Higher protein, low GI diets – evidence and practical considerations

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CAFHS and SAF Workshop – Sustainable diets

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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

Intake of total protein, plant protein and animal protein in relation to blood pressure: a meta-analysis of observational and intervention studies.

Tielemans et al J Hum Hypertens. 2013

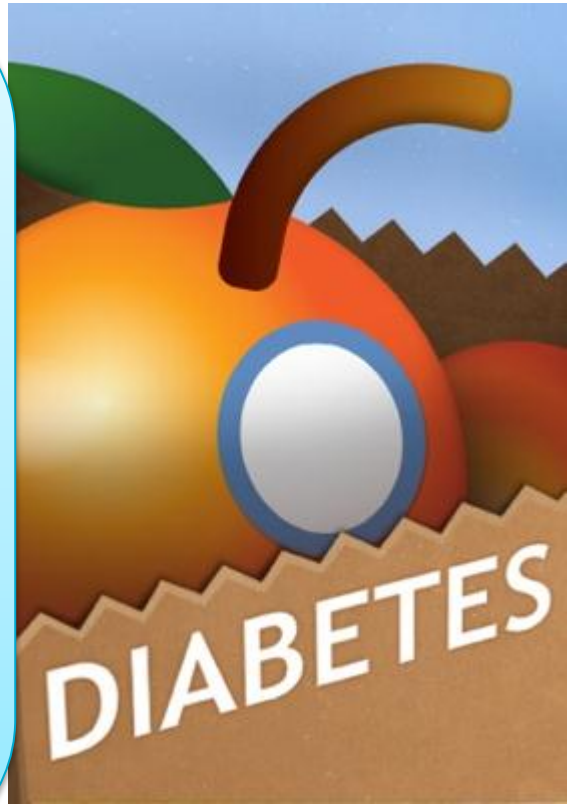
8 cross-sectional studies (n=48 985),
4 prospective studies (n=11 761)
and 17 RCTs (n=1449).
For RCTs that used carbohydrate as a control, the pooled BP effect was -2.11 mm Hg systolic for contrast in protein intake of 41g/d.
Associations of plant protein and animal protein with BP were broadly similar.
Increasing protein at the expense of carbohydrates may have a SMALL beneficial effect on BP independent of protein source.

Systematic review and meta-analysis of different dietary approaches to managing type 2 diabetes.

