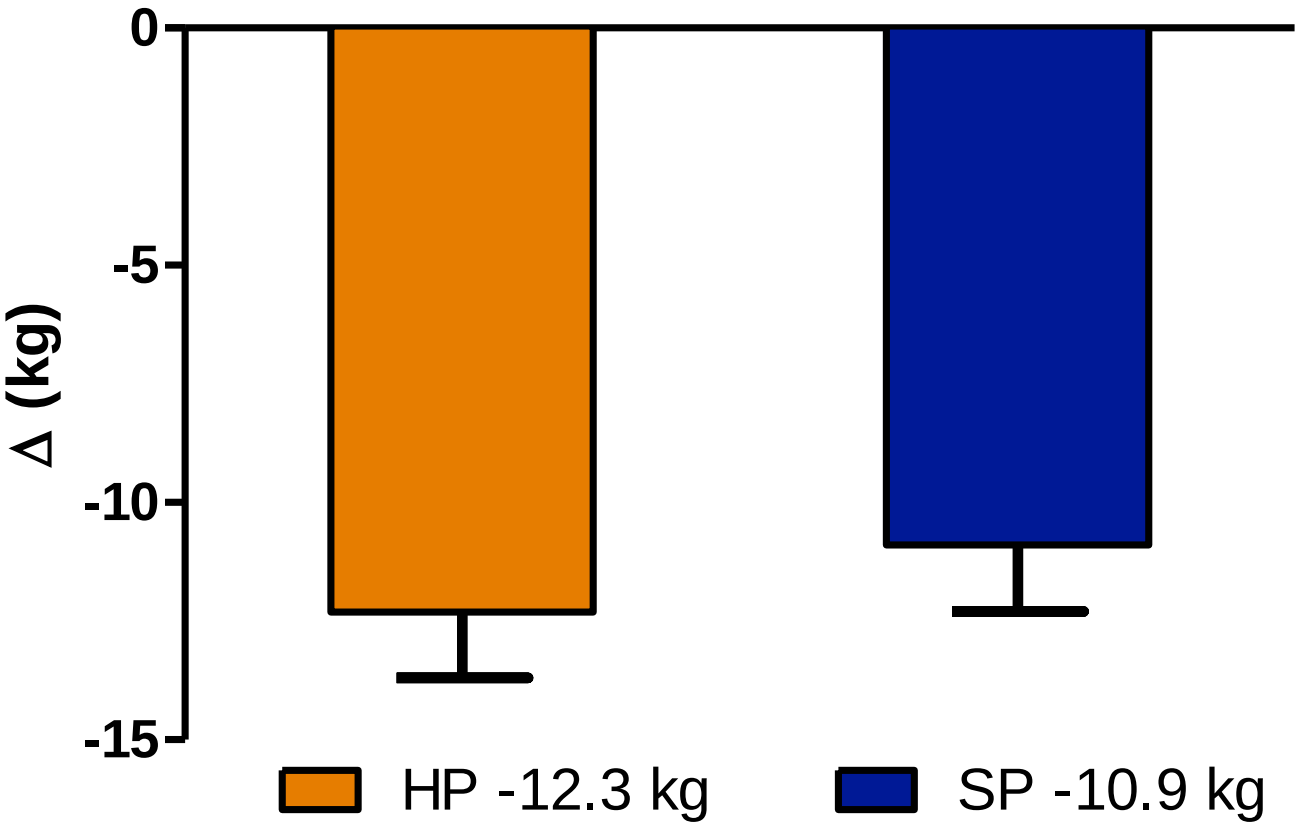
Time: P≤0.01 Time x Group: P≥0.14

Wycherley TP, Brinkworth GD, Clifton PM, Noakes M. Nutr Diabetes. 2012

Body Weight

Time: P<0.001 significantly different from Week 0

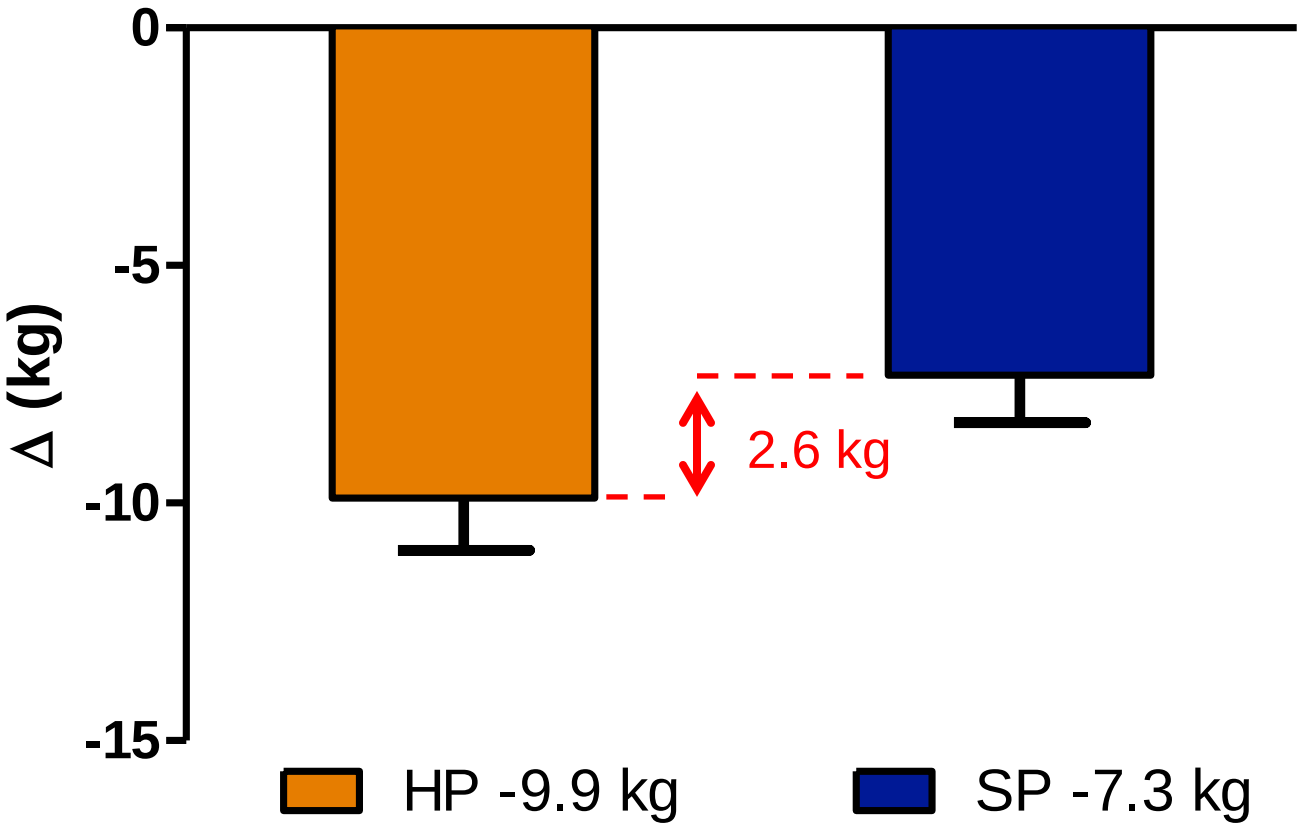