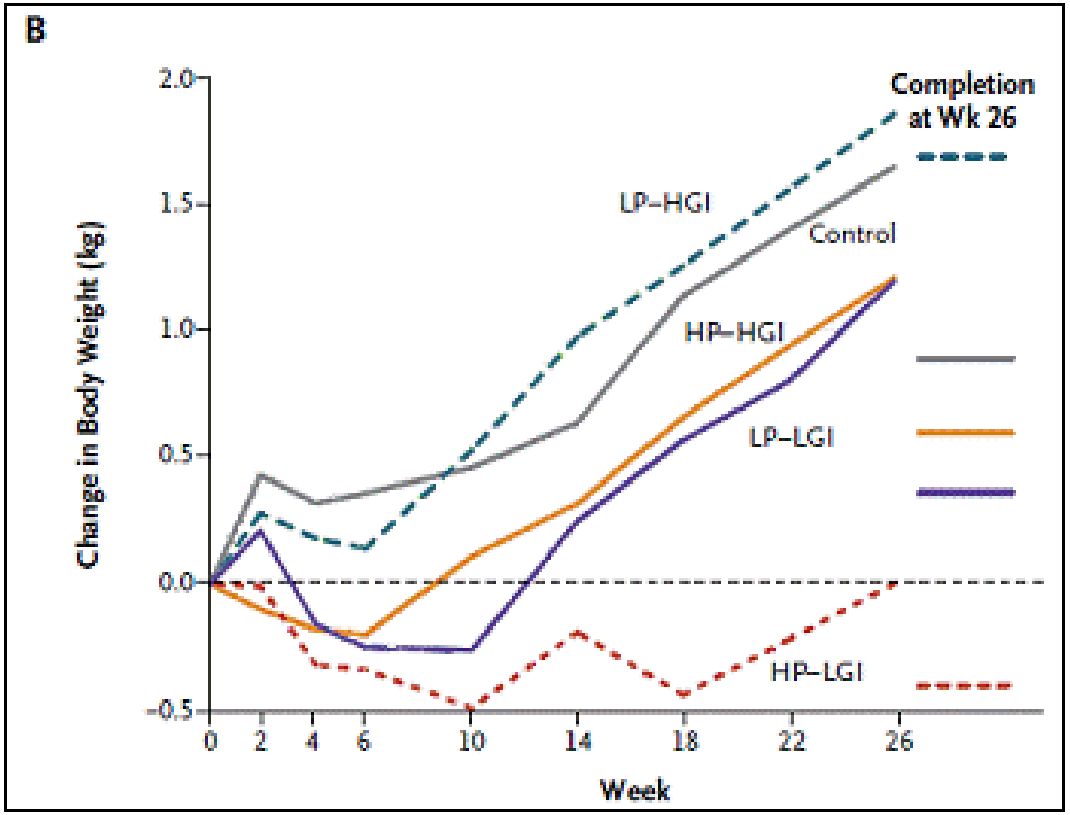
Ajala et al AJCN 2013

20 RCTs ≥6 mo (n = 3073) comparing low-carbohydrate, vegetarian, vegan, low-glycemic index (GI), high-fiber, Mediterranean, and high-protein diets with control higher carbohydrate diets.
The low-carbohydrate, low-GI, Mediterranean, and high-protein diets all led to a greater improvement in HbA1C -0.12% (P = 0.04), -0.14% (P = 0.008), -0.47% (P < 0.00001), and -0.28% (P < 0.00001), respectively].

Low-carbohydrate, low-GI, Mediterranean, and high-protein diets effective in improving glycaemic control in the overall strategy of diabetes management.



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.

RESIST Trial – High Protein vs High Carb in obese adolescents

Garnett et al J Clin Endocrinol Metab. 2013

Context:Prediabetes and clinical insulin resistance in adolescents are rapidly emerging clinical problems with serious health outcomes.

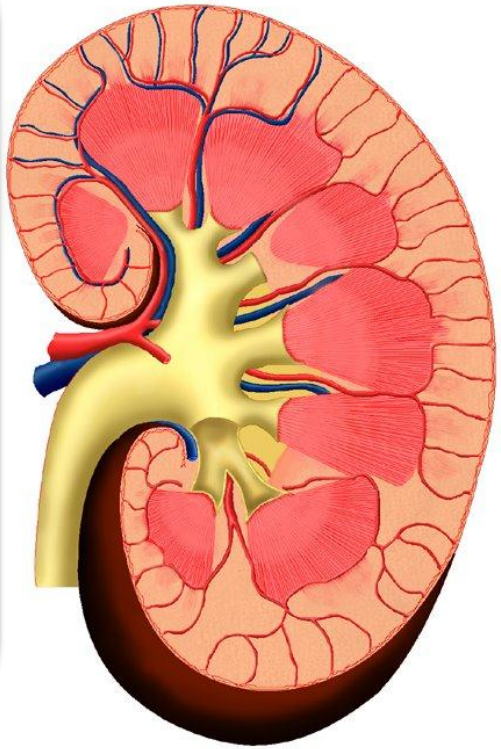
- Efficacy of 2 structured isocaloric lifestyle interventions, differing in protein/carb composition on insulin sensitivity in metformin treated adolescents.
- 98 subjects (58 girls) completed the 6-month intervention.
- After 6 months the mean insulin to glucose ratio decreased by 7.2% and BMI decreased by 9%
- Both dietary patterns effective with no significant differences in outcomes between the diet groups

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

Friedman et al Clin J Am Soc Nephrol. 2012

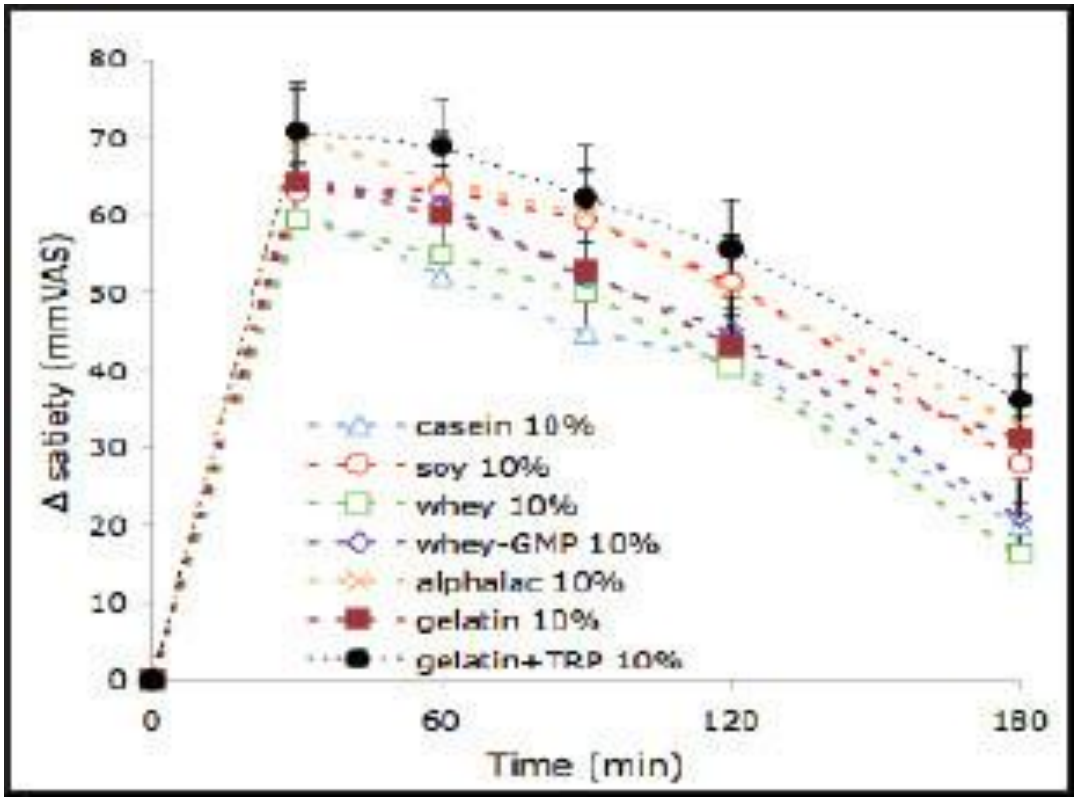
307 obese adults without serious medical illnesses were randomly assigned to a low-carbohydrate high-protein or a high carbohydrate weight-loss diet for 24 months.
Main outcomes – markers of renal function.

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.