Time x Group: P=0.83



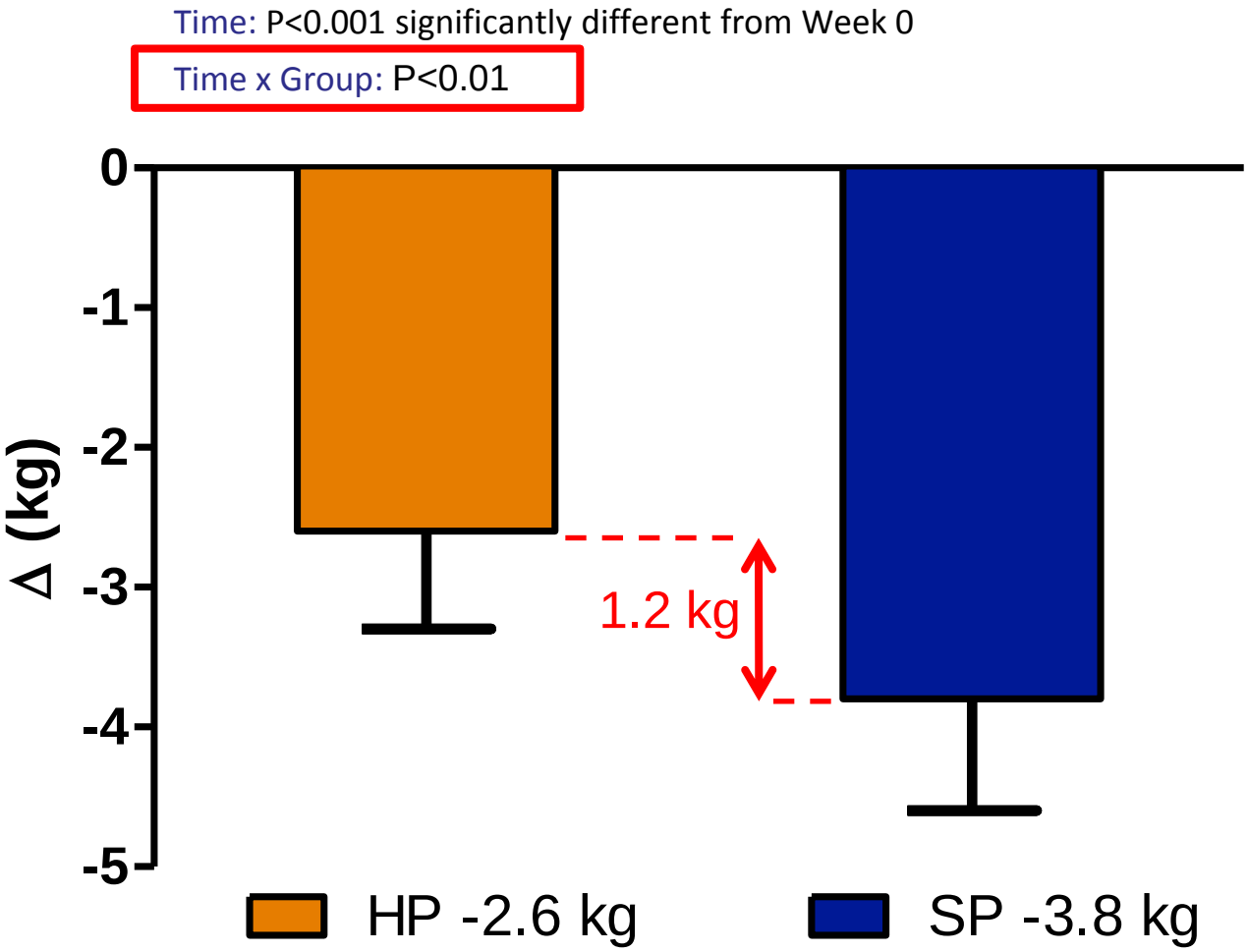
Total Body Fat Mass

Time: P<0.01 significantly different from Week 0

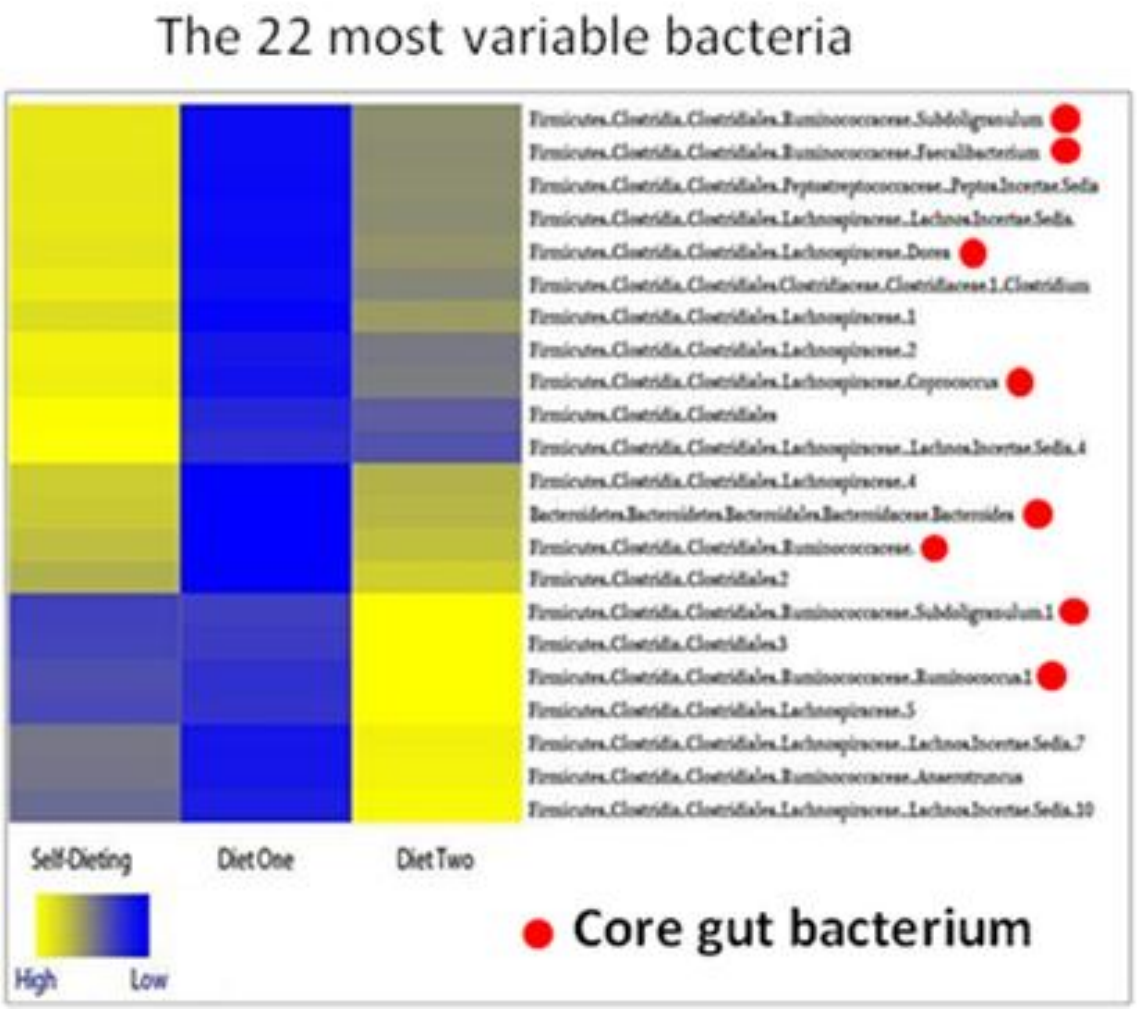
Time x Group: P=0.11



Total Body Fat Free Mass



Diet composition and the microbiome



•The gut communities are dominated by the phylum Firmicutes and there is no significant change between entry and week 12 on either diet.

•When we look at the 22 most variable bacteria we see discrete effects of the individual diets on bacterial members of the healthy human gut core microbiota.

•*Faecalibacterium prausnitzii*, a purported sentinel of gut health that can produce a potent anti-inflammatory, is reduced in abundance on diet 1 as compared to diet 2.

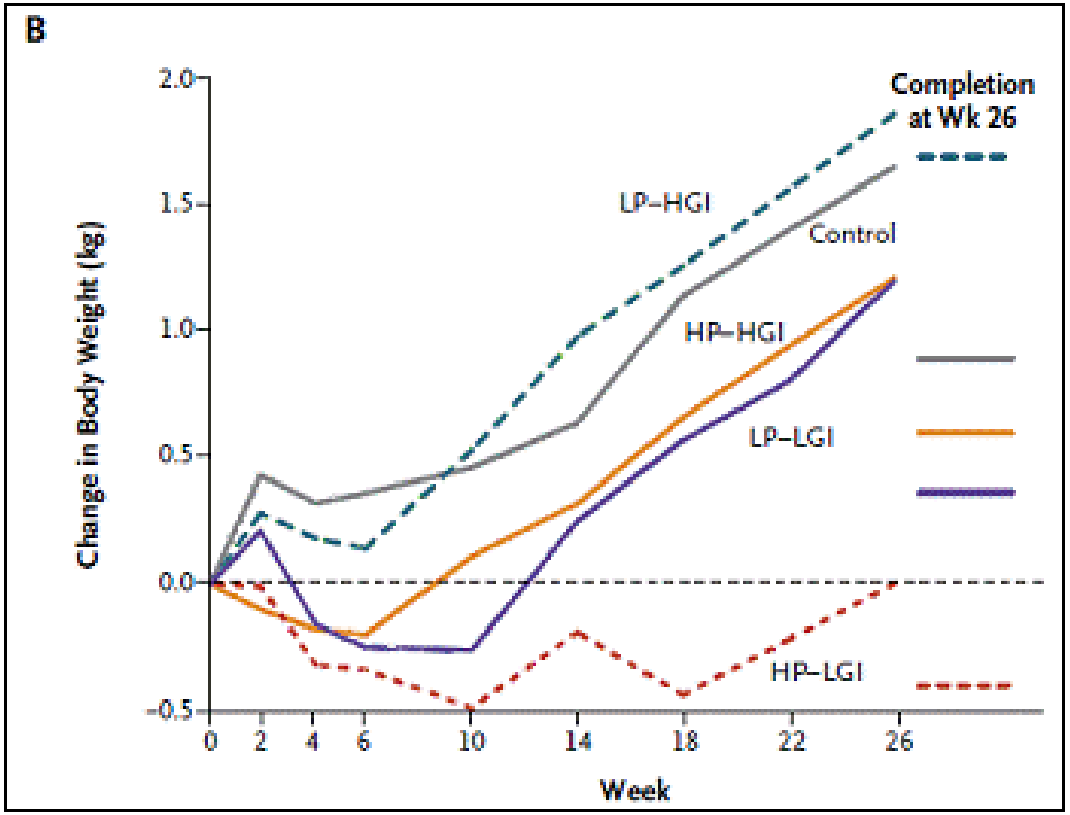
Cardiometabolic effects of energy-restricted high-protein compared with high carbohydrate diets: a meta-analysis of randomized controlled trials.

Wycherley et al Am J Clin Nutr. 2012

24 weight-loss trials (n= 1063) that compared isocaloric diets matched for fat intake but differed in protein and carbohydrate.

HP diet produced more favorable changes in:
- body weight (-0.79 kg)
- fat mass (FM; -0.87 kg)
- triglycerides (-0.23 mmol/L)
- mitigation of reductions in lean mass (+0.43 kg)
- resting energy expenditure (REE +595.5 kJ/d)
- Greater satiety with HP in 3 of 5 studies

Higher protein moderate carb low GI diet - most effective in maintenance of weight loss



22% protein
32% fat
43% carbohydrate
22g fibre
56 GI units

Larsen et al N Engl J Med. 2010 Nov 25;363(22):2102-13.

Controversy - Safety of High Protein Diets

Why the concern re high protein diets?

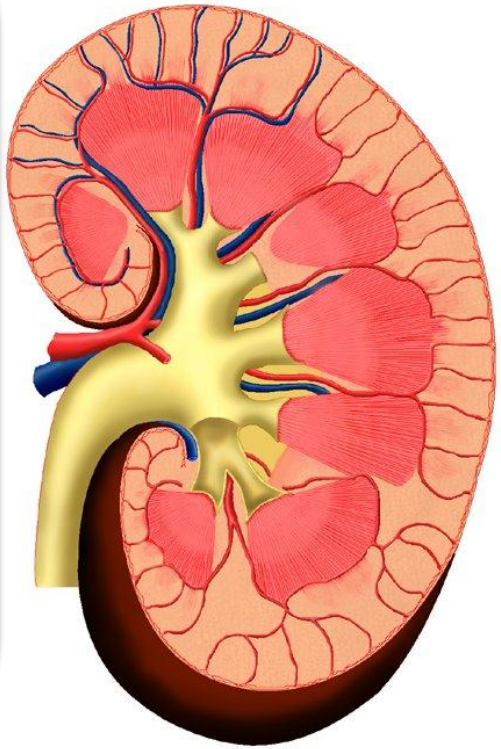
- No UL (Upper Limit for protein not defined)
- Nutrient Reference Values suggest <25% energy
  - (ie 132g to 156g for an average man and woman respectively)
- Most high protein diets contain less than these amounts

Renal effects of high-protein versus high carbohydrate weight loss diets

Friedman et al Clin J Am Soc Nephrol. 2012

307 obese adults without serious medical illnesses were randomly assigned to a low-carbohydrate high-protein or a high carbohydrate weight-loss diet for 24 months.
Main outcomes – markers of renal function.