Protein ingredients and acute satiety

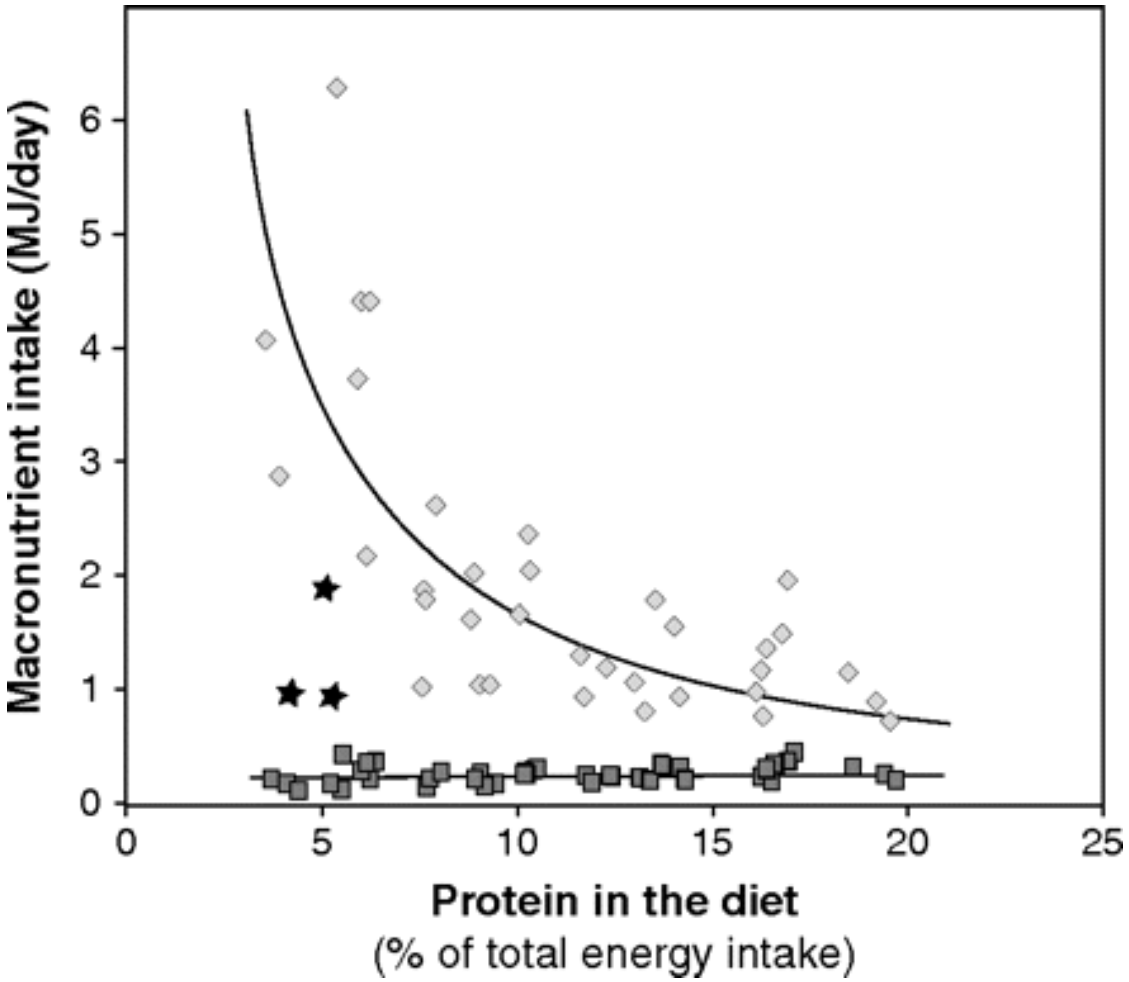
Veldhorst et al. Clin. Nutr. 2009



Satiety (3hrs) and food intake was significantly higher after breakfasts containing - gelatin, gelatin plus tryptophan, or alpha-lactalbumin.

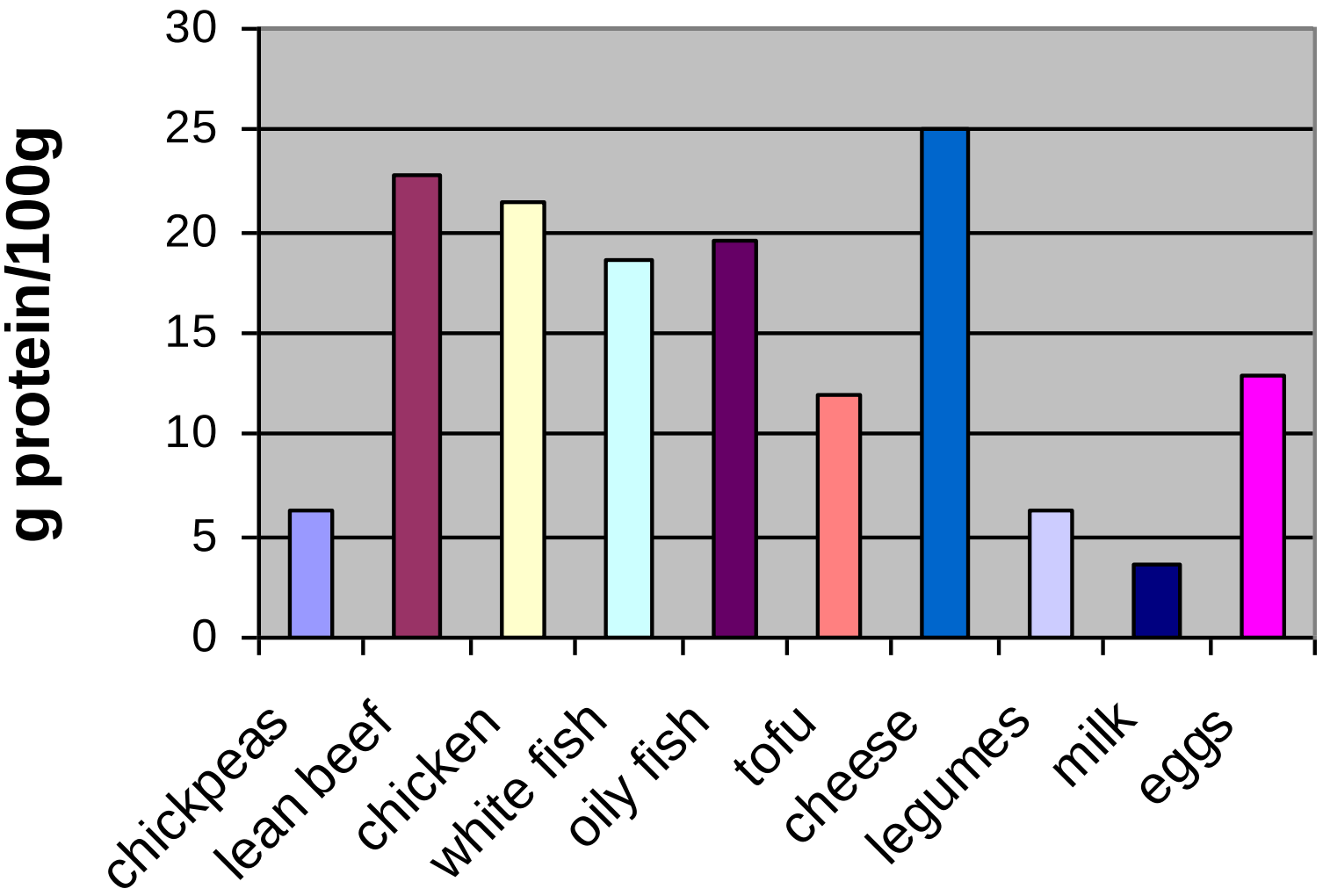
> Satiety with non essential AA?