CONCLUSIONS:
In healthy obese individuals, a low-carbohydrate high-protein weight-loss diet over 2 years was not associated with noticeably harmful effects on GFR, albuminuria, or fluid and electrolyte balance compared with a low-fat diet.

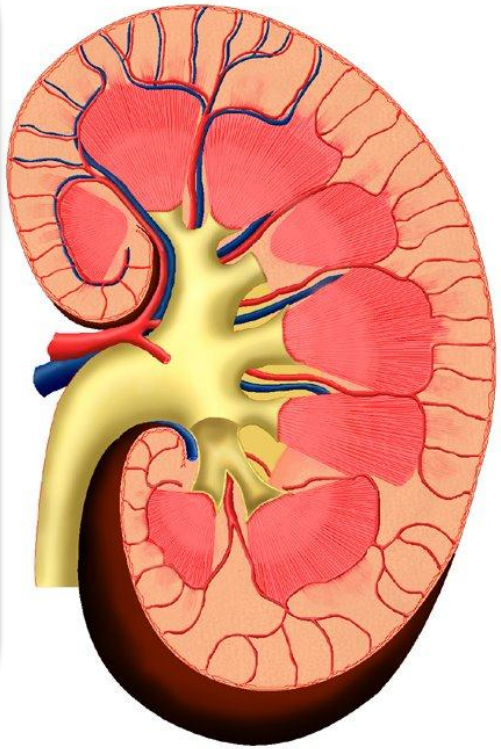


High-protein diet for weight loss – no adverse effects on renal function

Clifton et al Am J Clin Nut. 2013

Impact high protein vs high carb diets on renal function over 12 mo in 45 people with type 2 diabetes and early renal disease.

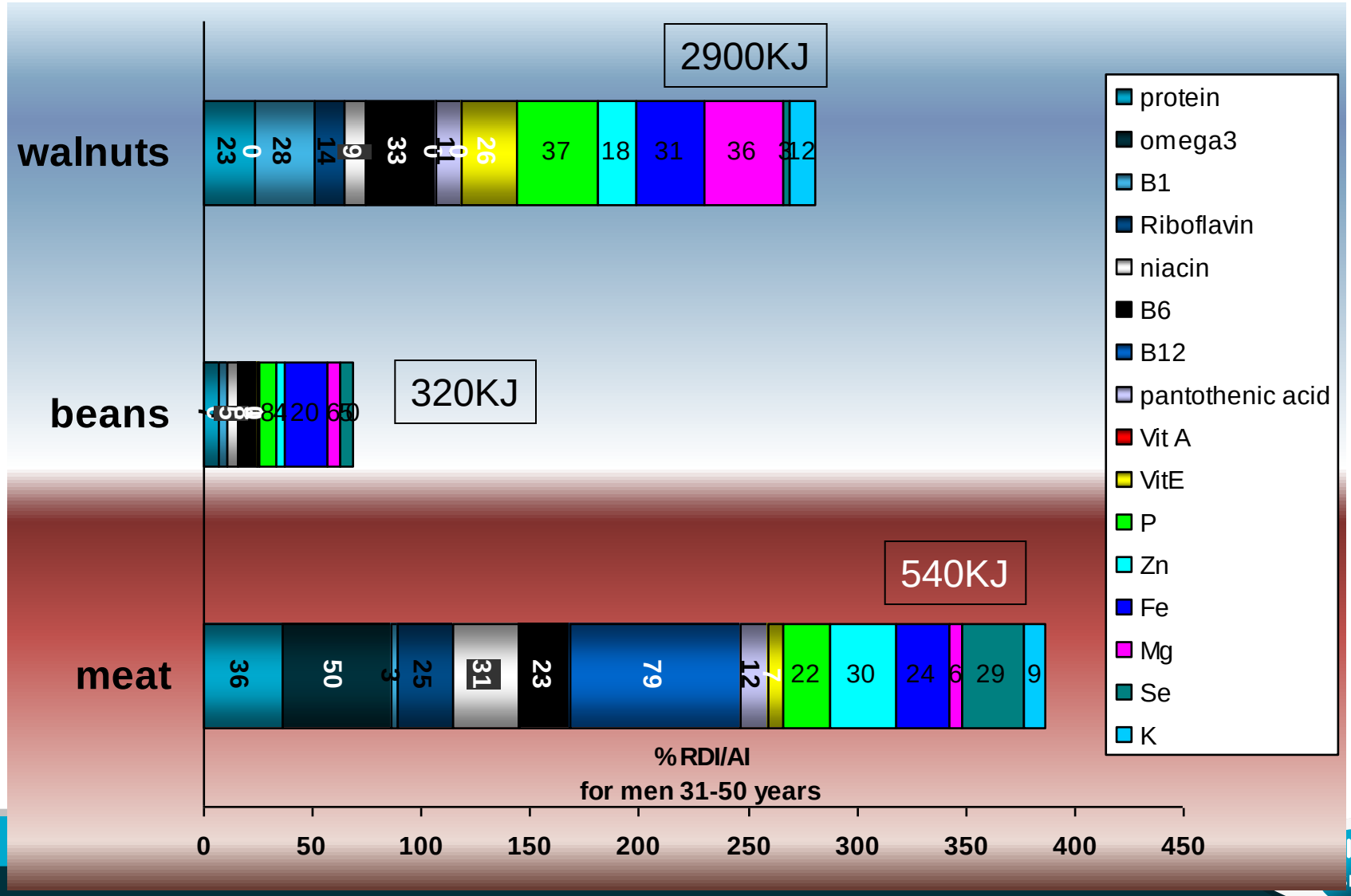
CONCLUSIONS:
After adjustment for weight loss, the baseline GFR remained a significant predictor of outcomes with no effect of dietary treatment.
An average difference in protein intake between diets of 19 ± 6 g/d was achieved.
Weight loss improved renal function, but differences in dietary protein had no effect.