Protein Leverage Hypothesis



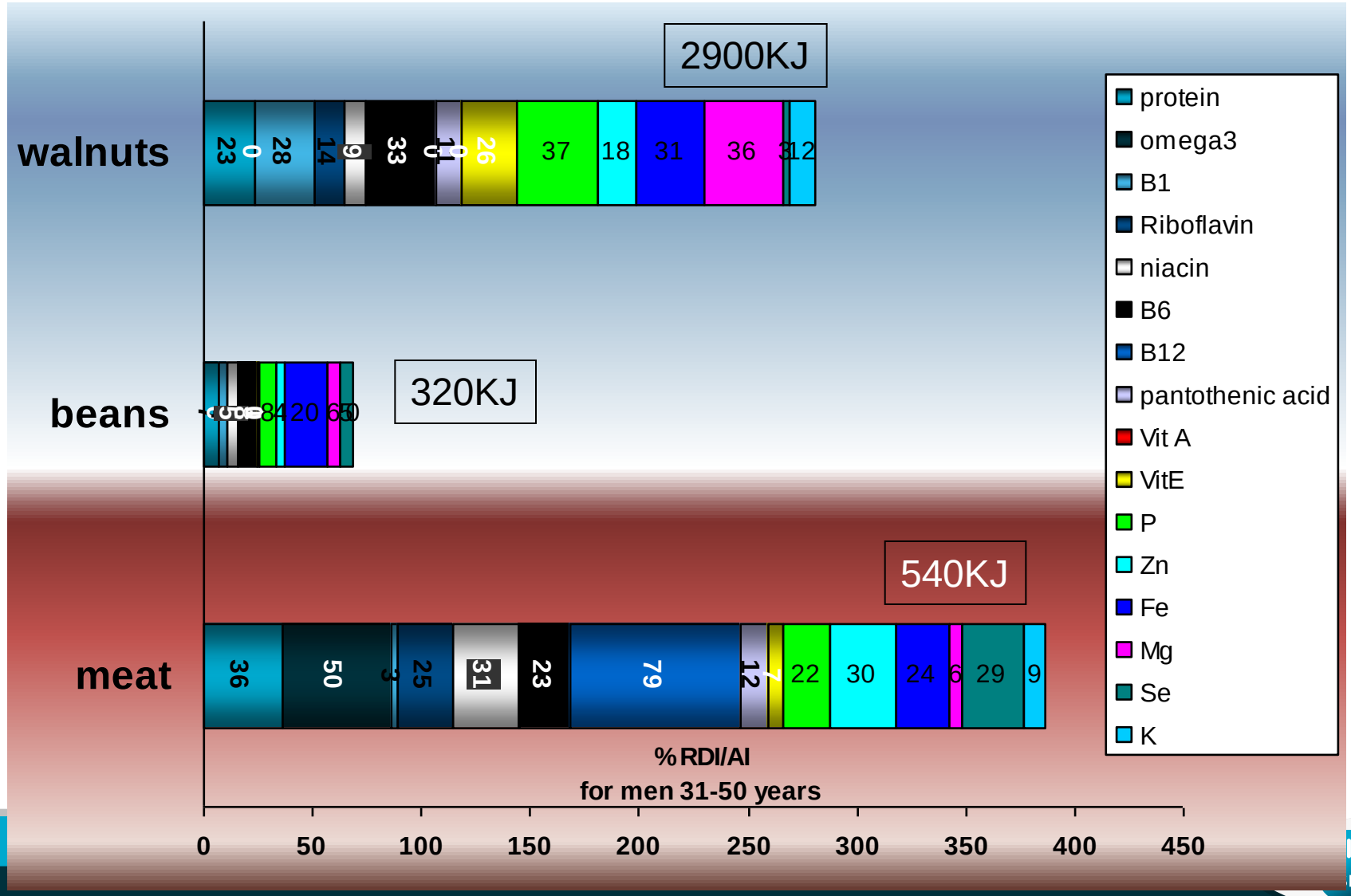
Felton, A.M., Felton, A., Raubenheimer, D., Simpson, S.J., et al. (2009) *Behavioral* Ecology, 20,685–690.