Protein foods – nutrition & sustainability

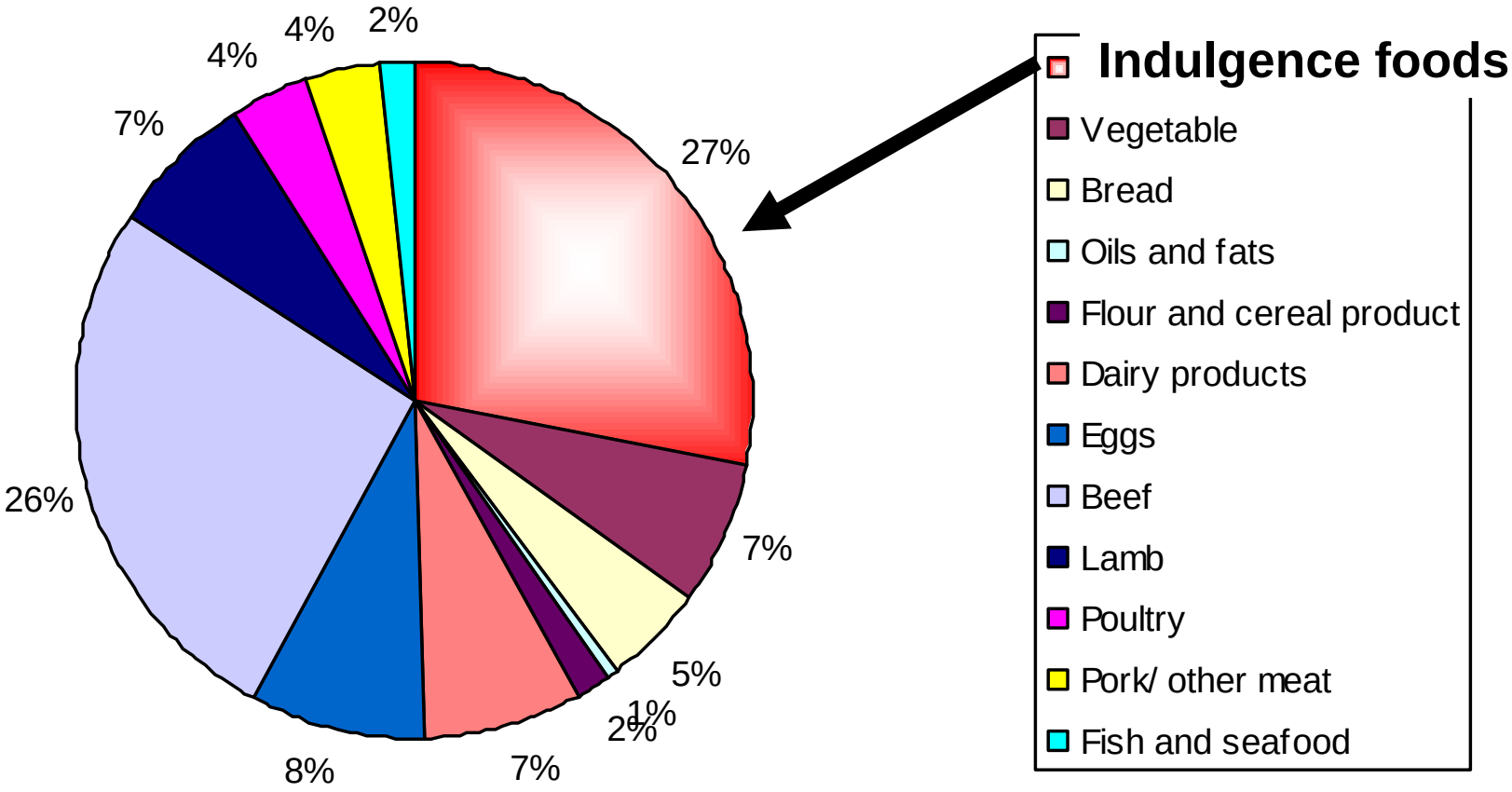
Protein *Foods* – More than protein

Nutrients per 100g



Food related emissions in the Average Australian Diet

Proportion of food related GHG emissions



TOTAL 5043 X 1000 kg C02e

Summary Points

High protein low GI diets for weight management have supportive evidence for dietary pattern of choice for weight management.

Protein foods are nutrient dense and need to be consumed as part of a balanced dietary pattern.

For western economies, reduction in environmental footprint and health improvements can be achieved readily without overly limiting nutrient dense protein foods in the diet by

- Wasting less food
- Eating fewer non nutritious foods (primarily refined carbohydrates)

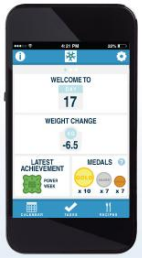

https://www.totalwellbeingdiet.com/12-week-prog
MSN Australia | Hotmail, Outlo...
How the Diet Plan Works | ...
Page
Safety
Tools
CSIRO
TOTAL WELLBEING DIET
THE DIET
12 WEEK PROGRAM