High Protein Foods



Protein *Foods* – More than protein

Nutrients per 100g



How Much Protein Do We Eat?

HIGHER PROTEIN DIETS

Protein consumed in Australia (grams per day)

Males	5th %	50th %	95th %
19-30y	**77**	**115**	**186**
31-49y	**79**	**107**	**155**
50-69y	**63**	**96**	**144**
Females			
19-30y	**47**	**74**	**120**
31-49y	**50**	**73**	**107**
50-69y	**47**	**70**	**101**

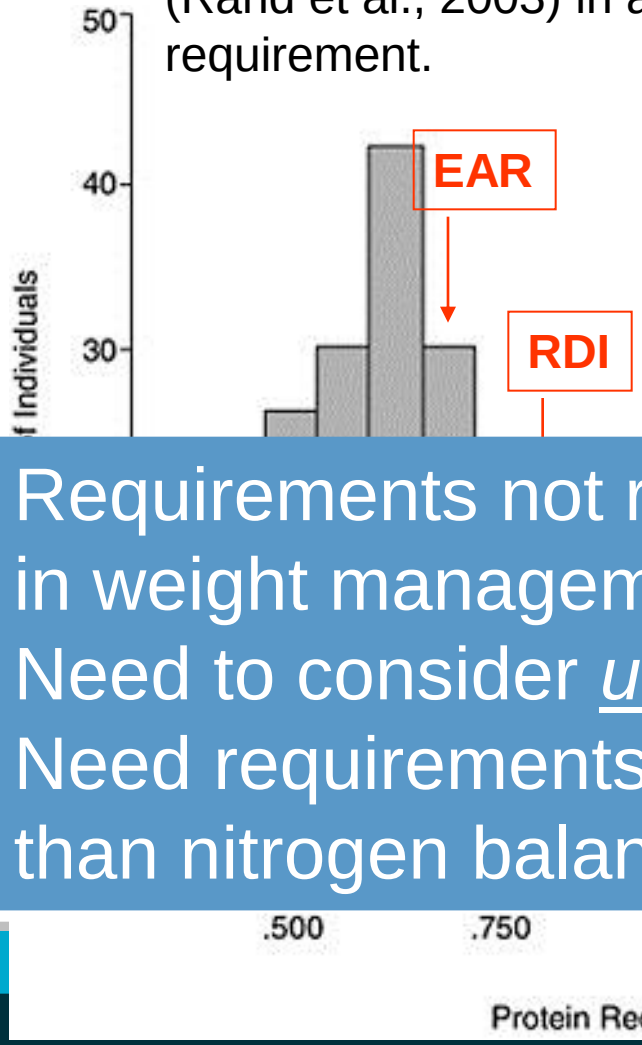
RDI Women
46 g/d(19-70 y)
58g /d(>70 y)

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

Source : NNS 95

Estimates of Protein Requirements

Distribution of the estimated protein requirements for 225 individuals (Rand et al., 2003) in a trimmed data set showing the skewness of protein requirement.



Estimated average requirement (EAR)
=0.66g /kg/day good quality protein

Recommended Dietary Intake (RDI)
=0.83g/kg/day

Requirements not relevant to energy restriction in weight management

Need to consider *utilisable* protein

Need requirements for *optimal health* rather than nitrogen balance alone

Foundation diets to meet nutrient needs are high in protein

Foundation Diets for women 19-50 years designed to attain RDI for each age group within energy needs of the smallest (150cm) and very sedentary (PAL = 1.4)

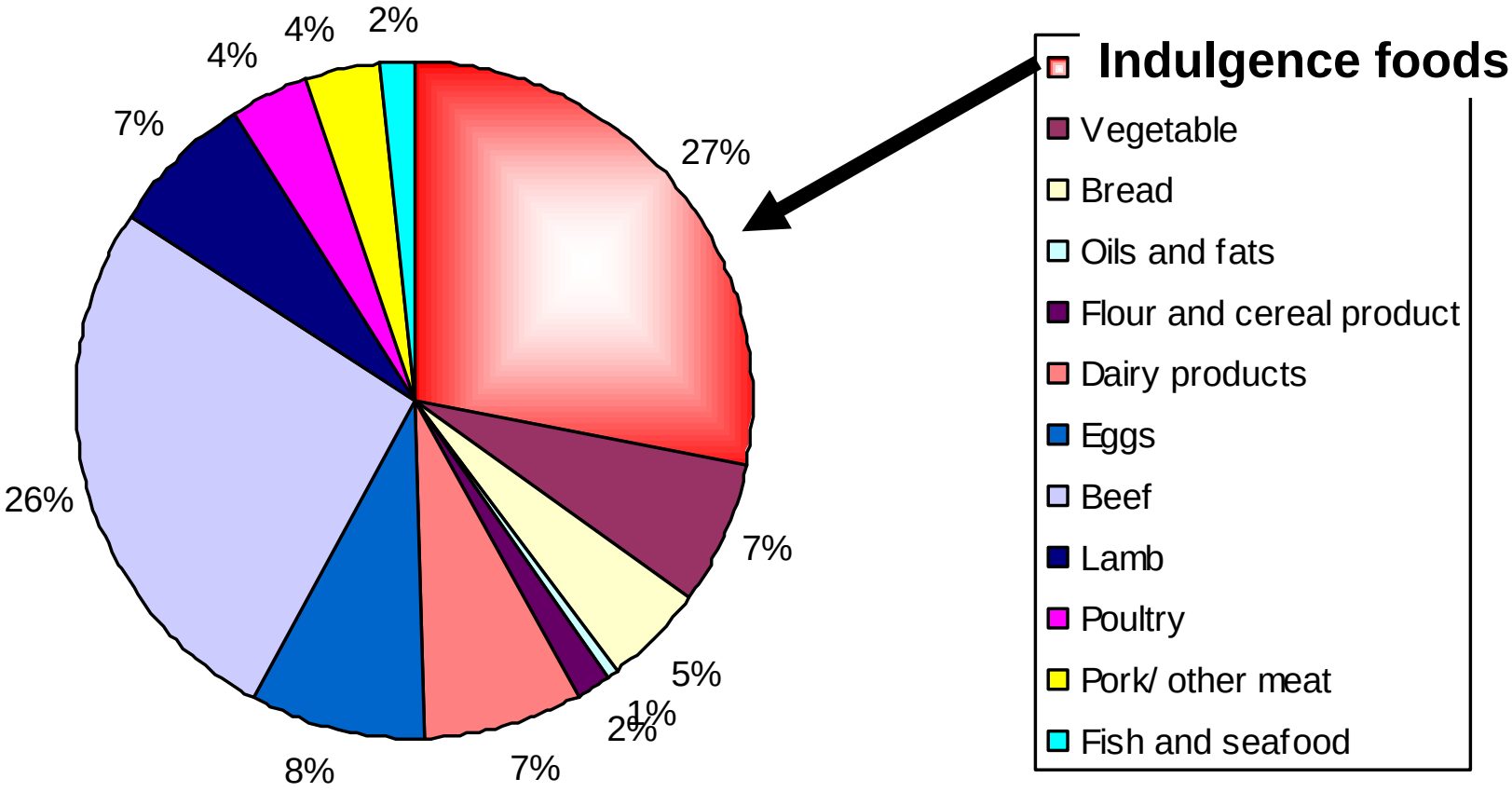
Protein foods 2.5 servers = 45g
Grain foods = 5 serves = 15g
Dairy = 2.5 serves = 25g
Veg/fruit = 5 serves = 10g
Fruit 2 serves = 2g
TOTAL PROTEIN = >90g

Recommended average daily number of serves								
			Fruit	Grain (cereal) foods, mostly wholegrain, such as breads, cer rice, pasta, noodles, polenta, couscous, oats, quinca and bar	Lean meat and poultry, fish, egg nuts and seeds, and legumes/be	Milk, yoghurt, cheese and/or alternatives (mostly reduced fat)	Approx. number of additional serves from the five food grou or discretionary choices
			2	6	3	2½	0–3
			2	6	2½	2½	0–2½
	70+	5	2	4½	2½	3½	0–2½
Women	19–50	5	2	6	2½	2½	0–2½
	51–70	5	2	4	2	4	0–2½
	70+	5	2	3	2	4	0–2
Pregnant	(19–50)	5	2	8½	3½	2½	0–2½
Lactating	(19–50)	7½	2	9	2½	2½	0–2½