BASED ON SCIENCE
HEALTH BENEFITS
REGISTER
LOGIN
How the CSIRO Diet Plan Works
4:54 PM
26/04/2015

impromy™

WEIGHT LOSS PROGRAM

Developed in collaboration with CSIRO

- High protein meal replacement program
- Point of care testing
- Face to face and app support
- Data capture on GuildCare
- Launched in 200 pharmacies Australia wide May 2014
- Ongoing R&D



Nutritionally Balanced Meals + Personalised App + Individual Consultant

Acknowledgements

Dr Grant Brinkworth
Dr Jane Bowen
Dr Peter Clifton
Dr Jennifer Keogh
Dr Emily Brindal
Belinda Wyld
Julie Syrette
CSIRO Clinical Research Unit
Dr Nathan O'Callaghan
Pennie Taylor
Gemma Williams
Dr Gary Wittert (Adelaide Uni)
Dr Lisa Moran (Adelaide Uni)
Dr Paul Foster

Dr Tom Wycherley (UniSA)
Dr Jon Buckley (UniSA)
Dr Ian Saunders (CMIS)
Dr Jill Freyne (ICT)
Dr Shlomo Berkovsky (ICT)
Mac Coombe (ICT)
Dr Greg Smith (ICT)
Dr Gilly Hendrie
Dr Karma Pearce (UniSA)
Prof. Rob Norman (Adelaide Uni)
Xenia Cleanthous
Dr Michael Fenech

Thank you