Protein foods – sustainability

Food related emissions in the Average Australian Diet

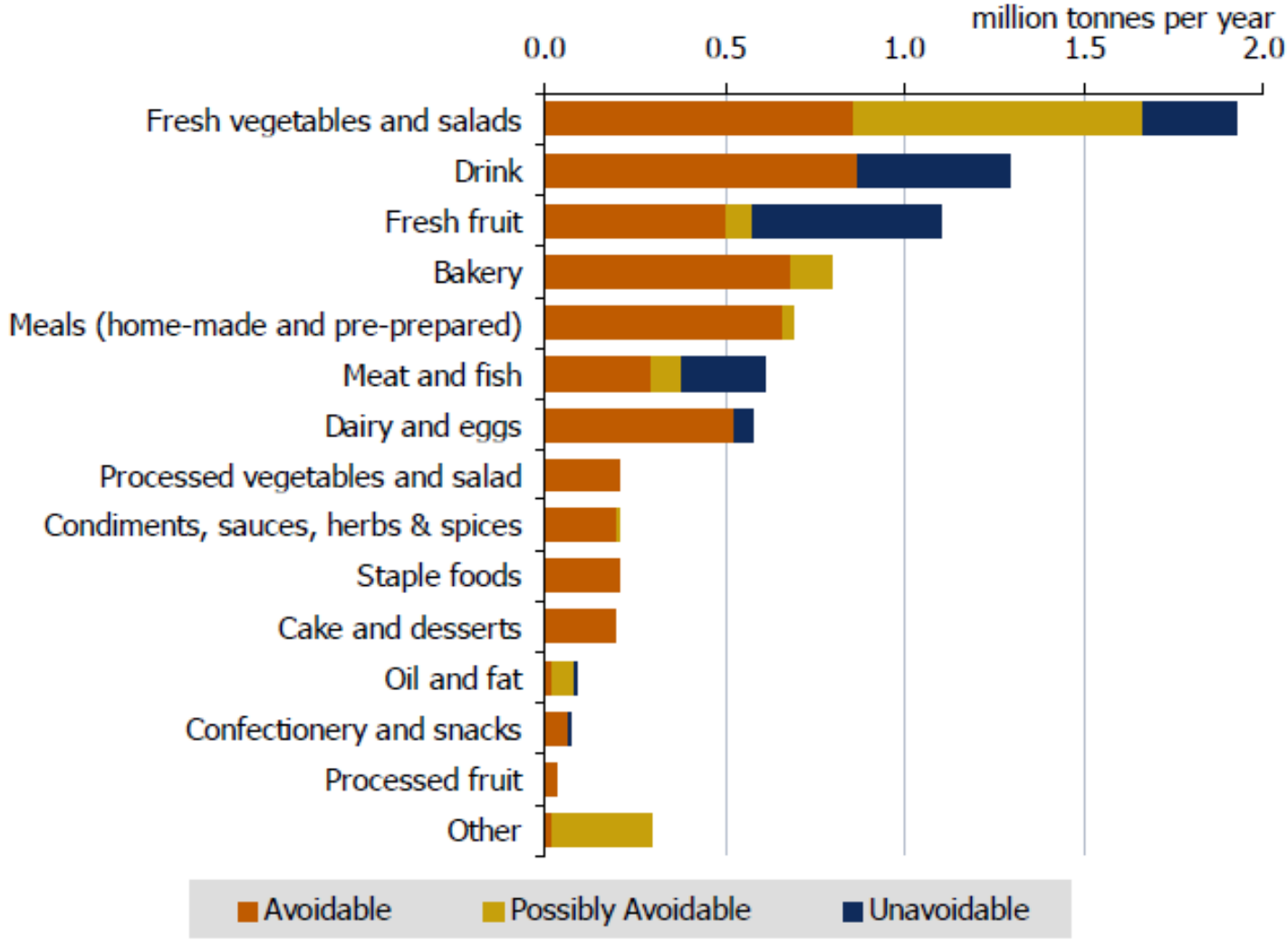
Proportion of food related GHG emissions



TOTAL 5043 X 1000 kg C02e

Food Waste

Figure 11: Weight of food and drink waste by food group, split by avoidability



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)

Thank you